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Quantum Mechanics: The Existential Crisis
(Eigenspace of the Position Operator is Not Unique)
(Position and Momentum Operators in QM Cannot Coexist)
(If Light Consists of Photons E=hf, Light Cannot Exist)
(Heisenberg Uncertainty Shenanigans Cannot Exist)

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Abstract—Quantum Mechanics (QM) is suffering from a genetic existential crisis. The existence crisis of QM originates from its foundational assumptions that a particle behaves as a wave and the position operator is position itself, **X**=x**I**. QM has no existence without these two assumptions, yet these two assumptions are mutually contradictory and cannot coexist. The position operator cannot be the position itself if a particle is assumed to behave as a wave. Conversely, a particle cannot be assumed to behave as a wave if the position operator is the position itself. The eigenspaces of all the operators must be unique for the existence of QM, yet the eigenspace of the position operator **X**=x**I** is not unique and hence QM cannot exist. Heisenberg Uncertainty cannot exist since the eigenspace of the position operator **X**=x**I** is not unique. For QM to exist, the energy must be given by energy quanta E=hf, yet energy cannot come in quanta E=hf since frequency has no independent existence. For energy to come in quanta E=hf, the amplitude of a wave must depend on the frequency, but frequency has no existence without amplitude. The amplitude of a wave cannot be determined by its own frequency. The existence of chicken cannot be determined by eggs since there are no eggs without chickens. Waves have no existence if E=hf. There will be no light if light consists of photons or quanta of energy E=hf. Energy must depend on the amplitude since frequency has no existence without amplitude. If energy comes in quanta E=hf, the energy of even the narrowest band wave will be infinite. Energy of a wave cannot be infinite and hence energy cannot come in quanta E=hf. If the position and momentum are probabilistic, particles cannot be assumed to behave as waves. The position and momentum must be deterministic for a particle to be assumed to behave as a wave. If the position is probabilistic as QM claims, its derivative operator has no existence, and hence the momentum operator cannot exist. QM cannot exist. Light cannot consist of photons E=hf. Heisenberg Uncertainty cannot exist.

If a particle is assumed to behave as a wave, the legitimate position and momentum operators must be mirror symmetric. The position operator must be obtainable from the momentum operator simply by exchanging the position and momentum. If a particle is assumed to behave as a wave, the momentum operator is given by the derivative with respect to the position, and the position operator must be given by the derivative with respect to the momentum, and they commute. The legitimate operators commute. There is no QM with legitimate operators.

If a particle is assumed to behave as a wave, all the operators, including the position operator, are given by the particle wave itself. All the operators that are given by or agree with the assumption that a particle behaves as a wave are unique and commutative. However, this is not the case if the position operator is speciously defined to be position itself, **X**=x**I**, which is different from what the position operator should be if a moving particle is assumed to behave as a wave. Without the unconscionably defined position operator **X**=x**I**, which is in contradiction with the momentum operator and the particle wave assumption, there would be no QM.

The position operator is naturally prohibited from being the position itself by the momentum operator and the assumption that a particle behaves as a wave. The position and momentum operators in QM are mutually contradictory and they cannot coexist. It is the invalid choice of the position operator as the position itself, which contradicts the particle wave assumption and the momentum operator, that gave birth to QM turning physics into voodoo-physics. The position operator cannot be the position itself.

In QM, although the eigenspace of the momentum operator is unique, the eigenspace of the position operator is not unique by its very definition as the position itself **X**=x**I**. The eigenspace of any Hermitian operator is also a legitimate eigenspace of the position operator **X**=x**I**. Hence, the wave function is not unique, and the observables are not unique. For QM to be a valid theory, all the operators must have unique eigenspaces. QM is not a valid theory since the eigenspace of the position operator **X**=x**I** is not unique.

The claim in QM that the position and momentum of a particle are probabilistic is in direct conflict with its fundamental assumption that a moving particle behaves as a wave. A particle cannot be assumed to behave as a wave if the position and momentum are probabilistic. Conversely, the position and momentum cannot be probabilistic if a particle is assumed to behave as a wave. The position and momentum must

be continuous for a particle to be assumed to behave as a wave, and hence position and momentum must be deterministic. If the position is probabilistic, the derivative operator is undefined, and hence the momentum operator has no existence; without the momentum operator, QM has no existence.

QM is also invalid in its assumption that the energy comes in quanta $E=hf$. For energy to be given by quanta $E=hf$, frequency must have an independent existence. Frequency has no independent existence. Frequency has no existence without amplitude. If energy comes in quanta $E=hf$, the amplitude has to be determined by frequency, which is impossible since frequency has no existence without amplitude. The energy cannot come in quanta $E=hf$, and hence QM has no existence. Energy must depend on the amplitude. Frequency has no energy unless the frequency is converted to energy.

If the energy comes in quanta $E=hf$, the energy of even the narrowest band wave would be infinite since there are infinitely many discrete frequencies within a frequency band. Energy of a bandlimited wave cannot be infinite and hence energy cannot come in quanta $E=hf$. The energy quantum $E=hf$ is meaningless since the frequency of a wave has no energy and frequency has no existence without amplitude. QM cannot exist.

QM represents the observables by operators under the assumption that a moving particle behaves as a wave. To represent observables by operators, every operator must have a unique eigenspace. If the operator of an observable does not have a unique eigenspace, the observable is not determinable. For QM to be a valid theory, the eigenspaces of all the operators must be unique. But, the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is not unique and hence the observables are not uniquely determinable in QM.

The definition of the position operator as the position itself, $\mathbf{X}=x\mathbf{I}$, is a direct violation of the primary assumption that a particle behaves as a wave. The definition of the position operator as the position itself also contradicts the momentum operator. There is no QM without the contradictory, illegitimate definition of the position operator as position itself, $\mathbf{X}=x\mathbf{I}$. The main reason for the non-commutation of the position and momentum operators is the invalid forcing of the position operator to be the position itself. There is no non-commutation between the legitimate operators that are derived from or in agreement with the particle wave assumption or the momentum operator.

There is no QM without the specious definition of the position operator as the position itself. The illegitimate position operator $\mathbf{X}=x\mathbf{I}$, without which QM has no existence, brings QM its own demise at its very foundation. If the position operator is chosen to be the position itself, the eigenspace of any Hermitian operator is also an eigenspace of the position operator. The eigenspace of the momentum operator is also an eigenspace of the position operator. Both the position and the momentum operators have a shared eigenspace, and hence the position and the momentum are simultaneously measurable in QM.

The Heisenberg Uncertainty Principle requires the position and momentum to be a Fourier transform pair. For the position and the momentum to be a Fourier transform pair, it is necessary for the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ to be given by the delta function, but it is not sufficient. The eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ given by the delta function must also be unique. Although the delta function is an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$, it is not the only legitimate eigenspace of the position operator, and hence, the position and the momentum cannot be a Fourier Transform pair even if one makes the false assumption that the position and momentum are mutually independent, which is also a necessary requirement for position and momentum to be a Fourier Transform pair.

For the position and momentum to be a Fourier transform pair, a particle must have multiple momenta for a given position, and multiple positions for a given momentum simultaneously, which requires the position and momentum to be mutually independent. The position and momentum of a particle are not mutually independent since a mass cannot have multiple positions for a given momentum, and multiple momenta for a given position simultaneously. A mass cannot be at multiple places simultaneously; to claim otherwise is voodoo-physics. QM is voodoo-physics. The whole Heisenberg Uncertainty shenanigans is false, a flimflam. There is no inherent uncertainty in the position and momentum. The precision of one has no effect on the precision of the other. Position and momentum are simultaneously measurable without any precision tradeoff to any achievable precision.

The wave function is a sequence of coordinates resulting from the projections of the state of a system onto the eigens-axes of the operator of an observable. However, the coordinates can be arranged in any order to form a sequence that represents the wave function. Since the reshuffling of the coordinates does not alter the state of a system, any wave function resulting from the reshuffled coordinates represents a valid wave function. Each and every reshuffling of the coordinates produces a new wavefunction for the same observable. As a result, the wavefunction of an observable in QM is not unique by its very definition.

For an observable with a unique eigenspace, an eigenvalue of the operator represents the observable if and only if the state of the particle overlaps the eigenvector of that eigenvalue. Since the eigenspace of the Hermitian operator of an observable represents an orthonormal coordinate system, the value of an observable at any general state is given by the Euclidean distance, the square root of the sum of the squares of all the projections of the state onto the eigenvectors of the observable. Observables have nothing to do with the eigenvalues unless the state overlaps with an eigenvector/eigenfunction. An object is never in all the axes simultaneously in any orthonormal representation, which is evident from 3D.

Even though the wave function of an observable is not unique since the reshuffled wavefunction also represents a valid wavefunction, the value of the observable is unique since the observable is given by

Euclidean distance is unaffected by the order in which the coordinates are arranged or by the reshuffling of the wavefunction. Eigenspace representation of the state is deterministic. There is no probability involved in the orthonormal representation of the state of a system in the domain of an observable. The probability that has been unconscionably forced upon QM contradicts its foundational assumption that a particle behaves as a wave. If position and momentum are probabilistic, a particle cannot behave as a wave, and the momentum operator cannot be defined since the derivative does not exist. If a particle behaves as a wave, the position and momentum cannot be probabilistic, and vice versa.

Eigenvalues are not unique. Hence, eigenvalues cannot be used for parameter estimation except for cases where eigenvalues are complex and the information is in the phase, which is unique. It is only the eigenspace of a non-trivial Hermitian operator that is unique, and hence can be used to represent the state of a system in the domain of an operator. When the position operator is defined as the position itself, the eigenvalues as well as eigenvectors are not unique making QM invalid. QM has no validity as a theory when the eigenspace of even one of the operators is not unique. The eigenspace of the position operator, $\mathbf{X}=x\mathbf{I}$, is not unique, and hence QM is not a valid theory. If the position operator is $\mathbf{X}=x\mathbf{I}$, a particle cannot be assumed to behave as a wave.

The definition of the position operator as position itself contradicts the definition of momentum operator as the derivative with respect to the position, and it also violates the primary assumption in QM that a particle behaves as a wave. Every operator in QM must abide by the particle wave assumption that QM is based on. If a moving particle is assumed to behave as a wave, all its operators are predetermined by the particle wave itself; we do not have the freedom to define them. If a particle is assumed to behave as a wave, the position operator cannot be the position itself. If the position operator is assumed to be the position itself, a particle cannot be assumed to behave as a wave. There is no wave-particle duality.

Wavefunction that is not unique cannot exist. Wavefunction that is not unique cannot propagate. Wave function that is anchored to a mass cannot propagate. Propagation requires a conjugate pair that is not anchored to a mass or space. Wavefunction is single and has no conjugate partner, and it is anchored to a mass. Hence, a wave function cannot propagate. Wavefunction is not a wave. Wavefunction has no real existence since it is not unique.

Any field that has no conjugate partner is not a wave and cannot propagate. Only an electromagnetic field has a conjugate pair of fields, which makes it a propagating wave in space. Any wave that is anchored to an object of mass or space cannot propagate. A single field has no existence unless it is anchored to a source. A wave that has no conjugate partner cannot exist.

If the position and momentum of a particle are probabilistic, a particle cannot be assumed to behave as a wave. If a particle behaves as a wave, the position and momentum cannot be probabilistic. A wavefunction with probabilistic position or momentum is not a wave and cannot propagate. Particles cannot behave as waves. A wave that is anchored to a mass cannot propagate. It is only that a moving charge particle generates a conjugate pair of electromagnetic waves that propagate; these waves are not anchored to the charge particles that generated them; these waves are not particle waves.

A single field cannot exist without being anchored to a source. There cannot be a sourceless single field. No disturbance can be generated in a single field. Generation of a disturbance requires a conjugate pair of fields. Single fields such as a gravitational field and the Higgs field can neither be disturbed nor can propagate. Gravitational waves cannot exist since the gravitational field is single. Gravitons that are defined as the disturbances in a gravitational field cannot exist since there cannot be a disturbance in a single field. Gravity cannot be a wave. Gravitational field exists since it is anchored to a source. Gravity or gravitational field is the interaction between masses, and it exists between masses. A single mass has no gravity. A single mass has no gravitational field.

The Higgs field cannot be disturbed since it has no conjugate partner. Higgs bosons, which are defined as the disturbances in the Higgs field, cannot exist since the Higgs field that has no conjugate partner cannot be disturbed. A static field has no existence without a source. The Higgs field cannot exist as a static field even hypothetically since there is no Higgs source. The Higgs field cannot exist as a wave since it is single and has no conjugate partner. The Higgs field simply cannot exist in any form, neither as a static field nor as a wave.

A wavefunction that is not unique cannot be a probability distribution. The eigenspace representation is deterministic and has nothing to do with probability. A particle with probabilistic position and momentum cannot behave as a wave. A wavefunction with probabilistic position and momentum is not a wave. If the position and momentum of a particle are probabilistic, then the momentum operator as the derivative with respect to the position is undefined, and there will be no QM. Propagating waves that are subjected to attenuation cannot be probability distributions. Nature does not normalize.

The legitimate position and momentum operators, which are derived from the assumption that a particle behaves as a wave, commute. There is no QM with the legitimate operators that agree with the particle wave assumption since they commute. There is no QM with the legitimate position operator that agrees with the momentum operator since they commute. The specious and illegitimate position operator $\mathbf{X}=x\mathbf{I}$ does not belong in QM and there is no QM without the position operator $\mathbf{X}=x\mathbf{I}$. QM is pseudoscience. QM is a pseudo-theory that is being pseudo-justified by pseudo-experiments. Quantum Mechanics is fictitious.

If the momentum operator is given by the partial derivative with respect to the position, the position operator cannot be the position itself. The definition of the position operator as position itself is a direct contradiction to the momentum operator and to the assumption that a particle behaves as a wave. There is no Heisenberg Uncertainty Principle without the position operator being the position itself. But the position operator cannot be the position itself since it is strictly forbidden by the momentum operator, and the particle wave assumption.

The Heisenberg Uncertainty Principle in Quantum Mechanics cannot hold even if the position operator is incorrectly chosen to be the position itself since the eigenspace of the position operator is not unique. If a particle is assumed to behave as a wave, all the operators are predetermined by the particle wave itself, and all the legitimate operators are mutually commutative. When all the operators are mutually commutative, QM fails where it began. QM is a mathematical and logical folly even if a moving particle is falsely assumed to behave as a wave.

Particle wave assumption is meaningless. Particles are not waves. Waves are not particles. Wavefunction that is single cannot propagate. A single wave cannot propagate. Propagation requires a conjugate pair. If a moving particle is assumed to behave as a wave, position and momentum cannot be probabilistic and the position operator cannot be the position itself. There is no Heisenberg uncertainty. Quanta in physics have no identification headers. Quantum without an identification header cannot exist. Nothing in nature can come in quanta. Vectors cannot come in quanta. Vectors cannot be quantized.

Energy cannot come in energy quanta $E=hf$ since frequency has no existence without the amplitude of the wave. The biggest dilemma in the claim that the light comes in light quanta or photons of energy $E=hf$ is that it precludes the very existence of light itself. If $E=hf$, the amplitude must be determined by frequency, but that is not possible since there is no frequency without amplitude; chicken and egg dilemma. Which one came first? Chicken or egg? Amplitude of a wave cannot be determined by frequency and hence energy cannot come in quanta $E=hf$. Frequency has no energy. QM cannot exist even hypothetically. Quantum Mechanics and Heisenberg Uncertainty are a result of theoretical oversight. QM is QMP (Quantum Mechanics Pseudoscience).

Keywords—*Quantum Mechanics; Particle Waves; Energy; Planck; Eigenvectors; Momentum Operator; Wavefunction; Schrodinger; Heisenberg; Uncertainty; Eigenvalues; Einstein;*

I. INTRODUCTION

Lemma:

If energy is quantized as $E=hf$, the energy of even a narrowband wave will be infinite since there are infinite discrete frequencies between any two distinct frequencies in a continuous spectrum.

Lemma:

Frequency has no energy. Frequency has no independent existence. There is no frequency without amplitude and hence the energy must depend on the amplitude, and cannot be given by $E=hf$.

In 1901, Max Planck presented the blackbody spectrum that agrees with the data obtained through a small hole on a blackbody cavity under the assumption that the energy comes in energy quanta given by $E=hf$, where E is the energy quantum, h is considered to be a universal constant that bears his name (the Planck constant), and f is the frequency. Following the path of his blackbody predecessors, Planck derived the blackbody spectrum by analyzing the modes present in a cavity to describe the spectrum obtained through a hole in a cavity. The problem is, what is coming out through a hole on a blackbody is not just what is inside the cavity. It does not matter how small the hole is, what is coming out through a hole has a continuous spectrum whereas what is inside the cavity has a discrete spectrum.

You cannot obtain the continuous spectrum that matches the data through a hole on a blackbody cavity by analyzing the discrete spectrum inside the cavity. Planck's derivation of the blackbody spectrum is incorrect; it is cavity dependent [1]. The Planck spectrum for a spherical cavity is not the same as the Planck spectrum for a cubic cavity. Blackbody radiation is cavity independent. Planck's assumption that the energy comes in quanta given by $E=hf$ is meaningless. Frequency of a wave does not have energy. There is no frequency without amplitude and hence energy must depend on the amplitude, and cannot be given by $E=hf$.

If the energy comes in energy quanta $E=hf$, the energy of a continuous spectrum will be infinite even for a narrowband wave. With $E=hf$, the energy can only be finite for a discrete spectrum and hence it is clear why Planck spectrum was confined to a cavity; it suits the Planck spectrum well since the spectrum inside a cavity is discrete. The problem though is that when you drill a hole into the cavity, what is coming out through the hole does not have a discrete spectrum, and hence if $E=hf$, the energy of the continuous spectrum through a hole will be unbounded since there are infinitely many frequencies in any continuous spectrum [1]. More importantly, to represent the energy by $E=hf$, frequency must have an independent existence. frequency has no independent existence. Frequency has no existence without amplitude and hence energy must be a function of amplitude. Planck's relationship $E=hf$ cannot hold, $E \neq hf$. Wave propagation is not possible if energy comes in quanta $E=hf$.

In 1905, Einstein went one step further and made the arbitrary claim that light or electromagnetic waves also come in particles or photons of energy $E=hf$. For more than a century, nobody, including Einstein, had a clue to how light particles or photons can propagate; it still remains as an unexplainable mystery. The fact is that waves cannot exist if energy comes in quanta $E=hf$. What is interesting is that both Planck and Einstein had to confine themselves into a blackbody cavity for making their claims; they could not make their derivations without a blackbody cavity. None of their derivations and assumptions make any sense outside a cavity. Their derivations were strictly cavity bound, even though the existence of a spectrum does not require a cavity. They fail to question why they needed a blackbody cavity to prove their claims in the first place. One cannot but wonder, is it because their claims do not apply outside a blackbody cavity?

Planck couldn't do without a cavity, because he obtained the blackbody spectrum by analyzing the wave modes present inside a cavity. Such a mode analysis cannot be done without a cavity. So, it is understandable that his adherence to a cavity is a necessity for his method of derivation. There is also another reason why they had to stay in a closet (cavity). If energy comes in quanta $E=hf$, the energy of a spectrum can only be finite inside a cavity. If $E=hf$, the energy of the spectrum cannot be finite outside a cavity since the spectrum is continuous outside a cavity. So, Planck had no option, he had to confine his spectrum into a cavity if he wanted to make the claim that the energy comes in energy quanta $E=hf$. Although one can derive the spectrum inside a cavity under the assumption energy comes in quanta $E=hf$, there is a hidden obstacle that makes the derivation useless.

The problem with using a cavity is that the spectrum inside a cavity is discrete while the spectrum outside a cavity or the spectrum through a hole on a cavity is continuous. The assumptions that have been made inside a cavity do not apply outside a cavity. Planck's assumption that the energy is quantized and a quantum of energy is given by $E=hf$ also has a problem; it is simply meaningless. Think about it. Frequency has no energy. Frequency has no existence without amplitude. Not all energies are associated with a frequency. Gravitational potential energy has no association with frequency. The kinetic energy of a mass moving at constant speed has no associated frequency. If energy quantum is given by $E=hf$, how long does one have to wait for that energy quantum, one cycle time, two cycles time, or endless time? These are not all the questions associated with Planck's claim that energy comes in quanta $E=hf$. The Planck spectrum is incorrect [1]. The derivation of the Planck spectrum is incorrect. The Planck spectrum is dependent on the geometry of the cavity. A cavity has nothing to do with the blackbody radiation.

Einstein used Planck's claim that the energy comes in quanta $E=hf$ together with the Philipp Lenard's experimental finding on photoelectric effect, and went a step further and made the hypothetical claim that the light itself is quantized and light comes in particles of energy quanta $E=hf$, or photons. The Planck spectrum is incorrect since it depends on the geometry of the cavity. Philipp Lenard's experiment on photoelectric effect is incomplete since he did not perform the experiment for different amplitudes of light [1]. He thought he varied the amplitude by dimming the source, but you cannot change the amplitude of a light source by dimming a light source. By dimming a source, you are varying the rate of light burst emitted by the source, not the amplitude [1].

As it was with Planck, Einstein also couldn't prove his claim without confining it to a cavity, because his derivation is based on the assumption that the light or electromagnetic waves in a blackbody cavity consists of random light particles spread inside the volume of the cavity uniformly. Without the help of a cavity of finite volume, he could not have made this assumption. So, his adherence to a cavity is also a necessity for his method of derivation. Here too, the problem is that the derivation inside a cavity where the spectrum is discrete and volume is finite does not apply outside a cavity where the spectrum is continuous and volume is unbounded. Further, Einstein's derivation of photons is incorrect [1].

Einstein's assumption that light comes in spatially random particles also has a problem. The problem is that if the light consists of spatially random particles or photons, as it was assumed in the derivation of photons, coherent rays of light we observe are not possible; it defies logic. In his derivation of photons, Einstein applied the Boltzmann entropy formula for uniformly distributed photons inside a cavity to show that the light comes in light quanta or photons given by $E=hf$. The problem is that the Boltzmann entropy relation cannot be applied to light since light has no mass, no energy, no entropy, and no momentum. Light has no temperature. There is no entropy without temperature. Boltzmann entropy only applies for particles of mass; it does not apply for the massless. You cannot force a momentum on light by proclaiming that the propagation of light is relative. Neither Einstein nor anybody else has ever proven light is relative and behaves as golf balls. Light does not behave as golf balls. The propagation of light is not relative [4].

Einstein's derivation of photons is incorrect since light has no entropy [1]. Coherent light cannot consist of spatially random particles. If light consists of energy quanta or photons of energy $E=hf$, the energy of even a narrowest band of light will be infinite since the spectrum outside a cavity is continuous. The energy cannot be infinite and hence light cannot consist of photons or light quanta.

Light is never a particle. Light comes in wave bursts. These wave bursts are not particles. By dimming a light source, we can slow down the rate of light burst emitted by a source to a level where we are able to observe the wave bursts separately [1]. These light bursts are not particles; they are wave bursts. There are no massless particles. There is no massless momentum. There is no massless energy, kinetic energy. The energy is the kinetic energy. Other energies are potential energies. Potential energies are not energy unless they are converted to kinetic energy by charge particles of mass.

The intensity or brightness of a source of light is determined by the rate of light bursts of the source. Intrinsic intensity of a source of light is amplitude independent. The amplitude of light of a source is source independent. All the sources of light have the same amplitude in a vacuum. The amplitude of light of a supernova will be the same as the amplitude of light of the sun or a candle light. Light sources differ from each other by the rate of light bursts emitted by the sources, not by the amplitude.

After Maxwell presented equations for the propagation of light in 1862, Lorentz's attempt to transform Maxwell's equations onto an inertial frame was not successful. However, in 1905, Einstein was able to transform Maxwell equations onto a moving frame by modifying the Lorentz transform using the factor $\gamma=1/\text{sqrt}(1\text{-}v^2/c^2)$ that he derived under the false assumption that light is relative, where v is the speed of the inertial frame and c is the speed of light. Einstein derived the factor γ separately using a thought experiment where he considered a beam of light on a moving train relative to the train as well as relative to a stationary platform.

What is inherently hidden in Einstein's light beam on a moving train thought experiment is the false assumption that light is relative; it was this false assumption that forced a false momentum on light. Einstein used the hidden false assumption in the thought experiment that light is relative to transform the Maxwell equations onto a moving frame, and then claimed that the light is relative; a deceptive circular approach. Light is not relative [4]. An entity that has no standstill existence cannot be relative. The path of light cannot be altered by observers. Light does not move like golf balls in a moving train. The massless cannot be relative. The massless cannot have momentum. Momentum by definition is limited to moving masses. You cannot force a momentum on light, the massless.

No thought experiment is required for the derivation of factor $\gamma=1/\text{sqrt}(1\text{-}v^2/c^2)$. If you choose γ as an unknown factor in the Lorentz transform, the relationship $\gamma=1/\text{sqrt}(1\text{-}v^2/c^2)$ emerges naturally from the transformation of Maxwell equations onto an inertial frame as an inherent condition required to maintain the form of the Maxwell equations on a moving frame [4]. No thought experiment is required for the derivation of the factor $\gamma=1/\text{sqrt}(1\text{-}v^2/c^2)$. It is a natural outcome of using the average return time of a light beam as time in Special Relativity and General Relativity. Special Relativity and General Relativity do work for one-way time given by clocks. Special Relativity and General Relativity are incompatible with clocks.

Although Einstein was able to transform Maxwell equations onto an inertial frame successfully, this transformation cannot be used to make the claim that the propagation of light is relative. The modified Lorentz transform with the factor $\gamma=1/\text{sqrt}(1\text{-}v^2/c^2)$ that transforms the Maxwell equations onto a moving frame is known as the Lorentz-Einstein transform. For this transformation of Maxwell equations onto a moving frame to hold, the Lorentz-Einstein transform must be unique. The problem is that there are infinitely many equally valid Lorentz-Einstein transforms for transforming the Maxwell equations onto an inertial frame. The Lorentz-Einstein transformation is not unique. Maxwell equations cannot be transformed onto an inertial frame uniquely. Propagation of light is not relative [4]. Light does not propagate relative to moving frames.

Einstein forced the speed of light to be a constant relative to observers while allowing direction of light to vary with respect to observers; that is how he obtained the factor $\gamma=1/\text{sqrt}(1\text{-}v^2/c^2)$. Einstein defined the time as the average return time of a beam of light on the path of the motion of the object. The factor γ is a result of this definition of time. The factor γ does not apply for one directional time given by clocks. Einstein assumed light to be relative. If you assume light to be relative, then, relative to light, any stationary mass m has a constant speed c from the start, and hence a stationary mass m has a kinetic energy or rest energy $E=mc^2$ relative to light. Light is not relative and hence the relationship $E=mc^2$ does not hold, $E\neq mc^2$ [4]. A stationary mass does not have rest kinetic energy. The rest kinetic energy of a mass is an oxymoron.

What is energy? There is no independent entity called energy by itself. Energy is present in association with particles of mass. There is no energy without particles of mass. If there is energy, there are moving particles of mass and hence there is a temperature. If there is a temperature, then there are moving particles of mass with kinetic energy. Energy is the kinetic energy of masses. When we refer to energy, it is the kinetic energy we refer to. Other energies are potential energies. Potential energies are not energy until they are converted into kinetic energy. Electromagnetic potential energy has no temperature. There is no energy without the association of moving masses. Energy is a property of moving particles of mass. There is no energy in the absence of moving particles of mass.

A stationary mass has no motion relative to light since light is not relative. Lorentz Transform is not unique and hence Special Relativity and General Relativity do not hold. As a result, $E=mc^2$ does not hold, $E\neq mc^2$. Kinetic energy of a mass has nothing to do with the speed of light unless the mass is moving at the speed of light c. If a mass is physically moving at speed c, kinetic energy of the mass is $E=(1/2)mc^2$, not $E=mc^2$. No mass can start at constant speed. A mass cannot have speed c relative to light since light has no standstill existence. A mass has no energy unless the mass is moving.

There is nothing preventing a mass moving at the speed of light c physically. The speed of light cannot limit the speed of objects. Light has no stand still existence and hence no mass can move relative to light. It is the track (the path) of light that is relative, not the propagation of light [4]. The speed and the direction of light on its fixed path are observer independent. The velocity of light is observer independent. What is relative to an observer is a still entity such as the path of the moving entity that is associated with a moving entity, not the moving entity itself. What is relative is a stationary entity, never a moving entity itself. A moving entity itself on its fixed path cannot be relative. The fixed path shifts or moves relative to a moving observer while the motion of an entity on the path remains unaltered relative to an observer [3]. What is relative is the distance to the path of a moving object.

Lemma:
It is the rail that is relative, not a moving train on a rail. A moving train on a rail is not relative. The speed of the train and the direction of the train on its rail are observer independent.

Lemma:
It is the track of light that is relative, not the propagation of light on its track. The speed of propagation of light and the direction of light on its track are observer independent.

It is not just the speed of light that is observer independent. It is the velocity of light that is observer independent. When the velocity of light is observer independent, no Special Relativity is required for the speed of light to be invariant relative to observers [3]. It is the path of light that moves relative to observers just as the mountain moves relative to a runner, not the light itself. It is the train track that moves relative to observers, not the train itself. Speed of a train on its track is naturally independent of observers. It is always something that is not moving that moves relative to an observer. If it is a moving object, it is a fixed entity that is associated with a moving object that moves relative to an observer; it is the fixed path that moves relative to observers [3].

Lemma:
Observers cannot derail a train. Cars do not end up in ditches relative to observers. Galileo-Newton relativity and Einstein relativity are incorrect.

Lemma:
The speed of any object on its fixed path remains unchanged relative to a moving observer. It is the path of the object that moves against the motion of the observer relative to a moving observer, not the object on its fixed path.

If Galileo-Newton relativity, Einstein's Special Relativity, and General Relativity hold, moving vehicles will end up in ditches, trains will derail, and light will bend relative to observers. Observer motion cannot change the direction of a moving object on its fixed path. Observer motion cannot derail a train. Propagation of light on its fixed path is observer independent. The motion of a train on its fixed track is observer independent. Observers cannot derail a train. Observers cannot bend a beam of light. Galileo-Newton relativity is incorrect. Einstein's Special Relativity and General Relativity are incorrect.

If an object is moving on its path at velocity $\mathbf{u}$ and an observer is moving at velocity $\mathbf{v}$, the relative velocity $\mathbf{w}$ of the object relative to the observer cannot be given by $\mathbf{w}=\mathbf{u}-\mathbf{v}$ as the Galileo-Newton relativity suggests, $\mathbf{w}\neq\mathbf{u}-\mathbf{v}$. The speed and the direction of an object (the velocity $\mathbf{v}$ of an object) on its path remain unchanged relative to any moving observer since objects move on fixed paths that are independent of observers. The direction of an object on its path is unaltered relative to observer motion. The speed of an object on its path is unaltered relative to the motion of observers. A moving object has no existence out of its path relative to observers. Trains do not derail relative to observers. Cars do not end up in ditches relative to observers. Observers cannot derail trains. It is the path of the object that moves relative to an observer against the motion of the observer. It is the path of a moving object that moves at velocity $-\mathbf{v}$ relative to an observer moving at velocity $\mathbf{v}$. The speed of the object on its path remains unchanged relative to any observer. The speed of light on its path remains unchanged relative to any observer. Galileo-Newton relativity as well as Einstein's Special Relativity and General Relativity are incorrect [5,3,4].

No observer can derail a train. Light propagates at constant speed on a fixed track in the vacuum and can only be altered by the change of the medium. No observer can derail light. Since no observer can derail light, the speed of light and the direction of light on its track is naturally independent of observers. It is the distance to the path of light that varies relative to observers. It is the fixed track of light that moves against the motion of an observer relative to the observer. The velocity of a train on its track is independent of observers naturally. The velocity of light on its track is independent of observers [3].

The speed and direction of light on its fixed track is independent of observers naturally. You don't have to force the speed of light to be independent of observers by violating the observer independence of the direction of light on its path as Einstein did in Special Relativity. Special Relativity is incorrect in its blatant disregard for the constancy of the direction of light. No Special Relativity is required [3]. Observers cannot derail light. In deriving Special Relativity, Einstein allowed light to derail relative to observers. Galileo-Newton relativity derailed the light. Every moving entity travels on a fixed path. The direction and the speed of any entity on its path is independent of observers.

The Galileo-Newton relativity is incorrect in its foundation. If the Galileo-Newton relativity is correct, the motor vehicles traveling on roads will end up in ditches relative to moving observers. Observers do not see that happening. The Galileo-Newton relativity appears to be correct only for the observers traveling parallel to a moving object. The Galileo-Newton relativity does not apply for observers traveling on oblique paths to the path of a moving object. Even for observers on a path parallel to the path of a moving object, what is actually taking place is not what is claimed to be taking place in the Galileo-Newton relativity.

In relativity, a moving object is unaltered relative to observers; the mass of a moving object is unaltered relative to observers; time is unaltered relative to observers; speed of the object on its path is unaltered relative to observers; the direction of the moving object on its path is unaltered relative to observers. It is the fixed path that the object is traveling on that moves relative to observers. It is always something that is fixed, which is associated with the moving object such as the path of the moving object, that moves relative to observers, not the moving object itself. A runner cannot derail a train. It is the distance between the path and the observer that changes with the observer motion. What a train does on its track is unaltered relative to observers.

"We need to reexamine Relativity in the reality that a moving car does not end up in a ditch relative to moving observers."

Relative velocity of a moving object cannot be obtained by velocity vector addition. Velocity vector addition appears to represent the relative speed only when an observer is traveling in the direction of the moving object or in the direct opposite to the moving object. Cars do not end up in ditches relative to observers. Trains do not derail relative to observers. It is the road or the track that moves relative to observers. Planets do not move relative to observers. It is the orbit of the planet that moves relative to observers. The speed of an object and the direction of the object on its track remains unaltered relative to observers. Blind velocity vector addition with no attention to the reality that is used for obtaining the relative speed in Galileo-Newton relativity is incorrect.

Einstein also gave the light a momentum by claiming that the energy E can be expressed as $E=pc$, where p is the momentum and c is the speed of light. However, light has no energy. What light has is electromagnetic potential energy. Potential energy has no momentum, and hence $E=pc$ is meaningless for light. The massless cannot be given a momentum by dividing the potential energy by the speed of light c. The relationship $E=pc$ does not apply for masses either, since no mass can start at a constant speed. If $E=pc$ for a particle of mass m, the momentum of the particle, p, must be given by $p=mc$, not by $p=mv$ since no particle can have two speeds, v and c, one for momentum $p=mv$ and one for energy $E=pc$.

In Special Relativity, the mass of a particle is assumed to be relative, $m'=\gamma m$, where $\gamma=1/\text{sqrt}(1-v^2/c^2)$, and hence the momentum is given by $p=m'v$. If this is the case, the relative mass of a neutrino would not be finite since neutrinos are considered to have speed close to the speed of light, yet the measured mass of a neutrino is finite and negligibly small. It shows the invalidity of relative mass $p=m'v$. For $v<<c$, $E=pc$, $p=mv$. This shows the mockery of $E=pc$.

According to Special Relativity, for a mass moving at speed v<<c, the energy of the mass is $E=mvc$, which is simply ridiculous. This is equivalent to momentum p moving at constant speed c. The relationship $E=pc$ does not apply to light since light has no momentum. Extension of the relationship $E=pc$ for a mass m is equivalent to giving a mass m two speeds, v and c, which is beyond imagination and simply ridiculous. The energy of a mass m moving at speed v is given by $E=(1/2)mv^2$, $E\neq pc$. The energy $E=pc$ does not apply for light or for moving objects of mass m.

In Special Relativity, the energy of a mass m moving at speed is given by $E=m'c^2$, where $m'=\gamma m$, which is derived as the work done to reach the speed v from stand still. The relationship $E=m'c^2$ is a result of using the Lorentz factor $\gamma=1/\text{sqrt}(1-v^2/c^2)$ for the acceleration phase of the object to reach the constant speed v. The problem is that the Lorentz factor does not apply for the acceleration phase. Lorentz factor applies for constant speed v. The derivation of $E=m'c^2$ in Special Relativity is incorrect. Mass is not relative. The relationship $E=m'c^2$ is invalid. The energy relationship $E=m'c^2$ is pure deception, not real, $E\neq m'c^2$. The energy of a moving mass has nothing to do with the speed of light c unless the mass is moving at speed of light c. The speed of light cannot limit the motion of masses. Speed of light is the speed of light, nothing more. The energy of a mass m moving at speed v is given by $E=(1/2)mv^2$, $E\neq m'c^2$.

Special Relativity claims that there is no absolute frame, yet, in hindsight, there is an absolute frame in Special Relativity. Special Relativity has chosen light as the absolute frame. Special Relativity assumes that a stationary mass m has a speed c relative to light and hence stationary mass m has the rest energy or rest kinetic energy $E=mc^2$ relative to light. That is one of the problems with Special Relativity. To consider the state of a mass relative to another entity, that entity must have a standstill existence or must be able to bring to a stop. Light has no standstill existence and cannot be brought to a stop, and hence the state of an object cannot be considered relative to light. A stationary mass has no relative speed c relative to light. A stationary mass m does not have rest energy, $E\neq mc^2$. Light is not relative [4]. No Special Relativity is necessary for the speed of light to be constant relative to a moving observer. The speed of any entity on its fixed path is naturally independent of observer motion. Observers cannot derail trains [3]. Observers cannot bend light. Gravity cannot bend light 5]. Light has no inertia.

Mass cannot be relative. It is the scale, the measuring instrument, that is relative, not the mass itself. If the measuring instrument (the scale) gives a different mass for an object when the object is in motion, it is not because the mass itself has changed with the speed, it is because the measuring instrument is not engineered to give the correct mass for measuring the mass of a moving object. If the instrument is designed to give the correct mass when it is on one inertial frame, it is not expected to give the correct measurement when it is on a different inertial frame unless the instrument is calibrated for that inertial frame. Any measuring instrument, including clocks, must be calibrated for the environment that they are in for the correct measurement.

The $E=pc$ that had been speciously and deceptively concocted for light by giving light hypothetical momentum does not apply for an object of mass m. The energy of a particle of mass m moving at speed v relative to any inertial frame is given by $E=(1/2)mv^2$, not $E=pc$. If the mass of an object moving at speed v is given by $m'=\gamma m$, where $\gamma=1/\text{sqrt}(1-v^2/c^2)$, then, the relative mass m' will be directional since the speed is directional. The mass of an object cannot be directional. The mass is not relative, $m'=m$. The factor $\gamma=1/\text{sqrt}(1-v^2/c^2)$ has been derived for the average return time of a light pulse, and hence it does not apply for real one-way time given by clocks. The factor $\gamma=1/\text{sqrt}(1-v^2/c^2)$ is hypothetical, and does not exist since light is not relative.

Potential energy is not energy until it is converted into kinetic energy in the presence of masses or charged masses. Chemical potential energy is not energy until it is converted into kinetic energy of masses. Light has no energy, no temperature, no entropy, no momentum. The radiation from a nuclear explosion has no effect in a vacuum. The massless has no momentum. It does not matter how much light is there in a vacuum, there is no temperature in a vacuum. Momentum is not defined for the massless. As a result, $E=pc$ does not hold. Light is useless without matter. There will be no light without matter. It is only that light can generate kinetic energy (temperature) in the presence of charged particles.

After observing Einstein's specious particle trickery of light, De Broglie had a sudden epiphany. De Broglie combined the Holy Trinity $E=mc^2$, $E=hf$, and $E=pc$ and obtained the wavelength $\lambda=h/p$ for a mass of momentum p, where $p=m'v$, $m'=\gamma m$, $\gamma=1/\text{sqrt}(1-v^2/c^2)$, and for $v<<c$, $p=mv$. He made an outlandish and arbitrary claim that if waves behave as particles, particles of mass m with momentum $p=mv$ must also behave as waves of wavelength $\lambda=h/p$. Even after hundred years of its proclamation that a moving particle of mass behaves as a wave, nobody still has a clue to what is waving with wavelength $\lambda=h/p$ in a moving mass m. Particles are not waves.

Schrodinger went even further and claimed, if a particle behaves as a wave, there must be a wave equation for a particle, and applied de Broglie's particle wave $\lambda=h/p$ for a particle mass m with momentum p and energy E to come up with a wave equation that bears his name, the Schrodinger equation. Schrodinger used the Hamiltonian operator to obtain the state of a particle, and used the particle wave to define the energy operator as the time derivative.

At the same time, Heisenberg had also been formulating an equivalent but cumbersome formulation based on matrix operators without even realizing that there were such mathematical entities called matrices until his supervisor Max Born pointed that out. How could a physicist not know the existence of matrices? It is with these developments that dubious Quantum Mechanics was born under the assumptions that the energy is quantized, $E=hf$, and particles behave as wave $\lambda=h/p$. The fact is that the energy cannot come in quanta and particles of mass cannot behave as waves [1].

Quantum Mechanics is based on the assumption that energy comes in quanta given by $E=hf$ and a proclamation that a particle behaves as a wave. The relationship $E=hf$ has no discernible meaning. Frequency has no energy unless frequency is converted into kinetic energy of particles. The obvious question with $E=hf$ is, frequency of what?. A particle of mass moving at constant speed has kinetic energy but has no associated frequency. Gravitational potential has no associated frequency. Gravitational potential is not energy until it is converted into energy. It is meaningless to claim that the gravitational potential is given by energy quanta $E=hf$. There is no energy without an association with a mass. There is no massless energy. The energy is the kinetic energy. There is no energy without temperature and vice versa. Light has no temperature. Light has no energy. Energy potential is not energy until it is converted into kinetic energy of a particle of mass.

Since light is not relative [4], light has no momentum and hence the Newton laws of motion of masses and Maxwell equations for the propagation of light (massless) cannot be unified. Einstein's unification of Newton's laws of motion for objects of mass and the Maxwell equations for propagation of light is deceptive; it is invalid and disastrously reality altering; it misled physics into a fantasy world. You cannot force the light to behave as golf balls just to make light to comply with the motion mechanics of objects of masses.

When Galileo claimed that no observer in a closed cabin could determine the state of the cabin within, he was referring to the fact that it is not possible to determine the state of a closed cabin from within using the motion of masses. Not much was known about the light at that time. If Galileo had known that the light is not relative and does not behave as golf balls, he could have said that it is possible to determine the state of a closed cabin using a burst of light. It is indeed possible to determine if a closed cabin is stationary or moving at constant speed or at an acceleration using a beam of light since light is not relative.

The laws of motion of masses (motion mechanics) are independent of the frame of reference since the motion of masses is relative. The laws of propagation of light (wave mechanics) is independent of the frame of reference since light is not relative. Propagation of light does not require our help to make propagation of light independent of the frame of reference. You do not have to force an imaginary momentum on light for light to be independent of the frame of reference. No Special Relativity and General Relativity are required [3]. Special Relativity and General Relativity are invalid since light is not relative.

Quantum Mechanics is a result of the Holy Trinity $E=hf$, $E=mc^2$, and $E=pc$. The Holy Trinity that neither applies for particles of mass nor for waves. Believers of the Holy Trinity adhere to it and swear on it religiously, and reject any criticism of it claiming that the non-believers cannot understand it. We are supposed to learn what is in the archaic text; we are not allowed to question it. Just like a religion, it is a heresy to question Modern Physics.

They claim that Quantum Mechanics is not questionable since it is experimentally proven again and again. They fail to realize that an experiment is as good as its interpretation. It is always possible to misinterpret experimental data to show what you want to show as it is often the case with physics experiments. When experiments are being misinterpreted to support the claim that a particle can be in multiple places simultaneously, it is time to question the very foundation of Modern Physics. If Modern Physics tells us that particles are waves, waves are particles, space is expanding, energy is quantized, momentum (which is a vector) is quantized, the state of a spin can be two dimensional, it is not the physics Modern Physics is talking about, it is voodoo physics.

If a village kid claims that he/she has seen virgin Mary, does it prove that God exists? Just because somebody misinterprets an observation to support an existing theory and claims that he/she has seen photons, can you claim that it is proven experimentally that light consists of particles or photons? Do they know what they have observed by dimming a light source are wave bursts, not photons or light quanta? Do they know the intensity of a light source is the rate at which light bursts are emitted by the source? Do they know that the amplitude of light at the source is source independent?

We cannot change the amplitude of light by dimming a light source [1]. By dimming a light source, what you are doing is changing the rate of light burst released by the source. That is why you can see the individual light bursts when you dim a light source low enough. The amplitude of light from the sun is the same as the amplitude of light of a candle light at the source. So, who is right? Is Quantum Mechanics a valid theory? Fallacy of Special Relativity is proven in [4,3]. Fallacy of the Planck spectrum is proven in [1]. Here we are going to see the fallacy of Quantum Mechanics in detail.

"Frequency has no energy, $E \neq hf$. Frequency has no existence without amplitude. Light has no energy. Light only has electromagnetic potential energy. Potential energy is not energy until it is converted to energy by charge particles. Energy has no existence without mass. Wherever there is energy, there must be temperature. There is no massless energy. There is no temperature-less energy. A stationary mass does not have speed c relative to light since light is not relative, and $E \neq mc^2$ unless mass m is moving at speed of light c. Speed of light cannot limit the speed of a mass."

II. FALLACY OF QUANTUM MECHANICS

Consider a particle of mass m at position x with momentum p. The observables of the particle are the position x, momentum p, and the energy E. A particle at a given position can only have one momentum at any given time. The momentum of a particle is the mass times the rate of change of the position at the position of the particle, which is unique at any given time. A particle cannot have multiple momenta at a given position at any given time. Similarly, a particle at given momentum cannot have multiple positions at any given time. The momentum of a particle at any given time is defined at the position of the particle, which is unique. The position and the momentum of a particle at any given time are unique. As a result, the position and momentum at any given time are not independent, and cannot be independent. Two physical quantities (the position of a particle and its momentum) that have no existence without an association with the mass m of an object cannot be mutually independent at any given time. Even though position and momentum cannot be mutually independent at any given time, Quantum mechanics falsely assumes the position and the momentum to be mutually independent.

Quantum Mechanics also makes the absurd assumption that a moving particle of momentum p and energy E at position x behaves as a wave given by the plane wave equation under further invalid assumptions that the wavelength λ is inversely proportional to the momentum under de Broglie hypothesis, and the frequency f is proportional to the energy E of the particle under the Planck hypothesis, where h is the Planck parameter,

$$\lambda = h/p \quad \text{(de Broglie conjecture)} \tag{2.1}$$

$$E = hf \quad \text{(Planck conjecture)} \tag{2.2}$$

A moving particle of momentum p has no associated frequency and hence, the representation of kinetic energy of a particle moving at constant speed as $E=hf$ has no meaning. The claim that a particle of mass m with momentum p is a wave with wavelength $\lambda = h/p$ is even more bizarre.

Later we will see that both these hypotheses are invalid both conceptually and mathematically; they are ridiculous, meaningless. Energy that has several flavors cannot come in quanta. If energy comes in quanta, there is no way to distinguish potential energy from kinetic energy since nature has no mechanism to carry the identity information in a quantum. Energy cannot be quantized. Particles cannot behave as waves. However, there is no quantum mechanics without these meaningless and absurd paranormal hypotheses.

If a particle is assumed to behave as a wave, for a particle moving with momentum p and kinetic energy E_p at position x at time t, the plane wave equation for the particle is given by,

$$\phi(x,p,E_p,t) = A \exp((j/\hbar)px)\exp((-j/\hbar)E_p t) \tag{2.3}$$

$$\phi(x,p,E_p,t) = A\ \phi(x,p)\phi(E_p,t) \tag{2.4}$$

$$\phi(x,p) = \exp((j/\hbar)px) \tag{2.5}$$

$$\phi(E_p,t) = \exp((-j/\hbar)E_p t) \tag{2.6}$$

where, and A is the amplitude.

Differentiating with respect to position x, we have,

$$-j\hbar\partial\phi(x,p)/\partial x = p\phi(x,p) \tag{2.7}$$

$$\mathbf{P}\phi(x,p) = p\phi(x,p) \tag{2.8}$$

$$\langle\phi(x,p)|\mathbf{P}|\phi(x,p)\rangle = p \tag{2.9}$$

$$\mathbf{P}|p\rangle = p|p\rangle \tag{2.10}$$

$$\langle p|\mathbf{P}|p\rangle = p \tag{2.11}$$

We use the physics notation for the representation of a vector $|p\rangle$, which is synonymous for both eigenvector and eigenfunction. Whereas in engineering, a vector is represented by boldfaced **p**=|p>. The conjugate transpose of |p> for both eigenvector and eigenfunction is <p|.

The momentum operator **P** and the eigenfunction |p> are given by,

$$\mathbf{P}=-j\hbar\partial/\partial x \quad (2.12)$$

$$|p>=\phi(x,p) \quad (2.13)$$

$$\phi(x,p)=\exp((j/\hbar)px) \quad (2.14)$$

The $\phi(x,p)$ is the time independent part of the plane wave equation (2.3).

Quantum mechanics disregards the fact that the position operator **X** is also determined by the time independent part of the plane wave equation, $\phi(x,p)=\exp((j/\hbar)px)$), which is also the eigenfunction of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$. Once the assumption that a moving particle behaves as a wave is made, we have no freedom to define the position operator **X** as we wish. The position operator is predetermined by the particle wave and the position operator. This is where the major mistake of Quantum Mechanics lies.

Even though we have no freedom to determine the position operator as we desire in a wave, in Quantum Mechanics, the position operator is defined as the position itself, $\mathbf{X}=x\mathbf{I}$, where **I** is an identity operator. It is this false, invalid, inappropriate, man-made definition of the position operator as the position itself that led to some of the bizarre conclusions in Quantum Mechanics. Without this invalid definition of the position operator as $\mathbf{X}=x\mathbf{I}$ in Quantum Mechanics, there will be no non-commutation between the position and momentum operators. Without a man-made artificial non-commutation between the position and momentum operators, there would be no Quantum Mechanics; no Heisenberg Uncertainty Principle.

In the plane wave, $\phi(x,p)=\exp((j/\hbar)px)$, there is no single independent variable; both momentum p and position x must be independent. Neither x nor p can be treated as special if they are assumed to behave as a wave given by the plane wave equation. Both x and p must be treated equally. The position operator **X** and the momentum operator **P** must be determined by the plane wave equation, $\phi(x,p)=\exp((j/\hbar)px)$, in the same manner.

The definition of the position operator **X** must be complementary with the definition of the momentum operator **P**. One cannot stand at odds with the other. Both the position operator **X** and the momentum operator **P** must comply with the time independent part of the plane wave equation, and **X** and **P** must have a mirror symmetry. We should be able to obtain one operator from the other simply by interchanging x and p, and vice versa. This is not possible with our imposed definition of the position operator **X** as the position itself; this is the fundamental mistake in Quantum Mechanics. Without this mistake as the foundation, there would be no Quantum Mechanics. The definition of position operator as position itself, $\mathbf{X}=x\mathbf{I}$, is contradictory to the definition of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$, as well as the assumption that a particle behaves as a wave, $\phi(x,p)=\exp((j/\hbar)px)$, in Quantum Mechanics. If a particle is assumed to behave as a wave, the position operator cannot be the position itself, $\mathbf{X}\neq x\mathbf{I}$.

It is also noteworthy that for a moving particle, the position, and the momentum of the particle (a mass) must be unique, and hence the assumption that a particle behaves as a wave is an invalid assumption. Besides, no particle has the energy required to be at wavelength $\lambda=h/p$ since no mass can have a constant speed from the start. The relationship $\lambda=h/p$ does not apply for a mass. The relationship $\lambda=h/p$ does not apply for light. Although light propagates at constant speed from the start, light has no momentum and hence the relationship $\lambda=h/p$ does not apply for light. Even though light has no momentum, light can generate momentum in the presence of a charge particle. Light is capable of generating momentum on a charged particle does not mean light has a momentum. Light has no momentum. A mass cannot be in multiple places simultaneously. Physics that makes such a false claim that a mass can be in multiple places simultaneously is voodoo-physics.

Unlike the light waves that propagate at constant speed from the start, a particle must start at speed zero and gain the speed to reach a constant speed. A particle only has half the energy required since no mass can have a constant speed from the start. The energy of a particle of mass m moving at speed v and momentum p is given by $E=(1/2)mv^2$ or $E=p^2/m$, not by $E=pc$ and $E\neq pc$. Even if a particle is assumed to behave as a wave, the de Broglie wavelength is incorrect. A particle with momentum p does not have energy required to be at de Broglie wavelength. Particle wave concept is meaningless [2].

There is no independent variable in a propagating wave. If the position and momentum of a particle is assumed to behave as a wave, even though neither the position x nor the momentum p by itself can be an independent variable, Quantum Mechanics incorrectly choses the position as the independent variable and define the position operator **X** as position itself,

$$\mathbf{X}=x\mathbf{I} \quad (2.14)$$

This invalid definition is the genesis of Quantum Mechanics as well as the source of all the ills in Quantum Mechanics and Modern Physics in general.

Lemma:

The position operator $\mathbf{X}=x\mathbf{I}$ is contradictory to the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ and the particle wave assumption, $\phi(x,p)=\exp((j/\hbar)px)$. The position operator $\mathbf{X}=x\mathbf{I}$ cannot describe the position x in the plane wave equation $\phi(x,p)=\exp((j/\hbar)px)$.

Any non-trivial Hermitian operator has a unique eigenspace. Unlike any non-trivial Hermitian operator, the operator $\mathbf{X}=x\mathbf{I}$ does not have a unique eigenspace. The operator $\mathbf{X}=x\mathbf{I}$ has many equally valid eigenspaces. We cannot talk about THE eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$. We can only talk about AN eigenspace for $\mathbf{X}=x\mathbf{I}$. Using Dirac notation, an orthonormal eigenspace |x> of $\mathbf{X}=x\mathbf{I}$ is given by,

$$\mathbf{X}|x\rangle = x|x\rangle \quad (2.15)$$

Where $\langle x|x\rangle=1$ and $\langle x|\mathbf{X}|x\rangle=x$. Note that the eigenfunction $|x\rangle$ here is independent of momentum p by the definition of position operator as position itself.

In this case, the most obvious and the trivial solution is given by the delta function $\delta(x)$,

$$|x\rangle=\delta(x) \quad (2.16)$$

where,

$$\delta(x)=1, \text{ at } x \quad (2.17)$$

$$\delta(x)=0, \text{ otherwise} \quad (2.18)$$

In Quantum Mechanics, the eigenfunction of the position operator $\mathbf{X}=x\mathbf{I}$ is assumed to be unique and given by the trivial solution delta function $\delta(x)$. This is the source of all the ills in the behavior of a particle in Quantum Mechanics. If you define the position operator $\mathbf{X}$ as the position itself, $\mathbf{X}=x\mathbf{I}$, the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is not unique. Furthermore, if a moving particle of momentum p at position x is assumed to behave as a wave, you cannot define the position operator $\mathbf{X}$ as position itself, $\mathbf{X}\neq x\mathbf{I}$. The position operator $\mathbf{X}$ must be determined by the plane wave equation itself. If a particle is assumed to behave as a wave, the position operator must not be contradictory to the momentum operator; they must be mirror symmetric.

Once the momentum operator is given, the position operator is already intrinsically fixed. Once the assumption that a particle behaves as a wave is being made, the position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$ as well as the kinetic energy operator $\mathbf{E}_p$ are all intrinsically fixed and defined by the plane wave equation,

$$\mathbf{P}=-j\hbar\partial/\partial x \quad (2.19)$$

$$\mathbf{X}=-j\hbar\partial/\partial p \quad (2.20)$$

$$\mathbf{E}_p=j\hbar\partial/\partial t \quad (2.21)$$

These are the legitimate operators if a particle is assumed to behave as a wave of wavelength $\lambda=h/p$ and frequency $f=E_p/h$, where E_p is the kinetic energy of the moving particle. Since the operator of an observable is Hermitian, where the operator is the same as its conjugate transform, the eigenspace of an operator provides a complete orthonormal basis for representing the state of a particle in the domain of the observable. The basic idea behind Quantum Mechanics is the representation of the state of a particle in the domain of each observable.

If a particle is moving with kinetic energy E_p in potential energy $V(x)$, the Hamiltonian of the particle is given by,

$$\mathbf{H}=\mathbf{E}_p+V(x) \quad (2.22)$$

$$\mathbf{H}|\Phi\rangle=\mathbf{E}_p|\Phi\rangle+V(x)|\Phi\rangle \quad (2.23)$$

Where, $|\Phi\rangle$ is the eigenvector/eigenfunction of the Hamiltonian $\mathbf{H}$. The state of the particle is $|\Phi\rangle$.

Lemma:

For a free moving particle, where potential $V(x)=0$, the Hamiltonian $\mathbf{H}$ is given by $\mathbf{H}=\mathbf{E}_p$ and hence the eigenfunction $|\Phi\rangle$ of the Hamiltonian $\mathbf{H}=\mathbf{E}_p$ is also the particle wave,

$$\phi(x,p,E_p,t)=A\exp((j/\hbar)px)\exp((-j/\hbar)E_pt),$$

The state of the particle $|\Phi\rangle$ for $V(x)=0$ is $|\Phi\rangle=\phi(x,p,E_p,t)$.

The state of the particle $|\Phi\rangle$ can be represented as the scalar multiplication of the eigenvectors, or orthonormal eigens-axes, of the operator of an observable. In other words, the state of a particle $|\Phi\rangle$ can be represented as the coordinates of eigens-axes in the domain of an observable. This representation is unique only for a non-trivial Hermitian operator of an observable where the operator of the observable is not the observable itself. The operator of an observable is a trivial operator if the operator is observable itself.

In the case of the position operator $\mathbf{X}$, the representation of the state $|\Phi\rangle$ of a particle in the domain of $\mathbf{X}$ is given by,

$$|\Phi\rangle=\sum\psi(x_i)|x_i\rangle \quad (2.24)$$

where, $\psi(x_i)$, $\forall_i$ are the coordinates of the state $|\Phi\rangle$ in the orthonormal eigen-representation based on the position operator eigenvectors/eigenfunctions as coordinate axes.

Since eigenspace $|x\rangle$ is orthonormal, we have the coordinates, $\psi(x_i)$, $\forall_i$ given by the projection of the state $|\Phi\rangle$ on the eigens-axes in the eigenvector representation,

$$\psi(x_i)=\langle x_i|\Phi\rangle \quad (2.25)$$

Note that the $\langle x_i|\Phi\rangle$ is the inner product between eigenaxis $|x_i\rangle$ and the state of the particle $|\Phi\rangle$. The function $\psi(x)=(\psi(x_1),\psi(x_2),\ldots)$ is the wave function of the particle in state $|\Phi\rangle$ in the domain of the position operator $\mathbf{X}$. In fact, $(\psi(x_1),\psi(x_2),\ldots)$ are the coordinates of the state $|\Phi\rangle$ on eigens-axes of the operator $\mathbf{X}$ of the observable x. This is no different from the 3D coordinate-axes representation.

Definition: Wave Function

The coordinates of a state vector $|\Phi\rangle$ on the eigenvectors of a Hermitian operator $\mathbf{X}$ in the increasing order of the observable x is defined as the wave function $\psi(x)$ of the particle in the domain of $\mathbf{X}$.

Lemma:

For the special case where the position operator is position itself, $\mathbf{X}=x\mathbf{I}$, the state of the particle $|\Phi\rangle$ is also the wave function $\psi(x)$. However, when $\mathbf{X}=x\mathbf{I}$, the wave function is not unique and hence the state of the particle $|\Phi\rangle$ is not unique. Since the state of the particle $|\Phi\rangle$ must be unique, the position operator cannot be the position itself, $\mathbf{X}\neq x\mathbf{I}$.

The representation of a state of a particle or a system using the eigenspace of the operator of an observable is no different from the representation of position $|r\rangle=(x,y,z)$ in 3D space with x, y, and z axes, where, $|x\rangle=(1,0,0)$, $|y\rangle=(0,1,0)$, $|z\rangle=(0,0,1)$, so that, $|r\rangle=x|x\rangle+y|y\rangle+z|z\rangle$.

In this 3D representation, the wave function $|\psi\rangle=(x,y,z)$ is the coordinates of the state $|r\rangle$ on the x, y, and z axes in 3D space. The 3D space is represented by the eigenvectors of the operator $\mathbf{R}$, where, $\mathbf{R}$ is a 3x3 diagonal matrix, $\mathbf{R}=\text{diag}(x,y,z)$. The eigenvalues of operator $\mathbf{R}$ are x, y, z and the eigenvectors are $|x\rangle=(1,0,0)$, $|y\rangle=(0,1,0)$, $|z\rangle=(0,0,1)$. In 3D coordinates representation of the position of a particle, a particle is not on the x axis, not on the y axis, not on the z axis; it is at (x,y,z). For any scalar α, we have $\alpha\mathbf{R}|x\rangle=\alpha x|x\rangle$, and hence the eigenvalues are not unique. As a result, the eigenvalues cannot be used for the estimation of the parameters of a system. However, the eigenspace of a non-trivial Hermitian operator is unique, and hence eigenvectors of a non-trivial Hermitian operator can be used for a unique orthogonal representation of a state vector. An operator is trivial if the operator of the observable is the observable itself. The position operator $\mathbf{X}=x\mathbf{I}$ is a trivial operator.

Extending the discrete representation given in the equation (2.24) for continuous x, the representation of the state $|\Phi\rangle$ of the particle on the eigenspace of the operator $\mathbf{X}$ is given by,

$$|\Phi\rangle=\int\psi(x)|x\rangle dx \quad (2.26)$$

where, $|x\rangle$ is the eigenfunction.

The $\psi(x)$ arranged in the increasing order of the position x is the wave function $\psi(x)$ in the position domain. If the position x is probabilistic, this wave function $\psi(x)$ has no existence since there is no order to position x if x is probabilistic. Wavefunction $\psi(x)$ does not exist if the position x is probabilistic. If the position x is probabilistic, the wave function $\psi(x)$ is not continuous, and hence the equation (2.26) does not hold. The claim that the position of a moving particle is probabilistic in Quantum Mechanics is self contradictory.

Lemma:

If the position x is probabilistic, the wave function in the position domain $\psi(x)$ has no existence.

If the position operator is position itself, $\mathbf{X}=x\mathbf{I}$, then, one of the eigenspaces of $\mathbf{X}$ is the delta function $\delta(x)$, which is the trivial solution. There are many other solutions for $\mathbf{X}|x\rangle=x|x\rangle$. In fact, there are as many solutions for $\mathbf{X}|x\rangle=x|x\rangle$ as there are Hermitian operators. The eigenspace of any Hermitian operator $\mathbf{L}$ is also an eigenspace of the position operator $\mathbf{X}|\ell\rangle=x|\ell\rangle$. The eigenspace of momentum operator $\mathbf{P}$ is also an eigenspace of the position operator $\mathbf{X}|p\rangle=x|p\rangle$.

Although there is no reason to choose one eigensolution over many other solutions, quantum mechanics choses the eigenspace given by the delta function as the eigenspace of the position operator $\mathbf{X}$. Quantum Mechanics chooses eigenspace of the operator $\mathbf{X}$ as the delta function,

$$|x\rangle=\delta(x) \quad (2.27)$$

There is no possible explanation for granting special privileges for the delta function and choosing it as the eigenspace of the position operator out of many equally valid eigenspaces except that this choice of the delta function as the eigenspace of the position operator fits the hidden agenda of the developers of the Quantum Mechanics and the Heisenberg Uncertainty Principle. Without this invalid choice of the eigenspace of the position operator as the delta function, there would be no Quantum Mechanics or Heisenberg Uncertainty Principle.

When $|x\rangle=\delta(x)$, from equation (2.26), we have,

$$|\Phi\rangle=\psi(x) \quad (2.28)$$

So, if the position operator is incorrectly defined as the position itself $\mathbf{X}=x\mathbf{I}$, and the eigenspace of the position operator, $|x\rangle=\delta(x)$ is falsely assumed to be unique, then, the state of a moving particle in quantum mechanics is represented by the wave function $\psi(x)$. In Quantum Mechanics, the wavefunction $\psi(x)$ suppose to provide everything we need to know about a moving particle subjected to the assumptions,

1. $\lambda=h/p$ (invalid de Broglie conjecture)
2. $E=hf$ (invalid Planck conjecture)
3. $\mathbf{X}=x\mathbf{I}$ (invalid Quantum Mechanics conjecture)

However, none of these assumptions holds; they are all invalid [1]. Light has no momentum. The energy $E\neq pc$, where p is the momentum and c is the speed of light. It is not just the speed of light that is a constant, the path of light is also fixed in a vacuum. Special Relativity derailed the light. Lorentz Transform is not unique, and as a result, the relative time and spacetime in Special Relativity are not unique. Special Relativity does not hold, $E\neq mc^2$. Light is not a particle. A particle of mass cannot behave as a wave, $\lambda\neq h/p$. Particle waves are an oxymoron. Energy cannot come in quanta, $E\neq hf$. The position operator cannot be the position itself if a particle is assumed to behave as a wave, $\mathbf{X}\neq x\mathbf{I}$.

The momentum operator $\mathbf{P}$ in quantum mechanics has been properly defined so that it is in agreement with the assumption that particles behave as waves. The eigenspace $|p\rangle$ for the momentum operator $\mathbf{P}$ is given by,

$$\mathbf{P}|p\rangle=p|p\rangle \quad (2.29)$$

where,

$$\mathbf{P}=-(j/\hbar)\partial/\partial x \quad (2.30)$$

$$|p\rangle=\exp((j/\hbar)px) \quad (2.31)$$

Since $\mathbf{P}$ is Hermitian, the eigenbasis $|p\rangle$ represents a complete orthonormal basis for state representation in the momentum domain. If the state of a particle is $|\Phi\rangle$, then, the state $|\Phi\rangle$ can also be represented as coordinates in the orthonormal eigenbasis $|p\rangle$ in the domain of the momentum $\mathbf{P}$,

$$|\Phi\rangle=\sum\Psi(p_i)|p_i\rangle,\ \forall i \quad (2.32)$$

The wavefunction $\Psi(p)$ in the momentum domain is a sequence of the coordinates $\Psi(p_i)$ given by,

$$\Psi(p)=(\Psi(p_1),\Psi(p_2),\dots) \quad (2.33)$$

The shape of $\Psi(p)$ depends on in what order the coordinates are arranged. We can reshuffle $\Psi(p_i)$ in equation (2.32) without affecting the equality giving us a new wavefunction $\Psi(p)$ for every reshuffle of $\Psi(p_i)$. Although the representation of the state of a particle is independent of the order the coordinates $\Psi(p_i)$, $\forall i$ are arranged, the shape of the wavefunction is completely determined by in which order the coordinates are arranged. The function $\Psi(p_i)$ arranged in the increasing order of p_i is the wave function of the particle in the state $|\Phi\rangle$ on the domain of the momentum operator **P**.

Since **P** is Hermitian and non-trivial, the eigenspace |p> represents a complete and unique orthonormal basis, and hence $\Psi(p_i)$ is the coordinate or the projection of the state of the particle |Φ> on the eigen-axis $|p_i>$,

$$\Psi(p_i)=<p_i|\Phi> \quad (2.34)$$

For continuous p, we have,

$$\Psi(p)=\int <p|\Phi>dx \quad (2.35)$$

Note that the $<p_i|\Phi>$ is the projection or the inner product between $|p_i>$ and |Φ>.

Under the false assumption that the eigenspace of the position operator is unique and given by the delta function δ(x), we already have from equation (2.28),

$$|\Phi>=\psi(x) \quad (2.36)$$

From the eigendecomposition of the momentum operator **P** given in eqs. (2.29) and (2.31), or directly from the assumption that a particle behaves as a wave, we have,

$$|p>=\exp((j/\hbar)px) \quad (2.37)$$

Substituting eqs. (2.36) and (2.37) in equation (2.35),

$$\Psi(p)=\int\psi(x)\exp((-j/\hbar)px)dx \quad (2.38)$$

For continuous p, the state of a particle |Φ> representation in the momentum domain **P** given in equation (2.32) can be written as,

$$|\Phi>=\int\Psi(p)|p>dp \quad (2.39)$$

The Ψ(p) arranged in the increasing order of the momentum p is the wave function Ψ(p) in the momentum domain. If the momentum p is probabilistic, this wave function Ψ(p) has no existence since there is no order of momentum p if p is probabilistic. If the momentum p is probabilistic, the wave function Ψ(p) is not continuous, and hence the equation (2.39) does not hold. The claim that the position of a moving particle is probabilistic in Quantum Mechanics is self contradictory.

Lemma:

If the momentum p is probabilistic, the wave function in the momentum domain Ψ(p) has no existence.

Under the false assumption that the eigenspace of the position operator is unique and given by the delta function δ(x), we already have from equation (2.28),

$$|\Phi>=\psi(x) \quad (2.40)$$

Substituting for |Φ> in equation (2.39), we have,

$$\psi(x)=\int\Psi(p)|p>dp \quad (2.41)$$

From the eigendecomposition of the momentum operator **P** given in eqs. (2.29) and (2.31), or directly from the assumption that a particle behaves as a wave, we have,

$$|p>=\exp((j/\hbar)px) \quad (2.42)$$

Substituting in eq. (2.41), we have,

$$\psi(x)=\int\Psi(p)\exp((j/\hbar)px)dp \quad (2.43)$$

We know that Ψ(p) is the projection of the state |Φ> of a particle on the eigenspace |p> in the momentum domain given by the momentum operator **P** in the increasing order of p. The Ψ(p) is given by,

$$\Psi(p)=\int <p|\Phi>dx \quad (2.44)$$

Since $|p>=\exp((j/\hbar)px)$, we have,

$$<p|=\exp((-j/\hbar)px) \quad (2.45)$$

From eq. (2.28) and (2.27), we have,

|Φ>= ψ(x), and |x>= δ(x).

Substituting for <p| and |Φ> in eq. (2.44), we have,

$$\Psi(p)=\int\psi(x)\exp((-j/\hbar)px)dx \quad (2.46)$$

From eq. (2.43), we already have,

$$\psi(x)=\int\Psi(p)\exp((j/\hbar)px)dp \quad (2.47)$$

According to the equations (2.46) and (2.47), the wave function ψ(x) in position domain and the wave function Ψ(p) in the momentum domain of a mass with momentum p at position x are a Fourier Transform pair provided that ψ(x) and Ψ(p) are continuous, and x and p are in the increasing order. The wave functions ψ(x) and Ψ(p) cannot be continuous if the position x and the momentum p of a particle of mass m are probabilistic. The Heisenberg Uncertainty Principle cannot hold if the position and the momentum of a particle are probabilistic.

On the other hand, the position x and momentum p must be mutually independent for ψ(x) and Ψ(p) to be a Fourier Transform pair, which is not possible since the momentum is given by the change of position at the position of the mass.

Lemma:

The position x and momentum p of a moving particle cannot be a Fourer transform pair if the position x and momentum p are probabilistic.

The momentum of a particle is the mass times the velocity, which is the rate of change of position of a particle at the position of the particle, not any other position. The position of a particle and its momentum are unique; they cannot have multiple values. The position of a particle and its momentum at the position of the particle are mutually dependent. Momentum has no existence without the position the particle is at.

For position and momentum to be a Fourier Transform pair, a mass must have an infinite number of momenta simultaneously at a given position. Similarly, the same mass must also be at infinite positions simultaneously for a given momentum. A mass at a given position cannot have a multiple number of momenta simultaneously since the mass of a particle and the position of a particle are unique. A particle at a given momentum cannot be at multiple positions simultaneously. As a result, in reality, the position and the momentum cannot be a Fourier Transform pair.

"No two entities associated with the same mass can be a Fourier Transform pair."

More importantly, as we have seen, for the wave functions pair [ψ(x), Ψ(p)] to be a Fourier Transform pair, the eigenspace of the position operator **X** must be unique and given by the delta function δ(x). Since the position operator **X** is defined to be position itself, the eigenspace of the position operator **X**=x**I** is not unique. Any eigenspace of a Hermitian operator is also a valid eigenspace of the position operator **X**. As a result, the eigenspace of the position operator cannot be chosen to be a delta function $\delta(x)$. If an equally valid different eigenspace is chosen for the position operator **X**, the wave functions pair $[\psi(x), \Psi(p)]$ is not given by the equations (2.46) and (2.47), and hence they are no longer a Fourier Transform pair. Since there are as many eigenspaces for the trivial position operator $\mathbf{X}=x\mathbf{I}$ as there are non-trivial Hermitian operators, we cannot choose the delta function $\delta(x)$ as the eigenspace of the position operator **X**. As a result, the position and momentum are not a Fourier Transform pair.

For a particle to behave as a wave, both position and momentum operators must have complementary structures that are similar and exchangeable. One operator should be able to convert to the other by the simple exchange of the observables. The position and momentum operators must be mirror symmetric for the position and momentum to be a Fourier Transform pair. Both position and momentum operators should comply with the particle wave assumption $\phi(x,p)=\exp((j/\hbar)px)$.

Lemma:

For the wave functions pair $[\psi(x), \Psi(p)]$ to be a Fourier Transform pair, the eigenspace of the position operator **X** must be unique and given by the delta function $\delta(x)$. Since the position operator **X** is defined to be position itself, the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is not unique. Although the position x and wavenumber $k=2\pi/\lambda$ of a wave are a Fourier Transform pair, the position x and momentum p of a particle are not a Fourier Transform pair.

Corollary:

Any two entities associated with the same mass cannot be a Fourier Transform pair since a mass cannot be in multiple places simultaneously. The position x is not the position of mass m unless the mass m is present at the position x. The momentum p is not the momentum of the mass m at position x unless $p=mdx/dt$. The position and the momentum of a mass are unique. A particle cannot be at multiple positions for a given momentum. A particle cannot have multiple momenta for a given position. a particle cannot be assumed to behave as a wave. A particle cannot behave as a wave. Waves cannot behave as particles. De Broglie wavelength $\lambda=h/p$ is meaningless. Light cannot be particles or photons of energy $E=hf$.

Lemma:

Light cannot exist if energy is quantized as $E=hf$ since the amplitude cannot be continuous if the energy is quantized as $E=hf$. The amplitude must be continuous for the existence of a wave.

Lemma:

There cannot be a wave-particle duality.

III. THE SHAPE OF THE WAVEFUNCTION IS NOT UNIQUE: A RESHUFFLED WAVEFUNCTION IS ALSO EQUALLY VALID

Consider an observable **L** with eigenvalue λ and the corresponding eigenvector $|\lambda\rangle$, where,

$$\mathbf{L}|\lambda\rangle=\lambda|\lambda\rangle \tag{3.1}$$

Assume that the state of a system is given by $|\Phi\rangle$. We can represent the state $|\Phi\rangle$ on the eigenspace of the observable **L** as,

$$|\Phi\rangle=\sum\psi(\lambda_i)|\lambda_i\rangle \tag{3.2}$$

where, $\psi(\lambda_i)$ is the projection of the state $|\Phi\rangle$ on the coordinate on the axes $|\lambda_i\rangle$, $\forall_i$.
The wavefunction $\psi(\lambda)$ is given by,

$$\psi(\lambda)=(\psi(\lambda_1), \psi(\lambda_2), \psi(\lambda_3) \ldots) \tag{3.3}$$

The coordinate $\psi(\lambda_i)$ in the eigenbasis representation is the component of the state $|\Phi\rangle$ of the particle on the coordinate-axis $|\lambda_i\rangle$, $\forall_i$, which are the orthonormal eigenvectors of the observable **L**,

$$\langle\lambda_i|\lambda_j\rangle=1,\ i=j \tag{3.3}$$

$$\langle\lambda_i|\lambda_j\rangle=0,\ i\neq j \tag{3.4}$$

As a result, we have,

$$\psi(\lambda_i)=\langle\lambda_i|\Phi\rangle \tag{3.5}$$

The i^{th} component of the wavefunction, $\psi(\lambda_i)$ is the projection of the state of the particle $|\Phi\rangle$ on the eigenvector or the axis $|\lambda_i\rangle$ corresponding to the eigenvalue λ_i. In other words, $\psi(\lambda_i)$ is coordinate of the state $|\Phi\rangle$ on the eigen-axis $|\lambda_i\rangle$.

According to the quantum mechanics, it is being said that the probability of observing λ_i or the $\mathrm{Prob}(\lambda_i)$ is given by,

$$\mathrm{Prob}(\lambda_i)=\psi^*(\lambda_i)\ \psi(\lambda_i) \tag{3.6}$$

where * denotes the conjugate, and $\psi(\lambda)$ is the normalized wavefunction.
Quantum mechanics claims that $\psi(\lambda)$ is the wavefunction in the domain of the observable **L**. Quantum mechanics also claims that the wavefunction propagates at the speed of light c. For that to happen, wavefunction must be unique; it must have a fixed shape or a unique shape at any given time t. In other words, the wavefunction on an eigenvector basis described by the observable **L** must be unique.

The problem is that if the wave function $\psi(\lambda)$ is defined as the projection of the state $|\Phi\rangle$ of a particle or system on the eigenvector space $|\lambda\rangle$ corresponding to the eigenvalue λ, then, $\psi(\lambda)$ is not unique. Here is why?

Consider the representation of the state $|\Phi\rangle$ on the eigenbasis of the observable **L**,

$$|\Phi\rangle=\sum\psi(\lambda_i)|\lambda_i\rangle \tag{3.7}$$

$$|\Phi\rangle=\psi(\lambda_1)|\lambda_1\rangle+\psi(\lambda_2)|\lambda_2\rangle+\psi(\lambda_3)|\lambda_3\rangle+\ldots) \tag{3.8}$$

In this case, the wavefunction $\psi(\lambda)$ is given by,

$$\psi(\lambda)=(\psi(\lambda_1), \psi(\lambda_2), \psi(\lambda_3) \ldots) \tag{3.9}$$

We can reshuffle the terms in the right side of the eqn. (3.8) without affecting the state vector $|\Phi\rangle$ on the left hand side,

$$|\Phi\rangle=\psi(\lambda_3)|\lambda_3\rangle+\psi(\lambda_2)|\lambda_2\rangle+\psi(\lambda_1)|\lambda_1\rangle+\ldots) \tag{3.10}$$

Although the state representations in both cases are the same, the wave functions resulting from them are different. There is no unique wavefunction. In which order you sum up the components of the vectors does not affect the overall result. How you add the projections $\langle\lambda_i|\Phi\rangle,\forall_i$, is immaterial. It does not matter how we reshuffle; the overall result is unaffected.

Yet, the shape of the wavefunction $\psi(\lambda)$ is determined by the order in which the projections $\psi(\lambda_i)$, $\forall_i$ are arranged. As a result, the wave function is not unique. What you have is not THE WAVEFUNCTION of a particle. What you have is A WAVEFUNCTION. How can a wavefunction $\psi(\lambda)$ propagate if it has multiple forms, or if it does not even know what it actually is?

Lemma:
By the very definition of the wave function as the projection of the state of a system on the eigenspace of the operator of an observable, the wave function is not unique. Any arbitrary arrangement of the eigenaxis coordinates represents a valid wave function.

Since wavefunction has no unique shape at any given moment t, it cannot be a wave that propagates. A wave function that is not unique cannot be a probability distribution since the probability distribution must be unique. As we are going to see later, a wave function cannot propagate even if it is unique. There is not a single wave that propagates. A single wave cannot propagate. Propagation is a dance of a couple. A single cannot tango. It takes two to tango. There is not a single field that propagates. A single field cannot propagate.

A single field cannot be disturbed. A single field is static. A single field cannot exist without a source, without being anchored to a source. There cannot be disturbances in a single field. If a single field cannot be disturbed, there cannot be gravitons, gravitational waves, Higgs particles, or Higgs waves since they are by definition disturbances in a single field. There is no reason to claim that the projections arranged in the increasing order of λ_i, $\forall_i$ is the right order for a wavefunction or the only order. Any other arrangement of the projections as a wavefunction is equally valid.

In the case of a moving particle of momentum p at position x, the wave function in quantum mechanics with the definition of the position operator as the position itself is given by,

$$\psi(x)=\int\Psi(p)\exp((j/\hbar)px)dp \qquad (3.11)$$

For the wave function $\psi(x)$ to be a wave, x must be continuous. The position of a particle cannot change from one position to another without passing all the in between positions in order. The position x of a particle cannot vary randomly. If x is probabilistic, $\psi(x)$ cannot be continuous, and x cannot be a position of a mass. No mass can disappear from one place and reappear in another place.

If the position of a particle is probabilistic, a particle cannot be assumed to behave as a wave. If a particle is assumed to behave as a wave, the position of a particle cannot be probabilistic. If the position is probabilistic, the momentum operator defined as the derivative with respect to the position cannot exist; the derivative is not defined.

Lemma:
If the position of a particle is probabilistic as conjectured in Quantum Mechanics, the wave function cannot be continuous. If the wave function is continuous, the position of the particle cannot be probabilistic.

Lemma:
If the position and momentum of a moving particle are probabilistic, a moving particle cannot be assumed to behave as a wave.

If the position x is probabilistic, x must be discrete. If the position x is discrete, the momentum operator $\mathbf{P}$ can no longer be expressed as a partial differential with respect to the position x, $\mathbf{P}\neq -j\hbar\partial/\partial x$. For the momentum operator to be defined as $\mathbf{P}=-j\hbar\partial/\partial x$, the position x cannot be probabilistic; position x must be continuous.

Lemma: The Dilemma
If the position x of a particle is probabilistic, the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is not definable. If the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is definable, the position x cannot be probabilistic.

Corollary:
The position and the momentum of a particle of mass cannot be probabilistic.

Similarly, the wave function $\Psi(p)$ is also no longer unique since the reshuffling of $\Psi(p)$ does not change the state $|\Phi\rangle$ of the particle,

$$|\Phi\rangle=\sum\Psi(p_i)|p_i\rangle \qquad (3.12)$$

We can arrange $\Psi(p_i)$ in the increasing order of p_i so that the wavefunction $\Psi(p)$ is given by,

$$\Psi(p)=(\Psi(p_1), \Psi(p_2), \Psi(p_3)\ \dots) \qquad (3.13)$$

We can also shuffle and reshuffle $\Psi(p_i)$ so that $\Psi(p)$ is given by,

$$\Psi(p)=(\Psi(p_3), \Psi(p_1), \Psi(p_2)\ \dots) \qquad (3.14)$$

We can reshuffle $\Psi(p_i)$ anyway we like and get different wave function $\Psi(p)$ without altering the state of the particle $|\Phi\rangle$ given by equation (3.12). In all these cases, even though the wavefunctions $\Psi(p)$ are different, the state $|\Phi\rangle$ of the particle remains the same. As a result, the wave function $\Psi(p)$ in the momentum domain is neither continuous nor unique. For the same reason, the wavefunction $\psi(x)$ in the position domain is neither continuous nor unique. In addition, when wave function $\psi(x)$ in position domain is neither continuous nor unique, the wave function $\Psi(p)$ in momentum domain is neither continuous nor unique and vice versa.

If the wave functions $\psi(x)$ and $\Psi(p)$ are continuous, the observables position x and the momentum p cannot be probabilistic. If x and p are probabilistic, $\psi(x)$ and $\Psi(p)$ cannot be continuous. Probability distribution cannot be a wave, and a wave cannot be a probability distribution of its variables. The representation of the square wave function as a probability distribution of an observable in quantum mechanics is self-contradictory.

The wave functions $\psi(x)$ and $\Psi(p)$ are not unique.

There are many wave functions that are equally valid. The wave functions $\psi(x)$ and $\Psi(p)$ are not guaranteed to be continuous. When wave functions $\psi(x)$ and $\Psi(p)$ are not guaranteed to be continuous, the momentum operator **P** is not defined. When momentum operator **P** cannot be defined, quantum mechanics fails.

The wave functions $\psi(x)$ and $\Psi(p)$ of a particle are not propagating waves. The functions $\psi(x)$ and $\Psi(p)$ cannot propagate. A wave anchored to a mass cannot propagate. A single function or a single field cannot propagate. Only the electromagnetic fields propagate. It requires a pair of conjugate fields for propagation. A single field cannot propagate. A single cannot tango.

Lemma:

A continuous wave function cannot be a probability distribution of its variable; if it is, then, it cannot be a continuous wave function.

Corollary:

A wave cannot be a probability distribution of its variables.

IV. EIGENSPACE OF THE POSITION OPERATOR IS NOT UNIQUE

The eigenspace represented by the delta function $\delta(x)$ is not the only eigenspace of the position operator **X**. It is one of many eigenspaces that the position operator **X** has if the position operator is defined as the position itself, $\mathbf{X}=x\mathbf{I}$. The eigenspace of the position operator is not unique.

Consider any Hermitian operator **L**. We have the eigendecomposition of **L** as,

$$\mathbf{L}|\ell\rangle=\ell|\ell\rangle \quad (4.1)$$

$$\langle\ell|\mathbf{L}|\ell\rangle=\ell \quad (4.2)$$

Where, $|\ell\rangle$ is the eigenvector corresponding to eigenvalue ℓ.

In quantum mechanics, the position operator **X** is the position itself, and hence,

$$\mathbf{X}=x\mathbf{I} \quad (4.3)$$

If we right multiply eq. (4.3) by the eigenvector $|\ell\rangle$ of the Hermitian operator **L**, we have

$$\mathbf{X}|\ell\rangle=x|\ell\rangle \quad (4.4)$$

$$\langle\ell|\mathbf{X}|\ell\rangle=x \quad (4.5)$$

This shows that the eigenspace of the Hermitian operator **L** is also an eigenspace of the position operator **X** when the position operator is defined as the position itself, $\mathbf{X}=x\mathbf{I}$, as it is done in Quantum Mechanics.

The eigenspace of any non-trivial Hermitian operator **L** is also an eigenspace of the position operator **X**. The eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is not unique.

Lemma:

The eigenspace of any non-trivial Hermitian operator **L** is unique, but an eigenspace of a trivial operator $\mathbf{X}=x\mathbf{I}$ is not unique.

Corollary:

The unique eigenspace of any nontrivial Hermitian operator is also an eigenspace of the position operator if the position operator is defined as position itself.

Lemma:

Eigenvalues are not unique.

V. POSITION AND MOMENTUM HAVE A SHARED EIGENSPACE

We have seen that the eigenspace of any Hermitian operator **L** is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$. When **L** is the momentum operator **P**, we have,

$$\mathbf{P}=(-j/\hbar)\partial/\partial x \quad (5.1)$$

$$\mathbf{P}|p\rangle=p|p\rangle \quad (5.2)$$

$$\mathbf{X}|p\rangle=x|p\rangle \quad (5.3)$$

$$\langle p|\mathbf{P}|p\rangle=p \quad (5.4)$$

$$\langle p|\mathbf{X}|p\rangle=x \quad (5.5)$$

The eigenspace $|p\rangle$ of the momentum operator **P** is also the eigenspace of the position operator **X** if the position operator is defined as the position itself, $\mathbf{X}=x\mathbf{I}$. In other words, we have,

$$|x\rangle\equiv|p\rangle \quad (5.6)$$

where, $|x\rangle$ is an eigenspace of the position operator **X**, and $|p\rangle$ is the eigenspace of the momentum operator **P**.

The momentum operator **P** and the position operator **X** have a shared eigenspace. If the operators **P** and **X** have a shared eigenspace, then, the momentum p and position x are simultaneously observable to any achievable precision without any precision tradeoff.

The operators $\mathbf{X}=x\mathbf{I}$ and $\mathbf{P}=(-j/\hbar)\partial/\partial x$ do not commute. However, the non-commutation of the operators **X** and **P** does not prevent them having a shared eigenspace since the eigenspace of the position operator is not unique when the position operator is position itself, $\mathbf{X}=x\mathbf{I}$. Even though the position operator $\mathbf{X}=x\mathbf{I}$ and the momentum operator $\mathbf{P}=(-j/\hbar)\partial/\partial x$ do not commute, they have a shared eigenspace, and hence the position x and the momentum p are simultaneously measurable.

Lemma:

The momentum p and the position x of a particle are simultaneously measurable to any achievable precision.

The position x with operator $\mathbf{X}=x\mathbf{I}$ is simultaneously measurable with any observable ℓ with the non-trivial Hermitian operator **L** since the eigenspace of any non-trivial Hermitian operator **L** is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$. The claim in quantum mechanics that the position and momentum cannot be observable simultaneously is false. This claim is based on the wrong assumption that the eigenspace of the position operator is unique and given by the delta function $\delta(x)$.

Without the delta function as the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$, the position and the momentum cannot be a Fourier Transform pair. Since the eigenspace of the position operator is not unique, position and momentum cannot be a Fourier

Transform pair. The wave functions $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain are not a Fourier Transform pair.

Most importantly, we do not have the freedom to define the position operator as we desire. We do not have the liberty to define the position operator as position itself when a particle is assumed to behave as a wave. In Quantum Mechanics, the definition of the momentum operator **P** had been correctly made according to the assumption that a particle behaves as a wave. However, once the momentum operator **P** is correctly chosen, the position operator is already predetermined, already fixed. We cannot choose the position operator as position itself.

In fact, the position and the momentum operators are predetermined by the plane wave equation when a particle is assumed to behave as a wave. The particle wave is determined by the position, momentum, and the kinetic energy of the particle while the state of the particle is determined by the Hamiltonian. We do not have any choice on the position, momentum, and the Hamiltonian operators.

The definition of the position operator as the position itself is one of the biggest mistakes in Quantum Mechanics that derailed physics into a mythical and unrealistic abyss, a phantom world. On the other hand, there is no Quantum Mechanics without the ill-definition of the position operator as the position itself.

Lemma:

The eigenspace of the momentum operator **P** is also a valid eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$. Observables, momentum and position do have a shared eigenspace.

Corollary:

Since the momentum and the position operators do have a shared eigenspace, the momentum and the position are simultaneously measurable without any precision tradeoff to any achievable precision.

VI. HEISENBER UNCERTAINTY SHENANIGANS: A FLIMFLAM (SILLY FOLLY OF HEISENBERG UNCERTAINTY PRINCIPLE)

When a particle is assumed to behave as a wave, all the operators of the observables are predetermined by the plane wave equation itself. A particle behaves as a wave determined by the position, momentum, and the kinetic energy of the particle by assumption. Under the presumption that a particle behaves as a wave, the momentum operator **P** is given by the plane wave equation as the partial derivative with respect to the position, $\mathbf{P}=-j\hbar\partial/\partial x$. When the momentum operator is given by $\mathbf{P}=-j\hbar\partial/\partial x$, we cannot choose the position operator **X** as we desire. It is not left to us to define the position operator **X**. If a particle is assumed to behave as a wave, the momentum operator **P** is not the only operator that is predetermined by the plane wave, the position operator **X** is also predetermined by the plane wave equation.

The definition of the position operator **X** in quantum mechanics as the position itself, $\mathbf{X}=x\mathbf{I}$, is contradictory to the definition of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$. There must be a symmetry between the position operator and the momentum operator since there is a symmetry of the observable x and p in the plane wave equation. If we exchange x to p, and p to x, we should be able to produce one operator from the other; the operators must be interchangeable.

The position and the momentum operators must be mirror symmetric. We should be able to obtain the position operator **X** by interchanging x and p of the momentum operator **P**. Similarly, the momentum operator **P** must be able to be obtained by exchanging x and p in the position operator **X**. If that cannot be achieved, the definition of the operators must be in error. The definition of position operator as position itself, $\mathbf{X}=x\mathbf{I}$, goes against the mirror symmetry of the position x and the momentum p in the plane wave equation of the particle if the particle is assumed to behave as a wave.

Once the assumption that a particle behaves as a wave is made, irrespective of the invalidity and meaninglessness of the assumption, all the operators of the observables are determined by the plane wave equation. The position and the momentum operators are predetermined by the wave equation.

Even though the position operator is predetermined by the wave equation, Quantum Mechanics opted for defining its own position operator as the position itself that contradicts the very assumption that a particle behaves as a wave. It is this contradictory and incorrect definition of position operator as position itself that led to a non-commutative relationship between the position and momentum operators paving the way for quantum mechanics. There would be no Quantum Mechanics if the position operator had been obtained in the same way the momentum operator had been obtained from the plane wave equation if a particle is assumed to behave as a wave.

In Quantum Mechanics as well as in Heisenberg Uncertainty Principle, the momentum operator **P** and the position operator **X** are given by,

$$\mathbf{P}=-j\hbar\partial/\partial x \qquad (6.1)$$

$$\mathbf{X}=x\mathbf{I} \qquad (6.2)$$

Heisenberg incorrectly assumes that the eigenspace $|x\rangle$ of the position operator **X** is unique and given by the delta function $\delta(x)$. We have already seen that an eigenspace $|x\rangle$ of the position operator is not unique. Since the eigenspace of any Hermitian operator is also an eigenspace of the position operator, the delta function $\delta(x)$ is one of the many equally valid eigenspaces of the position operator. As a result, it is incorrect to claim that the eigenspace of the position operator is given by the delta function $\delta(x)$.

It is this invalid choice of the position operator and the wrong assumption that the eigenspace of the position operator is unique and given by the delta function $\delta(x)$ that made the wavefunction $\psi(x)$ in position domain and the wave function $\Psi(p)$ in the momentum domain a Fourier Transform pair,

$$\Psi(p)=\int\psi(x)\exp((-j/\hbar)px)dx \quad (6.3)$$
$$\psi(x)=\int\Psi(p)\exp((j/\hbar)px)dp \quad (6.4)$$

Lemma:
Without the delta function δ(x) as the eigenspace of the position operator, there will be no Fourier Transform pair.

Lemma:
The eigenspace of the position operator is not unique. The delta function δ(x) is not the only eigenspace of the position operator, and hence, the position and momentum are not a Fourier Transform pair.

When the position wavefunction $\psi(x)$ and the momentum wave function $\Psi(p)$ are a Fourier Transform pair, their respective bandwidths, the position bandwidth Δx and the momentum bandwidth Δp satisfy the inequality,

$$\Delta x(2\Delta p/\hbar)\geq 1 \quad (6.5)$$

The Fourier Transform is bi-polar and hence the bandwidth of the Fourier Transform of $\psi(x)$ is twice the actual bandwidth Δp. This is the reason for the factor 2 in eq. (6.5).
Now, we have,

$$\Delta x\Delta p\geq \hbar/2 \quad (6.6)$$

This is the Heisenberg Uncertainty Principle, a result of series of mistakes:

1) If you assume a particle behaves as a wave, $\phi(x,p,t)=A\ \exp((j/\hbar)px)\exp((-j/\hbar)E_pt)$ under the de Broglie conjecture $\lambda=h/p$ and the Planck conjecture $E=hf$, the operators are predefined by the plane wave equation itself as $\mathbf{P}=-j\hbar\partial/\partial x$, $\mathbf{X}=-j\hbar\partial/\partial p$, and $\mathbf{E}_p=j\hbar\partial/\partial t$. We have no freedom to pick and choose the operators.
2) There is a symmetry between position x and momentum p in the plane wave equation. As a result, the correct position operator $\mathbf{X}$ and momentum operator $\mathbf{P}$ must be symmetric. By exchanging x and p, we should be able to convert one operator to the other and vice versa. The position operator $\mathbf{X}$ and momentum operator $\mathbf{P}$ in Quantum Mechanics are not symmetric by design even though they must be mirror symmetric by the assumption that a particle behaves as a wave.
3) We have no freedom to choose and define the position operator as the position itself.
4) Once the momentum operator is chosen as $\mathbf{P}=-j\hbar\partial/\partial x$ in agreement with the plane wave equation, the position operator $\mathbf{X}$ is predetermined as $\mathbf{X}=-j\hbar\partial/\partial p$. We cannot choose it as we please, $\mathbf{X}\neq x\mathbf{I}$.
5) The choice of position operator as the position itself, $\mathbf{X}=x\mathbf{I}$, contradicts the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$.
6) If the position x and the momentum p are assumed to behave as a wave, neither x nor p alone can be independent variables.
7) The position x and the momentum p must have equal status in the wave equation. Must be treated equally.
8) Both the position x and the momentum p must be mutually independent for them to behave as a wave, $\phi(x,p,t)=A\ \exp((j/\hbar)px)\exp((-j/\hbar)E_pt)$.
9) The position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$ must be symmetric. The position operator $\mathbf{X}$ cannot be the position itself, $\mathbf{X}\neq x\mathbf{I}$.
10) If the position operator is given by $\mathbf{X}=x\mathbf{I}$, the eigenspace of the position operator $\mathbf{X}$ is not unique. The delta function $\delta(x)$ is just one of the many valid eigenspaces for $\mathbf{X}=x\mathbf{I}$.
11) The delta function $\delta(x)$ is NOT THE ONLY eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$.
12) For the wave function $\psi(x)$ in the position domain and the wave function $\Psi(p)$ in the momentum domain to be a Fourier Transform pair, the eigenspace $|x\rangle$ of the position operator $\mathbf{X}$ must be unique and given by the delta function $\delta(x)$.
13) The position x and the momentum p cannot be a Fourier Transform Pair without $\delta(x)$ being the unique eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$, which can never be.
14) Eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is not unique. Operator $\mathbf{X}=x\mathbf{I}$ has no unique eigenspace. The delta function $\delta(x)$ is not the only eigenspace of the position operator $\mathbf{X}$; it is an eigenspace of $\mathbf{X}$, one of the many. And hence the position wave function $\psi(x)$ and the momentum wave function $\Psi(p)$ are not a Fourier Transform pair.
15) When the position wave function $\psi(x)$ and the momentum wave function $\Psi(p)$ are not a Fourier Transform pair, Heisenberg Uncertainty Principle is invalid.
16) The choice of position operator as position itself $\mathbf{X}=x\mathbf{I}$ contradicts the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$, and this fact itself also makes the Heisenberg Uncertainty Principle invalid.
17) Position x alone cannot be an independent variable if a particle is assumed to behave as a wave. Both x and p must be mutually independent for a particle to be assumed to behave as a wave.
18) When the position operator $\mathbf{X}$ and momentum operators $\mathbf{P}$ are correctly defined as $\mathbf{X}=-j\hbar\partial/\partial p$ and $\mathbf{P}=-j\hbar\partial/\partial x$ in accordance with the assumption that a particle behaves as a wave, then, the operators $\mathbf{X}$ and $\mathbf{P}$ commute. When operators $\mathbf{X}$ and $\mathbf{P}$ commute, there is no Heisenberg Uncertainty Principle or no Quantum Mechanics in general.

In addition, the momentum of a particle is defined at the position where the particle is at. A mass at a given position cannot have multiple momenta. To have multiple momenta, the mass must be in multiples, which is physically and realistically not possible. The position and the momentum of a particle are unique.

The direction of the momentum is determined by the direction of the change of the position at the position of the particle. A particle or a mass can be at only one position irrespective of its size. A momentum is a vector, and momentum cannot exist independent of the direction of the momentum that is determined by the change of the position of a particle. The momentum, the direction of the momentum, and the change of position of a particle are not separate entities; they are interlinked; they are not independent.

Any moving mass, irrespective of its size, has a unique position and a unique momentum. For a given momentum of a particle, the position of the particle must be unique. Similarly, for a given position of a particle, the momentum of the particle must be unique. A mass cannot be at multiple places simultaneously; it is not physically possible. A mass cannot have multiple momenta simultaneously since momentum $\mathbf{p}$ is given by $\mathbf{p}=m\mathbf{v}$, where m is the mass, and $\mathbf{v}$ is the velocity of the particle. A mass can only be at only one position with only one momentum at any given time. No mass can be at multiple states simultaneously; it is not physically possible. Any assumption must be physically possible, realistic. The invalid and meaningless claim that a particle can be in multiple states simultaneously may be OK for mystery novels and Hollywood movies where the main focus is to grab the audience for financial gain, but not in physics or science.

For the position wavefunction $\psi(x)$ and the momentum wave function $\Psi(p)$ to be a Fourier Transform pair, for a given position x, a mass m must be able to have infinitely many momenta p simultaneously, and for a given momentum p of a mass m, the same mass m must be able to be at infinite number of positions x simultaneously, which is not possible for a mass m. As a result, the position wavefunction $\psi(x)$ and the momentum wave function $\Psi(p)$ are NOT a Fourier Transform pair. Position x and momentum p of a moving mass cannot be a Fourier Transform pair.

It is the use of the delta function $\delta(x)$ as the eigenspace of the position operator $\mathbf{X}$ that made the position wavefunction $\psi(x)$ and the momentum wave function $\Psi(p)$ a Fourier Transform pair. Since the delta function $\delta(x)$ is not THE ONLY eigenspace of the position operator $\mathbf{X}$, the position wavefunction $\psi(x)$ and the momentum wave function $\Psi(p)$ are not a Fourier Transform pair. Without the eigenspace described by the delta function $\delta(x)$ being unique for the position operator $\mathbf{X}$, there will be no Heisenberg Uncertainty Principle. The eigenspace of the position operator $\mathbf{X}$ is not unique when it is the position itself.

Try with one of many eigenspaces of the position operator other than the delta function $\delta(x)$, you will not get a Fourier Transform pair. There is no lack of eigenspaces to try since eigenspace of any Hermitian operator is also an eigenspace of the position operator if the position operator is defined as the position itself, $\mathbf{X}=x\mathbf{I}$.

Do not try to define the position operator as you desire with some goal in mind. Position operator is not left for us to define when a particle is assumed to behave as a wave. Position operator is naturally fixed with its own unique eigenspace when a particle is assumed to behave as a wave. The position operator is predetermined when the momentum operator is defined as $\mathbf{P}=-j\hbar\partial/\partial x$.

Lemma:

If the position operator $\mathbf{X}$ is defined as the position itself $\mathbf{X}=x\mathbf{I}$, a particle cannot be assumed to behave as a wave. The choice of the position operator as $\mathbf{X}=x\mathbf{I}$ is incompatible and contradictory with the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ and the assumption that a particle behaves as a wave.

VII. MOTION OF A PARTICLE UNDER THE DEFINITION OF THE POSITION OPERATOR AS POSITION ITSELF ($\mathbf{X}=x\mathbf{I}$)

The theory of Quantum Mechanics in particle physics is based on the false premise that the position operator is position itself, $\mathbf{X}=x\mathbf{I}$, and the eigenspace $|x\rangle$ of the position operator $\mathbf{X}|x\rangle=x|x\rangle$ is unique and given by the delta function, $|x\rangle=\delta(x)$. If the position operator is defined incorrectly and contradictory to the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ as the position itself, the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is not unique. The eigenspace of any Hermitian operator of an observable is unique except when the operator of the observable is observable itself. The eigenspace of any Hermitian operator is also an eigenspace of the position operator when the position operator is incorrectly defined as the position itself.

It is noteworthy that the definition of the position operator as the position itself is not only a contradiction to the definition of the momentum operator but also goes against the fundamental assumption in Quantum Mechanics that a moving particle behaves as a wave, which is indeed meaningless. Moving particles do not behave as waves. Moving charge particles generate waves; these generated waves are not particle waves. The eigenspace of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is also a valid eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$.

The eigenfunction $|p\rangle$ corresponding to the eigenvalue p of the momentum operator is given by,

$$\mathbf{P}=-j\hbar\partial/\partial x \qquad (7.1)$$

$$\mathbf{P}|p\rangle=p|p\rangle \qquad (7.2)$$

$$\langle p|\mathbf{P}|p\rangle=p \qquad (7.3)$$

where, eigenfunction $|p\rangle$ is given by,

$$|p\rangle=\exp((j/\hbar)px) \qquad (7.4)$$

The eigenfunction $|x\rangle$ corresponding to the eigenvalue x of the position operator is given by,

$$\mathbf{X}=x\mathbf{I} \qquad (7.5)$$

$$\mathbf{X}|x\rangle=x|x\rangle \qquad (7.6)$$

$$\langle x|\mathbf{X}|x\rangle=x \qquad (7.7)$$

Since the eigenspace $|p\rangle$ of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is also an eigenspace of position operator $\mathbf{X}=x\mathbf{I}$, we have,

$$|x\rangle\equiv|p\rangle \qquad (7.8)$$

Substituting in eq. (7.6), we have,

$$\mathbf{X}|p\rangle=x|p\rangle \qquad (7.9)$$

$$\langle p|\mathbf{X}|p\rangle=x \qquad (7.10)$$

Two different operators can have a shared

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eigenspace if one of the two operators is the observable itself. As a result, the eigenspace of the momentum operator can also be the eigenspace of the position operator and the projection of the state of the particle $|\Phi>$ onto the eigenspace $|x>$ of the position operator, which is the wavefunction $\psi(x)$, can also be identical to the projection of the state $|\Phi>$ onto the eigenspace $|p>$ of the momentum operator, which is the wavefunction $\Psi(p)$,

$$\psi(x)\equiv\Psi(p) \quad (7.11)$$

Since the eigenspace of the position operator can also be the delta function $\delta(x)$, we also have $\psi(x)\equiv|\Phi>$, which is given in equation (2.28). The eigenspace $|p>$ and the eigenspace delta function $\delta(x)$ are equally valid for the position operator $\mathbf{X}=x\mathbf{I}$. From this it is clear that the wavefunction $\psi(x)$ is not unique. When eigenspace of the position operator is chosen to be the delta function $\delta(x)$, $\psi(x)$ and $\Psi(p)$ are a Fourier Transform pair. However, when eigenspace of the position operator is chosen as the eigenspace of the momentum operator, $\psi(x)$ and $\Psi(p)$ are the same, and they are not a Fourier Transform pair.

Lemma:
The wavefunction $\psi(x)$ is not unique.

When the eigenspace of the position operator is chosen rightfully to be the same as the eigenspace of the momentum operator, the wavefunction in the momentum domain overlaps with the wavefunction in the position domain. Both $\psi(x)$ and $\Psi(p)$ are the same function of x and p.

Since $|x>\equiv|p>$ and $|p>=\exp((j/\hbar)px)$, we have,

$$<x|p>=1 \quad (7.12)$$

$$<p|x>=1 \quad (7.13)$$

Note that $<x|p>$ and $<p|x>$ are not a conjugate pair. They are a conjugate pair only when an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is chosen to be the delta function $\delta(x)$.

The wavefunction $\psi(x)$ in the position domain is given by,

$$\psi(x)=\int<x|p><p|\Phi>dp \quad (7.14)$$

$$\psi(x)=\int<x|p>\Psi(p)dp \quad (7.15)$$

Since $<x|p>=1$, we have,

$$\psi(x)=\int\Psi(p)dp \quad (7.16)$$

The wavefunction $\psi(x)$ is the average of the wavefunction $\Psi(p)$ in momentum domain.

Similarly, the wavefunction $\Psi(p)$ in momentum domain is given by,

$$\Psi(p)=\int<p|x><x|\Phi>dx \quad (7.17)$$

$$\Psi(p)=\int<p|x>\psi(x)dx \quad (7.18)$$

Since $<p|x>=1$, we have,

$$\Psi(p)=\int\psi(x)dx \quad (7.19)$$

The wavefunction $\Psi(p)$ in the momentum domain is the average of the wavefunction $\psi(x)$ in position domain.

The wavefunction $\psi(x)$ is the projection of the state vector $|\Phi>$ onto the eigenspace $|x>$ and the wavefunction $\Psi(p)$ is the projection of the same state vector $|\Phi>$ onto the eigenspace $|p>$,

$$\psi(x)=<x|\Phi> \quad (7.20)$$

$$\Psi(p)=<p|\Phi> \quad (7.21)$$

Since $|x>\equiv|p>$, we have,

$$\psi(x)\equiv\Psi(p) \quad (7.22)$$

In Quantum Mechanics, out of nowhere, without any acceptable reason, position and momentum are proclaimed to be probabilistics. The probability $Prob(x)$ of observing the position x, and the probability $Prob(p)$ of observing the momentum p are proclaimed to be given by,

$$Prob(x)=\psi^*(x)\psi(x) \quad (7.23)$$

$$Prob(p)=\Psi^*(p)\Psi(p) \quad (7.24)$$

where, $\psi(x)$ and $\Psi(p)$ are normalized wave functions.

As we are going to see later, this probabilistic view in Quantum Mechanics is meaningless since there is no probability involved in the orthonormal eigenbasis representation.

Lemma:
If the position and momentum are probabilistic, a particle cannot be assumed to behave as a wave and vice versa.

The eigenspace of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$. For a given particle at position x with momentum p, both the momentum and the position are simultaneously measurable to any achievable precision with no precision tradeoff. There is no inherent uncertainty in the presence of a shared eigenspace. The precision of the measuring position is unaffected by the precision of measuring the momentum. There is no inherent uncertainty between the position x and the momentum p.

Lemma:
Two different Hermitian operators can have a shared eigenspace if one of the two operators is the observable itself.

VIII. POSITION OPERATOR IS DETERMINED BY THE MOMENTUM OPERATOR AND VICE VERSA

It is not us to proclaim what the position operator should be. We cannot justifiably claim position operator is position itself as it is done in Quantum Mechanics. If the position operator is defined as the position itself, a particle cannot be assumed to behave as a wave and vice versa.

Once the momentum operator is chosen, the position operator is already fixed by the momentum operator. Once it is assumed that a particle behaves as a wave, both the position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$ are prefixed and described by the plane wave equation.

In Quantum Mechanics, the momentum operator $\mathbf{P}$ is correctly chosen according to the assumption that a particle behaves as a wave of wavelength, $\lambda=h/p$,

$$\mathbf{P}=-j\hbar\partial/\partial x \quad (8.1)$$

In Quantum Mechanics, the observable, momentum p of a particle is given by the eigenvalue of the momentum operator $\mathbf{P}$,

$$\mathbf{P}\phi(x,p)=p\phi(x,p) \quad (8.2)$$

where, $\phi(x,p)$ is the eigenfunction corresponding to the

eigenvalue p at position x.
Since $\mathbf{P}=-j\hbar\partial/\partial x$, substituting for $\mathbf{P}$ in equation (8.2), we have,

$$-j\hbar\partial\phi(x,p)/\partial x=p\phi(x,p) \quad (8.3)$$

The solution to the equation (8.3) is given by,

$$\phi(x,p)=\exp((j/\hbar)px) \quad (8.4)$$

The eigenfunction $\phi(x,p)$ is in fact the time independent part of the plane wave equation for a free moving particle if a particle is assumed to behave as a wave of wavelength $\lambda=h/p$.

When we have the time independent part of the plane wave equation $\phi(x,p)=\exp((j/\hbar)px)$ under the assumption that the momentum operator is given by $\mathbf{P}=-j\hbar\partial/\partial x$, we have no freedom to define the position operator $\mathbf{X}$ as we desire. We cannot choose the position operator $\mathbf{X}$ as position itself, $\mathbf{X}\neq x\mathbf{I}$. The variation of the position x and momentum p are both governed by the eigenfunction $\phi(x,p)=\exp((j/\hbar)px)$.

The partial derivative of the eigenfunction $\phi(x,p)$ of the momentum operator $\mathbf{P}$ with respect to the momentum p is given by,

$$\partial\phi(x,p)/\partial p=(j/\hbar)x\phi(x,p) \quad (8.5)$$

$$-j\hbar\partial\phi(x,p)/\partial p=x\phi(x,p) \quad (8.6)$$

$$\mathbf{X}\phi(x,p)=x\phi(x,p) \quad (8.7)$$

$$\mathbf{X}=-j\hbar\partial/\partial p \quad (8.8)$$

The position operator $\mathbf{X}$ of the position observable x is given by $\mathbf{X}=-j\hbar\partial/\partial p$. In other words, once the momentum operator $\mathbf{P}$ is chosen to be $\mathbf{P}=-j\hbar\partial/\partial x$, the position operator $\mathbf{X}$ is already fixed. We have no freedom to specify both position and momentum operators. Once a particle is assumed to behave as a wave, both position and momentum operators are given by the plane wave equation of the particle of momentum p at position x, which is $\phi(x,p)=\exp((j/\hbar)px)$.

The operators $\mathbf{P}$ and $\mathbf{X}$ are complementary symmetric; one is the partial derivative with respect to the other; that should be the case if the position x and momentum p are to be assumed to behave as a wave. The momentum operator $\mathbf{P}$ is given by the partial derivative $\partial/\partial x$ with respect to the position x, and the position operator $\mathbf{X}$ is given by the partial derivative $\partial/\partial p$ with respect to the momentum p.

This agrees with the symmetry of the plane wave equation if the particle is assumed to behave as a wave. The position operator $\mathbf{X}$ cannot be position itself if the momentum operator is given by $\mathbf{P}=-j\hbar\partial/\partial x$.

$$\mathbf{P}=-j\hbar\partial/\partial x \quad (8.9)$$

$$\mathbf{X}=-j\hbar\partial/\partial p \quad (8.10)$$

$$\mathbf{X}\neq x\mathbf{I} \quad (8.11)$$

The eigen-relationships are given by,

$$\mathbf{P}\phi(x,p)=p\phi(x,p) \quad (8.12)$$

$$\mathbf{X}\phi(x,p)=x\phi(x,p) \quad (8.13)$$

The eigenspace |x> of position operator $\mathbf{X}$ is $\phi(x,p)$. The eigenspace |p> of momentum operator $\mathbf{P}$ is $\phi(x,p)$.

The wavefunction $\psi(x)$ of a particle is the projection of the state vector $|\Phi\rangle$ onto the eigenspace |x> in the domain of the position operator $\mathbf{X}$. The wavefunction $\Psi(p)$ is the projection of the same state vector $|\Phi\rangle$ onto the eigenspace |p> in the domain of the momentum operator $\mathbf{P}$, where,

$$\psi(x)=\langle x|\Phi\rangle \quad (8.14)$$

$$\Psi(p)=\langle p|\Phi\rangle \quad (8.15)$$

Since $|x\rangle\equiv|p\rangle$, we have,

$$\psi(x)\equiv\Psi(p) \quad (8.16)$$

As a result, If you follow the incomprehensible and meaningless probabilistic definition of Quantum Mechanics, the probability Prob(x) of observing position x is the same as the probability Prob(p) of observing momentum p,

$$\text{Prob}(x)=\text{Prob}(p) \quad (8.17)$$

Both the momentum operator $\mathbf{P}$ and the position operator $\mathbf{X}$ have the shared eigenspace $\phi(x,p)=\exp((j/\hbar)px)$. Since momentum operator $\mathbf{P}$ and position operator $\mathbf{X}$ have a shared eigenspace, momentum p and position x are simultaneously measurable to any achievable precision with no precision tradeoff.

The delta function, $\delta(x)$ is not an eigenfunction of the position operator $\mathbf{X}$ since $\mathbf{X}=-j\hbar\partial/\partial p$ and $\mathbf{X}\neq x\mathbf{I}$. When the delta function $\delta(x)$ cannot be the eigenspace of the position operator $\mathbf{X}$, wavefunction $\psi(x)$ in position domain and the wavefunction $\Psi(p)$ in the momentum domain cannot be a Fourier Transform pair. The position x and the momentum p are not a Fourier Transform pair. There is no inherent uncertainty in the position x and the momentum p. The Heisenberg uncertainty Principle is false.

The position operator is predetermined by the plane wave equation $\phi(x,p)=\exp((j/\hbar)px)$ itself once the particle is assumed to behave as a wave, which is the eigenspace for all the observables at any state of a particle. A particle cannot have different eigenspaces for different observables once the particle is assumed to behave as a wave; that is not possible.

If a particle is assumed to behave as a wave, the plane wave equation at any time t is given by,

$$\phi(x,p,E_p,t)=A\exp((j/\hbar)px)\exp((-j/\hbar)E_pt) \quad (8.18)$$

Where, E_p is the kinetic energy of the particle.
Differentiating with respect to x, p, and t, we have,

$$-j\hbar\partial\phi(x,p,E_p,t)/\partial x=p\phi(x,p,E_p,t) \quad (8.19)$$

$$-j\hbar\partial\phi(x,p,E_p,t)/\partial p=x\phi(x,p,E_p,t) \quad (8.20)$$

$$j\hbar\partial\phi(x,p,E_p,t)/\partial t=E_p\phi(x,p,E_p,t) \quad (8.21)$$

$$j\hbar\partial\phi(x,p,E_p,t)/\partial E_p=t\phi(x,p,E_p,t) \quad (8.22)$$

$$\mathbf{P}=-j\hbar\partial/\partial x \quad (8.23)$$

$$\mathbf{X}=-j\hbar\partial/\partial p \quad (8.24)$$

$$\mathbf{E}_p=j\hbar\partial/\partial t \quad (8.25)$$

$$\mathbf{T}=j\hbar\partial/\partial E_p \quad (8.26)$$

where, $\phi(x,p,E_p,t)$ is the shared eigenfunction of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$, the position operator $\mathbf{X}=-j\hbar\partial/\partial p$, the kinetic energy operator $\mathbf{E}_p=j\hbar\partial/\partial t$, and the time operator $\mathbf{T}=j\hbar\partial/\partial E_p$,

$$\mathbf{X}\phi(x,p,E_p,t)=x\phi(x,p,E_p,t) \quad (8.27)$$

$$\mathbf{P}\phi(x,p,E_p,t)=p\phi(x,p,E_p,t) \quad (8.28)$$

$$\mathbf{E}_p\phi(x,p,E_p,t)=E_p\phi(x,p,E_p,t) \quad (8.29)$$

$$\mathbf{T}\phi(x,p,E_p,t)=t\phi(x,p,E_p,t) \quad (8.30)$$

Note that the time operator $\mathbf{T}$ is the derivative with respect to the kinetic energy E_p of the particle. It is not just the time alone that is an independent variable, the kinetic energy of a particle is also an independent variable. Both time t and kinetic energy E_p are mutually independent. The time operator $\mathbf{T}$ cannot be time itself, $\mathbf{T}\neq t\mathbf{I}$. If you want to represent the observables as operators, the operators of all the observables must be consistent with the assumption that a moving particle behaves as a wave.

Separating the plane wave equation of a particle into time independent and space independent parts, we have,

$$\phi(x,p,E_p,t)=A\ \phi(x,p)\phi(E_p,t) \quad (8.31)$$
$$\phi(E_p,t)=\exp((-j/\hbar)E_pt) \quad (8.32)$$
$$\phi(x,p)=\exp((j/\hbar)px) \quad (8.33)$$
$$\mathbf{P}\phi(x,p)=p\phi(x,p) \quad (8.34)$$
$$\mathbf{X}\phi(x,p)=x\phi(x,p) \quad (8.35)$$
$$\mathbf{E}_p\phi(E_p,t)=E_p\phi(E_p,t) \quad (8.36)$$
$$\mathbf{T}\phi(E_p,t)=t\phi(E_p,t) \quad (8.37)$$

All the operators are determined by the plane wave of a moving particle $\phi(x,p,E_p,t)=A\ \exp((j/\hbar)px)\exp((-j/\hbar)E_pt)$ if the particle is assumed to behave as a wave. All the operators have a shared eigenspace, which is the particle wave,

$\phi(x,p,E_p,t)=A\ \exp((j/\hbar)px)\exp((-j/\hbar)E_pt)$,

defined by the position and the momentum of the particle.

Lemma:

A natural system cannot have different eigenspaces for different observables of the same system. All the operators of observables of any natural system must consist of a shared eigenspace.

Corollary:

For an observable to be an observable in reality, the eigenspace of the operator of the observable must be unique.

Corollary:

Any system that does not have a shared eigenspace for all the observables of the system cannot exist in reality. Such a system cannot exist even hypothetically.

Corollary:

Quantum Mechanics is not real, Quantum Mechanics cannot exist even hypothetically. Quantum Mechanics is not even a theory.

IX. APOCRYPHAL SCHRODINGER EQUATION

The plane wave equation for a wave of frequency f and the wavelength λ is given by,

$$\phi(x,k,f,t)=A\ \exp(jkx)\exp(-\omega t) \quad (9.1)$$

Where the wave number $k=2\pi/\lambda$ and $\omega=2\pi f$. Wave equation deals with the position x, wavelength λ and frequency f. In the wave equation, all the x, k, f, and t are mutually independent. For a given value of any variable, any of the other variables can have an infinite number of values with no contradiction.

However, a moving particle deals with the position x, momentum p, and kinetic energy E_p. If you make a meaningless claim that a moving particle behaves as a wave, then, you must find a way to express or relate wavelength λ of the wave equation to the momentum p, and the frequency f of the wave equation to the kinetic energy E_p of a particle at position x. Quantum Mechanics achieved these by two conjectures.

In an effort to express the observed blackbody radiation through a small hole, Planck made a meaningless conjecture that the energy of a system comes in packets or quanta given by $E=hf$, where E is the energy, h is considered a constant and f is the frequency. Problem with the Planck spectrum is that it is cavity dependent [1]. Spectrum of a blackbody cannot be cavity dependent.

Einstein went one step further and made another false and meaningless claim that the light also comes in energy quanta or photons given by $E=hf$. Einstein used the Boltzmann entropy formula in his photon derivation. The problem is that the Boltzmann entropy does not apply to light since light has no temperature. Einstein's derivation of photons is invalid. Light has no energy. Light has no entropy. Light has electromagnetic potential energy. Potential energy is not energy until it is converted to energy.

After seeing Einstein's light particles or photons, de Broglie hypothesized that if light behaves as particles, particles must also behave as waves given by wavelength $\lambda=h/p$, Even though the the idea that a particle has a wavelength given by $\lambda=h/p$ simply ridiculous, with that the particle waves were born.

However, it is important to note that the Planck spectrum is not a spectrum since Planck spectrum is cavity dependent, and its derivation is incorrect, Einstein's photon derivation is invalid since light has no temperature and hence no entropy, and de Broglie conjecture is meaningless since $E\neq pc$, and the energy is not quantized and the Planck's conjecture is incorrect, $E\neq hf$ [1]. Although the concept of particle-wave is simply a voodoo claim that is meaningless, modern physics is grounded on that and there are many religious believers.

In Quantum Mechanics, the so-called particle wave is obtained by substituting $\lambda=h/p$ and $f=E_p/h$ in the plane wave equation in place of λ and f,

$$\phi(x,p,E,t)=A\ \exp((j/\hbar)px)\exp(-(j/\hbar)E_pt) \quad (9.2)$$

where $\hbar=h/2\pi$.

Since the momentum p and the position x are attached or inherent to a mass m that cannot be at multiple places simultaneously, position x and momentum p cannot have multiple values simultaneously. A mass cannot be at multiple places simultaneously. The position x, the momentum p, and the kinetic energy E_p of a moving mass m must be unique at any given time t.

Quantum Mechanics is founded under two conjectures,

$$E=hf \text{ or } E=\hbar\omega \quad (9.3)$$
$$\lambda=h/p \text{ or } p=\hbar k \quad (9.4)$$

It is important to note that a particle of mass m and momentum p does not have sufficient energy to behave as a wave of wavelength $\lambda=h/p$ since a mass cannot have a constant speed or constant momentum from the start. A mass has to accelerate from standstill to reach a constant speed, and hence a mass only has half the energy required for a particle of momentum p to have de Broglie wavelength. A particle of mass cannot be at de Broglie wavelength $\lambda=h/p$.

A particle with momentum p and kinetic energy E_p at position x is assumed to behave as a wave described by,

$$\phi(x,p,E_p,t)=A\phi(x,p)\phi(E_p,t) \quad (9.5)$$

$$\phi(x,p)=\exp((j/\hbar)px) \quad (9.6)$$

$$\phi(E_p,t)=A\exp(-(j/\hbar)E_pt) \quad (9.7)$$

The time dependent part of the wave equation for a particle with momentum p and kinetic energy E_p is given by,

$$\phi(E_p,t)=A\exp(-(j/\hbar)E_pt) \quad (9.13)$$

where, $E_p=p^2/2m$.

By taking the partial differential of $\phi(E_p,t)$ with respect to time t, and with respect to E_p, we have,

$$\partial\phi(E_p,t)/\partial t=(-j/\hbar)E_p\phi(E_p,t) \quad (9.14)$$

$$j\hbar\partial\phi(E_p,t)/\partial t=E_p\phi(E_p,t) \quad (9.15)$$

$$\mathbf{E}_p\phi(E_p,t)=E_p\phi(E_p,t) \quad (9.16)$$

$$\mathbf{E}_p=j\hbar\partial/\partial t \quad (9.17)$$

$$\mathbf{T}=j\hbar\partial/\partial E_p \quad (9.18)$$

Note that the eigenvalue of the operator $j\hbar\partial/\partial t$ is equal to kinetic energy of the particle E_p, not to the total energy E given by the eigenvalues of the Hamiltonian $\mathbf{H}$, where $\mathbf{H}=\mathbf{E}_p+V(x)$. It is important to note that,

$j\hbar\partial\phi(E_p,t)/\partial t\neq E\phi(E_p,t)$,

$j\hbar\partial\phi(E_p,t)/\partial t=E_p\phi(E_p,t)$.

In Quantum Mechanics, if a particle is assumed to behave as a wave, then the time t is an eigenvalue of the time operator $\mathbf{T}=j\hbar\partial/\partial E_p$, and hence for the time to exist, the the differential $\partial/\partial E_p$ must exist. For the time operator $\mathbf{T}=j\hbar\partial/\partial E_p$ to exist, the kinetic energy E_p of the particle must be continuous, which is a contradiction to the claim if Quantum Mechanics that the energy is quantized. The assumption that a particle behaves as a wave cannot be made if the energy is quantized.

Lemma:

If a particle is assumed to behave as a wave and the momentum and energy are assumed to be quantized, then, the time and the position cannot be continuous.

The very idea of a moving particle behaving as a wave contradicts the assumption that the momentum and energy of a particle are quantized. If a particle behaves as a wave, the time is the eigenvalue of the time operator $\mathbf{T}=j\hbar\partial/\partial E_p$. If the time is an eigenvalue of the time operator $\mathbf{T}=j\hbar\partial/\partial E_p$, time cannot be relative. Quantum Mechanics and Special Relativity are in mutual contradiction.

For a particle at position x having a momentum p, we have,

$$\mathbf{P}\phi(x,p,E_p,t)=p\phi(x,p,E_p,t) \quad (9.19)$$

$$\mathbf{X}\phi(x,p,E_p,t)=x\phi(x,p,E_p,t) \quad (9.20)$$

$$\mathbf{E}_p\phi(x,p,E_p,t)=E_p\phi(x,p,E_p,t) \quad (9.21)$$

$$\mathbf{T}\phi(x,p,E_p,t)=t\phi(x,p,E_p,t) \quad (9.22)$$

$$\mathbf{P}=-j\hbar\partial/\partial x \quad (9.23)$$

$$\mathbf{X}=-j\hbar\partial/\partial p \quad (9.24)$$

$$\mathbf{E}_p=j\hbar\partial/\partial t \quad (9.25)$$

$$\mathbf{T}=j\hbar\partial/\partial E_p \quad (9.26)$$

All the operators, the position operator $\mathbf{X}$, the momentum operator $\mathbf{P}$, the kinetic energy operator $\mathbf{E}_p$ have a shared eigenfunction, which is the plane wave equation, $\phi(x,p,E_p,t)=A\exp((j/\hbar)px)\exp(-(j/\hbar)E_pt)$, where A is the amplitude.

The state of the particle $|\Phi\rangle$ is described by the the eigenspace of the Hamiltonian operator $\mathbf{H}$ of the system given by $\mathbf{H}=\mathbf{E}_p+V(x)$. The state of the particle $|\Phi\rangle$ at any time t is given by,

$$\mathbf{H}|\Phi\rangle=E|\Phi\rangle \quad (9.27)$$

$$\mathbf{H}=\mathbf{E}_p+V(x) \quad (9.28)$$

The energy E of the system is the eigenvalue of the Hamiltonian $\mathbf{H}$ of the system. The Hamiltonian $\mathbf{H}$ for a system (a moving particle in a potential) that consists of a particle of mass m with momentum p at the potential $V(x)$ at position x is given by,

$$\mathbf{H}|\Phi\rangle=(1/2m)\mathbf{P}^2|\Phi\rangle+V(x)|\Phi\rangle \quad (9.29)$$

where $|\Phi\rangle$ is the eigenfunction of the Hamiltonian $\mathbf{H}$.

What Quantum Mechanics does is, it represents the state $|\Phi\rangle$ of the moving particle in the eigenspaces of observables.

The eigenfunction/eigenvector $|\Phi\rangle$ of the Hamiltonian $\mathbf{H}$ is also the wavefunction $\psi(x)$ of the particle in the position domain if and only if the position operator is chosen to be the position itself, $\mathbf{X}=x\mathbf{I}$. The wave function $|\Phi\rangle$ represents the state of the particle for a particle of momentum p in a potential $V(x)$ at any time t. The state of the particle $|\Phi\rangle$ can be represented as the superposition of the plane wave $\phi(x,p)=\exp((j/\hbar)px)$ for a particle of momentum p and kinetic energy E_p.

If we represent the state $|\Phi\rangle$ in the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ as defined in Quantum Mechanics, we get the wavefunction $\psi(x)$ in the position domain,

$$\psi(x)=|\Phi\rangle \quad (9.30)$$

Similarly, if we represent the state $|\Phi\rangle$ of the moving particle in the eigenspace of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$, we get the wavefunction $\Psi(p)$ in the momentum domain,

$$\Psi(p)=\int\psi(x)\exp((-j/\hbar)px)dx \quad (9.31)$$

$$\psi(x)=\int\Psi(p)\exp((j/\hbar)px)dp \quad (9.32)$$

Since $\mathbf{P}=-j\hbar\partial/\partial x$, we have,

$$\mathbf{H}|\Phi\rangle=\mathbf{E}_p|\Phi\rangle+V(x)|\Phi\rangle \quad (9.33)$$

$$\mathbf{H}|\Phi\rangle=(-1/2m)\hbar^2\partial^2(|\Phi\rangle)/\partial x^2+V(x)|\Phi\rangle \quad (9.34)$$

The Hamiltonian operator, $\mathbf{H}=\mathbf{E}_p+V(x)$, of the system for a moving mass m at potential $V(x)$ is given by,

$$\mathbf{H}=(-1/2m)\hbar^2\partial^2/\partial x^2+V(x) \quad (9.35)$$

Although particle waves are derived from the electromagnetic plane waves that propagate, the particle waves cannot propagate. Unlike the electromagnetic waves, a particle wave is single. A single wave cannot propagate. A single field cannot propagate. No disturbance can be generated in a single field. There are no propagating disturbances in a single field. Propagation requires a conjugate partner. Solution to the Schrodinger equation is single and cannot propagate. The wave function in the domain of an observable of a moving particle is not a propagating one.

Lemma:

Wavefunction of a particle cannot propagate. The so-called particle waves cannot propagate.

Lemma:

Since all the operators have a shared eigenspace, observables are simultaneously measurable. The position x and the momentum p are simultaneously measurable.

If the momentum operator is $\mathbf{P}$=-jħ∂/∂x, the position operator cannot be position itself, $\mathbf{X}$≠x$\mathbf{I}$. The choice of $\mathbf{X}$=x$\mathbf{I}$ is illegitimate and contradictory to the momentum operator $\mathbf{P}$=-jħ∂/∂x. In addition, if the position operator is position itself, the eigenspace is not unique. Quantum Mechanics as a theory falls apart when the eigenspace of the position operator $\mathbf{X}$ is not unique.

There is no Quantum Mechanics if the eigenspace of any of the operators is not unique. Quantum Mechanics cannot hold since the eigenspace of the position operator $\mathbf{X}$=x$\mathbf{I}$ is not unique. The position operator that is in compliance with the momentum operator $\mathbf{P}$=-jħ∂/∂x is $\mathbf{X}$=-jħ∂/∂p, and they commute. There is no Quantum Mechanics when the operators commute.

Eigenvalues of operators cannot be used to estimate the observables since the eigenvalues are not unique. Any scalar multiplied eigenvalue is also an eigenvalue. Eigenvalues can only play a role in parameter estimation when the eigenvalues are complex and the phase carries the information about the parameters as in the case of direction of arrival (DOA) of electromagnetic waves in antenna arrays.

When the position operator is chosen correctly in agreement with the momentum operator, the position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$ commute, and they share the same eigenspace. As a result, the wavefunction ψ(x) in the position domain is the same as the wavefunction Ψ(p) in the momentum domain, ψ(x)≡Ψ(p). Whether the position operator is defined to be $\mathbf{X}$=x$\mathbf{I}$ in contrary to the momentum operator or chosen as $\mathbf{X}$=-jħ∂/∂p in agreement with the momentum operator, the wavefunction ψ(x) in the position domain and the wavefunction Ψ(p) in the momentum domain are not a Fourier Transform pair. There is no uncertainty principle. Heisenberg Uncertainty Principle does not exist. There is no probability involved here. All the operators have a shared eigenspace.

For the momentum operator to be defined as $\mathbf{P}$=-jħ∂/∂x, the differential ∂/∂x must exist. If position x is probabilistic, differential ∂/∂x is not defined. As a result, if the observable position x is probabilistic, the momentum operator $\mathbf{P}$ has no existence. If the momentum operator $\mathbf{P}$ has an existence, the observable position x cannot be probabilistic. The position x must be continuous for the momentum operator $\mathbf{P}$ to exist. The claim that the observable x is probabilistic contradicts the very definition of the momentum operator $\mathbf{P}$ in Quantum Mechanics.

Corollary:

The momentum operator $\mathbf{P}$=-jħ∂/∂x cannot exist if the position x is probabilistic. For the momentum operator $\mathbf{P}$=-jħ∂/∂x to exist, the position x must be continuous. If the position x is probabilistic, the position x cannot be continuous and vice versa. A variable cannot be both probabilistic and continuous.

In Quantum Mechanics, the position operator $\mathbf{X}$ is chosen to be the position itself, $\mathbf{X}$=x$\mathbf{I}$. In this case, the eigenspace of $\mathbf{X}$ is not unique. The eigenspace of the momentum operator $\mathbf{P}$=-jħ∂/∂x is unique. The eigenspace of the momentum operator $\mathbf{P}$=-jħ∂/∂x is also a legitimate eigenspace of the illegitimate position operator $\mathbf{X}$=x$\mathbf{I}$. The momentum operator $\mathbf{P}$=-jħ∂/∂x shares its eigenspace with the illegitimate position operator $\mathbf{X}$=x$\mathbf{I}$. As a result, the position x and the momentum p are simultaneously measurable even though the illegitimate position operator $\mathbf{X}$=x$\mathbf{I}$ and the legitimate momentum operator $\mathbf{P}$=-jħ∂/∂x do not commute.

The non-commutation of the operators of two observables do not preclude the simultaneous measurability of the observables if one of the two operators is observable itself. Non-commutation of two observables only matters for the simultaneous observability of the two observables if and only if none of the observables is the observable itself, or none of the observables is trivial. In Quantum Mechanics, the position operator is ill-defined to be position itself, $\mathbf{X}$=x$\mathbf{I}$, and hence non-commutation of $\mathbf{X}$ and $\mathbf{P}$ is simply immaterial for the simultaneous observability without precision tradeoff.

Wavefunction ψ(x) in the position domain and the wavefunction Ψ(p) in the momentum domain are not a Fourier Transform pair. The position x and the momentum p are not a Fourier Transform pair. The position x and the momentum p are simultaneously measurable to any achievable precision even though operators $\mathbf{X}$ and $\mathbf{P}$ do not commute when the position operator $\mathbf{X}$ is ill-defined to be position itself, $\mathbf{X}$=x$\mathbf{I}$.

Lemma:

The position and momentum of a particle are simultaneously measurable without any tradeoff to any achievable precision.

X. WAVE FUNCTIONS ψ(x) AND Ψ(p) ARE NEVER A FOURIER TRANSFORM PAIR

For the wavefunction ψ(x) in the position domain x and the wavefunction Ψ(p) in the momentum domain p to be a Fourier Transform pair, the eigenspace of the position operator must be unique and given by the delta function δ(x). If the position operator is position itself $\mathbf{X}$=x$\mathbf{I}$, the delta function δ(x) is an eigenspace of the position operator, but it is not unique. Further, If the position operator is position itself $\mathbf{X}$=x$\mathbf{I}$, the momentum operator cannot be $\mathbf{P}$=-jħ∂/∂x. If the momentum operator is $\mathbf{P}$=-jħ∂/∂x, the position operator cannot be position itself, $\mathbf{X}$≠x$\mathbf{I}$. The position x and momentum p cannot be a Fourier Transform pair.

In addition, for the wavefunction ψ(x) in the position domain x and the wavefunction Ψ(p) in the momentum domain p to be a Fourier Transform pair, the position x and the momentum p of a particle must be mutually independent. However, the position x of a particle is determined by the momentum momentum p, and the momentum p is determined by the rate of change of the position dx/dt at the position x, and as a result, the position and momentum of a particle cannot be mutually independent. The position x cannot have multiple values for a given momentum p, and the momentum p cannot have multiple values for a given position x. The position x and momentum p cannot be a Fourier Transform pair.

The claim in QM that the position and momentum are a Fourier Transform pair is false.The wavefunction $\psi(x)$ in the position domain x and the wavefunction $\Psi(p)$ in the momentum domain p can never be a Fourier Transform pair.

Lemma:

The wave function $\psi(x)$ in the position domain x and the wavefunction $\Psi(p)$ in the momentum domain p can never be a Fourier Transform pair since the position operator $\mathbf{X}$ cannot be the position itself, $\mathbf{X}\neq x\mathbf{I}$, when the momentum operator is $\mathbf{P}=-j\hbar\partial/\partial x$, and the position x and momentum p are not mutually independent.

Consider the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ with the eigenvalue eigenvector pair $(p,|p>)$. Since the operator $\mathbf{P}$ is Hermitian, the eigenvector $|p>$ provides a unique orthonormal basis for the representation of any vector. Any state of a particle can be represented in the eigenbasis $|p>$ in the momentum domain.

If the state of a moving particle is $|\Phi>$, which is given by the eigenvector/eigenfunction of the Hamiltonian $\mathbf{H}=\mathbf{E}_p+V(x)$, we can represent $|\Phi>$ in the momentum domain $|p_i>$ $\forall i$ as,

$$|\Phi>=\sum\Psi(p_i)|p_i> \qquad (10.1)$$

where, $\Psi(p_i)$ is the complex multiplication factor of $|p_i>$, or the coordinate of $|\Phi>$ on the axis $|p_i>$.

If p is continuous, we have,

$$|\Phi>=\int\Psi(p)|p>dp \qquad (10.2)$$

When $\mathbf{P}=-j\hbar\partial/\partial x$, we have,

$$\mathbf{P}|p>=p|p> \qquad (10.3)$$

$$\lambda_p=p \qquad (10.4)$$

$$|p>=\exp((j/\hbar)px) \qquad (10.5)$$

Since $|p>$ is a unique orthonormal basis, the wavefunction $\Psi(p)$ in the momentum domain is given by,

$$\Psi(p)=<p|\Phi> \qquad (10.6)$$

The wavefunction $\Psi(p)$ in the momentum domain is the projection of the state of the particle $|\Phi>$ on the orthonormal basis $|p>$ in the momentum domain.

In Quantum Mechanics, in the case of a motion of a particle, the position operator is ill-defined as the position itself $\mathbf{X}=x\mathbf{I}$. There is no special reason for this choice of the position operator as the position itself. There is no reason to treat the position observable differently from the momentum observable. If the position and momentum are assumed to behave as a wave, the position and momentum have a symmetry in the plane wave equation.

There is no dependent or independent variable when it comes to the position and the momentum in the plane wave equation for a moving particle. The position and the momentum have equal stature in the plane wave equation for a moving particle. From the choice of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ and from the mirror symmetry stand point, the obvious and the correct choice of the position operator would have been $\mathbf{X}=-j\hbar\partial/\partial p$. But no attention had been paid to $\mathbf{X}=-j\hbar\partial/\partial p$, and it was never chosen probably because there would not have been Quantum Mechanics if that correct choice had been made. Instead, an incorrect and contradictory choice, $\mathbf{X}=x\mathbf{I}$, had been made in Quantum Mechanics; that is the reason for the existence of Quantum Mechanics at least superficially.

Even when the position operator is ill-defined as position itself $\mathbf{X}=x\mathbf{I}$, Quantum Mechanics still falls apart since the eigenspace of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ can also be an eigenspace of the ill-defined position operator $\mathbf{X}=x\mathbf{I}$, $|x>\equiv|p>$. Eigenspace of the ill-defined position operator $\mathbf{X}=x\mathbf{I}$ is not unique.

When the position operator is ill-defined as position itself,

$$\mathbf{X}|x>=x|x> \qquad (10.7)$$

we know that the eigenspace of the momentum operator is also an eigenspace of the ill-defined position operator $\mathbf{X}=x\mathbf{I}$,

$$|x>\equiv|p> \qquad (10.8)$$

We also know that the delta function $\delta(x)$ is also an eigenspace of the ill-defined position operator $\mathbf{X}=x\mathbf{I}$,

$$|x>=\delta(x) \qquad (10.9)$$

where ,

$$\delta(x)=1 \text{ at } x \qquad (10.10)$$

$$\delta(x)=0 \text{ otherwise} \qquad (10.11)$$

The eigenspace of the ill-defined position operator $\mathbf{X}=x\mathbf{I}$ is not unique. Eigenspace of any Hermitian operator can also be an eigenspace of the ill-defined position operator $\mathbf{X}=x\mathbf{I}$. Quantum Mechanics falsely assumes that the eigenspace of the ill-defined position operator $\mathbf{X}=x\mathbf{I}$ given by the delta function $\delta(x)$ is unique.

Let us consider what happens when the eigenfunction $|x>$ of the position operator $\mathbf{X}=x\mathbf{I}$ is given by the delta function $\delta(x)$. Now, the orthonormal basis in the position domain is given by $\delta(x)$.

We can represent the state $|\Phi>$ of a particle in the orthonormal basis $|x_i>$ in the position domain x as,

$$|\Phi>=\sum\psi(x_i)|x_i> \qquad (10.12)$$

Since $|x_i>$ represents an orthonormal basis, we have,

$$\psi(x)=<x|\Phi> \qquad (10.13)$$

Since $\mathbf{X}=x\mathbf{I}$, the wave function $\psi(x)$ is independent of momentum p. The wave function $\psi(x)$ is the projection of the state $|\Phi>$ on the eigenspace $|x>$ in the position domain.

For continuous x, we have,

$$|\Phi>=\int\psi(x)|x>dx \qquad (10.14)$$

As it is done in Quantum Mechanics, If the eigenspace $|x>$ is chosen to be the delta function, $|x>=\delta(x)$, we have,

$$|\Phi>=\int\psi(x)\delta(x)dx \qquad (10.15)$$

$$|\Phi>=\psi(x) \qquad (10.16)$$

If we falsely consider that the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ to be unique and given by the delta function $|x>=\delta(x)$, then, the state of the particle $|\Phi>$ given by the Hamiltonian $\mathbf{H}$ is also the wavefunction $\psi(x)$ itself.

We know that the eigenspace of any Hermitian operator is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$. It is only if we incorrectly disregard the all the other possible eigenspaces of the position operator $\mathbf{X}=x\mathbf{I}$, and choose the delta function $\delta(x)$ as the only eigenspace, we can say that the wavefunction $\psi(x)$ represents the state of a particle.

The wavefunction $\Psi(p)$ in the momentum domain is given by,

$$\Psi(p)=\langle p|\Phi\rangle \quad (10.17)$$

From equation (10.16), $|\Phi\rangle=\psi(x)$, and hence we have,

$$\Psi(p)=\langle p|\psi(x)\rangle \quad (10.18)$$

From equation (10.5), we already have,

$$|p\rangle=\exp((j/\hbar)px) \quad (10.19)$$

Now we have,

$$\Psi(p)=\int\psi(x)\exp((-j/\hbar)px)dx \quad (10.20)$$

From equation (10.2), we have,

$$|\Phi\rangle=\int\Psi(p)|p\rangle dp \quad (10.21)$$

Since $|\Phi\rangle=\psi(x)$ for $|x\rangle=\delta(x)$, we have,

$$\psi(x)=\int\Psi(p)|p\rangle dp \quad (10.22)$$

Since $|p\rangle=\exp((j/\hbar)px)$, we have,

$$\psi(x)=\int\Psi(p)\exp((j/\hbar)px)dp \quad (10.23)$$

From equation (10.20),

$$\Psi(p)=\int\psi(x)\exp((-j/\hbar)px)dx \quad (10.24)$$

If $|x\rangle=\delta(x)$, we have,

$$\psi(x)=\int\Psi(p)\exp((j/\hbar)px)dp \quad (10.25)$$

$$\Psi(p)=\int\psi(x)\exp((-j/\hbar)px)dx \quad (10.26)$$

Equations (10.25) and (10.26) show that if the eigenspace of the position operator is chosen as the delta function $|x\rangle=\delta(x)$, then the wavefunction in position domain $\psi(x)$ and the wavefunction in the momentum domain $\Psi(p)$ are a Fourier Transform pair. However, since the choice of $\mathbf{X}=x\mathbf{I}$ is a contradiction to the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$, and the chosen eigenspace $|x\rangle=\delta(x)$ of the position operator $\mathbf{X}=x\mathbf{I}$ is not unique, the wave functions $\psi(x)$ and $\Psi(p)$ never a Fourier Transform pair.

For the wave functions $\psi(x)$ and $\Psi(p)$ to be a Fourier Transform pair, the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ must be unique and given by the delta function $\delta(x)$. The eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is NOT unique. The position x and the momentum p are not a Fourier Transform pair.

When $|x\rangle\neq\delta(x)$, we have,

$$\psi(x)\neq\int\Psi(p)\exp((j/\hbar)px)dp \quad (10.27)$$

$$\Psi(p)\neq\int\psi(x)\exp((-j/\hbar)px)dx \quad (10.28)$$

The wave function $\psi(x)$ in the position domain x and the wavefunction $\Psi(p)$ in the momentum domain p are a Fourier Transform pair if we choose the position operator to be position itself $\mathbf{X}=x\mathbf{I}$ contrary to the momentum operator and the eigenspace $|x\rangle$ is incorrectly chosen to be unique and given by the delta function $|x\rangle=\delta(x)$ despite the fact that the position operator $\mathbf{X}=x\mathbf{I}$ can have many equally valid eigenspaces. The choice of position operator as the position itself $\mathbf{X}=x\mathbf{I}$ is also in contradiction with the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ and the particle wave assumption. When the eigenspace of the position operator is not unique, nature has no mechanism to choose one eigenspace out of many; neither do we. When the position operator is $\mathbf{X}=x\mathbf{I}$, the momentum operator cannot be $\mathbf{P}=-j\hbar\partial/\partial x$. When the position operator is $\mathbf{X}=x\mathbf{I}$, a moving particle cannot be assumed to behave as a wave.

Eigenspace of any Hermitian operator is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$. There are as many different eigenspaces for the position operator $\mathbf{X}=x\mathbf{I}$ as there are different Hermitian operators. Eigenspace of the position operator is not unique if the position operator is chosen as the position itself $\mathbf{X}=x\mathbf{I}$. Eigenspace $|p\rangle=\exp((j/\hbar)px)$ of the legitimate momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ of a moving particle with momentum p is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$, and hence $|x\rangle\equiv|p\rangle$.

When the eigenspace of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$, there is no Fourier Transform pair. It is only if the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is unique (which is not) and it is given by the delta function $\delta(x)$, that is if $|x\rangle\equiv\delta(x)$, the wavefunction $\psi(x)$ in position domain x and the wavefunction $\Psi(p)$ in momentum domain p become a Fourier Transform pair. It is only if the eigenspace of the position operator is unique and represented by the delta function $\delta(x)$, $|x\rangle\equiv\delta(x)$ that the wavefunction $\psi(x)$ is also the state of the particle $|\Phi\rangle$ given by the eigenfunction of the Hamiltonian $\mathbf{H}$.

The eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ of a particle is not unique and hence the wavefunction $\psi(x)$ does not represent the state $|\Phi\rangle$ given by the Hamiltonian $\mathbf{H}$ of the particle. The Heisenberg Uncertainty Principle is false since the eigenspace of the position operator, delta function $\delta(x)$, is not unique. The wavefunction $\psi(x)$ in position domain x and the wavefunction $\Psi(p)$ in momentum domain p are not a Fourier Transform pair since the delta function $\delta(x)$ is not THE ONLY eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$. Without the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is being unique and given by the delta function $\delta(x)$, the position and the momentum are not a Fourier Transform pair. Without the position and the momentum being a Fourier transform pair, there will be no Heisenberg Uncertainty Principle.

Lemma:

The wavefunction $\psi(x)$ in the position domain x and the wavefunction $\Psi(p)$ in the momentum domain p are not a Fourier Transform pair.

Corollary:

The Heisenberg Uncertainty Principle does not hold.

XI. APOCRYPHAL PARTICLE WAVES CANNOT PROPAGATE

In Quantum Mechanics, a particle at position x with momentum p and kinetic energy E_p is assumed to behave as a wave of wavelength $\lambda=h/p$ and frequency $f=E_p/h$, which is indeed false and nonsensical. The kinetic energy E_p of the particle at position x with momentum p is given by $E_p=p^2/2m$. The particle wave, $\phi(x,p,E_p,t)=\phi(x,p)\phi(E_p,t)$ is the eigenfunction of the position $\mathbf{X}=-j\hbar\partial/\partial p$, momentum $\mathbf{P}=-j\hbar\partial/\partial x$, kinetic energy $\mathbf{E}_p=j\hbar\partial/\partial t$, and time $\mathbf{T}=j\hbar\partial/\partial E_p$ operators. The state $|\Phi>$ of a moving particle is given by the eigenfunction of the Hamiltonian $\mathbf{H}=\mathbf{E}_p+V(x)$ of the particle. However, in Quantum Mechanics, the position operator is incorrectly chosen as the position itself, $\mathbf{X}=x\mathbf{I}$ When the position operator is chosen to be the position itself $\mathbf{X}=x\mathbf{I}$, the state $|\Phi>$ of the particle is also the wavefunction $\psi(x)$ in the position domain $\mathbf{X}$.

$$\psi(x)=|\Phi> \quad (11.1)$$

$$\mathbf{H}|\Phi>=E|\Phi> \quad (11.2)$$

$$\mathbf{H}=(-1/2m)\hbar^2\partial^2/\partial x^2+V(x) \quad (11.3)$$

When $V(x)=0$, $\mathbf{H}=\mathbf{E}_p$ and $|\Phi>$ is equal to the particle wave given by the plane wave $\phi(x,p,E_p,t)=\phi(x,p)\phi(E_p,t)$ and hence the wavefunction $\psi(x)=\phi(x,p)\phi(E_p,t)$.

Yes, plane wave $\phi(x,p,E_p,t)=\phi(x,p)\phi(E_p,t)$ for a particle having momentum p represents a wave. Wavefunction $\psi(x)$ represents a wave. However, not every wave propagates. There is not a single wave that propagates. A single wave cannot propagate. There is not a single field that propagates. A single field cannot propagate.

A uni-field does not propagate. A uni-wave does not propagate. In physics, it claims that it is the disturbance of a field that propagates. However, it is not possible to create a disturbance in a single field. A disturbance can only be created in a conjugate pair of fields. You cannot claim that it is the disturbance in a field that propagates since it is not possible to create a disturbance in a single field. A disturbance requires an energy transfer between a conjugate pair, between two conjugate fields.

Lemma:

There is not a single field that propagates.

Lemma:

A single field cannot be disturbed. There is not a single field that can be disturbed. No disturbance can be generated in a single field.

Corollary:

A single field must be static and cannot exist without being anchored to a source. There is no sourceless single field.

It takes two complementary or conjugate partners to tango. One cannot tango. It takes two conjugate hands to clap. One hand cannot clap. Electromagnetic fields propagate since they have two conjugate fields, an electric field and a magnetic field that are out of phase by 90° so that there is cyclic transfer of electric potential energy into magnetic potential energy and vice versa between the two fields. Ocean waves propagate since there is a cyclic transfer of potential energy and kinetic energy. It is the cyclic transfer of electromagnetic potential energy between two conjugate fields that makes an electromagnetic field to propagate.

Electromagnetic potential energy is not the energy until it is converted into energy in the presence of a charged particle (charged mass) and hence electromagnetic waves have no energy, no temperature. Electromagnetic waves have no entropy. Light has no momentum, no energy, no temperature, no entropy. Light does not behave as golf balls. Light has no mass. Light cannot generate mass. Mass can generate light. There is no energy without objects of mass. There is no independent entity called energy. Energy is the kinetic energy of objects of mass.

Lemma:

Electromagnetic waves have no temperature. Electromagnetic waves have no entropy. It is only that the electromagnetic waves can generate a temperature and hence entropy in the presence of charged particles (mass) or a medium (matter).

Consider the electric field or wave alone that satisfies the wave equation,

$$\nabla^2\mathbf{E}=(1/c^2)\partial^2\mathbf{E}/\partial t^2 \quad (11.4)$$

Mathematically, it propagates at speed c. However, physically it does not exist or propagate. When we write a wave equation for electric field $\mathbf{E}$, we also know there is a conjugate partner magnetic field $\mathbf{B}$ that is described by the same wave equation right beside it,

$$\nabla^2\mathbf{B}=(1/c^2)\partial^2\mathbf{B}/\partial t^2 \quad (11.5)$$

It is the marriage of these two together that propagate. Neither one alone can propagate. It is the complementary pair $(\mathbf{E},\mathbf{B})$ that propagates. An electric field $\mathbf{E}$ that satisfies the wave equation $\nabla^2\mathbf{E}=(1/c^2)\partial^2\mathbf{E}/\partial t^2$ does not propagate or cannot propagate without the conjugate partner magnetic field $\mathbf{B}$ that satisfies the wave equation $\nabla^2\mathbf{B}=(1/c^2)\partial^2\mathbf{B}/\partial t^2$ even though each individual wave equations mathematically indicates that each propagates at speed c.

Lemma:

Propagation requires two complementary fields or two orthogonal waves that are cyclic with 90° phase shift.

Corollary:

No single wave or field can propagate even when it is described by the wave equation,

$\psi(x,k,f,t)=A\exp(jkx)\exp(-j\omega t)$,

where, $k=2\pi/\lambda$, $\omega=2\pi f$,

or for a particle wave,

$\psi(x,p,E_p,t)=A\exp((j/\hbar)px)\exp((-j/\hbar)E_p t)$,

where, $\lambda=h/p$, $f=E_p/h$.

The so-called particle wave is a single wave. There is no conjugate partner for a particle wave. A wave cannot propagate without a conjugate partner to periodically transfer the potential energy with. A single wave such as hypothetical particle waves cannot propagate. A solution to the Schrodinger equation does not have a conjugate partner. Solutions to the Schrodinger equation cannot propagate. Wavefunction of a particle cannot propagate. A single field cannot propagate.

Lemma:

A particle wave is a single wave. A particle wave cannot propagate. The wave function of a particle cannot propagate. Wave functions of particles have no existence.

In Physics, the wavefunction $\psi(x)$ is claimed to propagate. One may even show mathematically that the wavefunction $\psi(x)$ propagates. However, it is half a story. This appearance of the propagating wave function is a result of mal-adopting electromagnetic wave propagation into particles. Electromagnetic waves consist of two conjugate partners. One wave cannot do what two conjugate waves can do. A mal-adopted hypothetical particle wave does not have a conjugate partner wave to facilitate propagation.

In order for the wavefunction $\psi(x)$ of a particle to propagate, $\psi(x)$ must have a complementary partner always on its side. The complementary partner must be 90° out of phase. The energy must be exchanged between the complementary partners cyclically. When the energy of one complementary partner is maximum, the energy of the other complementary partner is minimum and vice versa. The cyclic potential energy transfer between two waves or fields that are 90° out of phase, which is required for the propagation, is not available for the wave function $\psi(x)$ of a particle. As a result, the wave function $\psi(x)$ cannot propagate.

In fact, there is not a single field that propagates. There is not a single wave that propagates. A single field is always anchored to a source. A single field cannot exist without being anchored to a source. A field that is anchored to a source cannot propagate. A single field cannot exist without being anchored to a source.

One might falsely claim that it is a disturbance of a field that propagates. The problem is that there cannot exist a disturbance in a single field. There is no disturbance in a single field. You cannot create a disturbance in a single field by any means. It is only a conjugate pair of fields that can be perturbed. A static field is a single field. A static field has no conjugate partner. Static field cannot be a wave. A static field cannot be perturbed.

The motion of a charge generates an electromagnetic field, which is a conjugate pair, that is independent of the static electric field of the charge. This generated electromagnetic field has no attachment to the static field; it is not a part of the static field. Although the static electric field is anchored to a charge and moves with the charge unaltered, the generated electromagnetic field by the motion of the charge is not anchored to the charge and consists of a conjugate pair that varies cyclically. As a result, the generated electromagnetic field propagates.

Static electric field of a charge does not propagate. The generation of the electromagnetic waves does not alter the static electric field of the charge. The static electric field of a charge exists relative to the charge. The propagating electromagnetic field exists relative to the space it is propagating in. The speed of propagation is determined by the Coulomb and Ampere constants of the space. The speed of propagation of electromagnetic waves is affected by a medium, not determined by a medium. Light propagates in space even in the presence of a medium.

Gravitational field is anchored to a mass. Gravitational field is a static field. Gravitational field is not a wave. You cannot generate a disturbance in a gravitational field since it has no conjugate partner. You cannot generate a perturbation in a field that has no conjugate partner. You can even blow up a mass into smithereens, but it does not generate a perturbation in the gravitational field since the gravitational field of each piece is no different from the gravitational field of the individual piece when the mass was intact prior to the blowing up.

Gravitational field that is anchored to a mass cannot propagate. There are no gravitational field perturbations. Even when you create hypothetical gravitational perturbations in your mind (psychotons) as is done at LIGO (Laser Interferometer Gravitational Wave Observatory), these hypothetical gravitational perturbations or (psychotons) cannot propagate since a gravitational field has no conjugate partner. A single field cannot propagate. A single field cannot be perturbed. A single wave cannot propagate. There are no gravitational waves.

In physics, the fluctuations in a gravitational field are defined as gravitational particles or gravitons that are psychotons (exists only in the mind of believers). These gravitons are mythical and hypothetical since a gravitational field that does not have a conjugate partner cannot carry fluctuations. There are no gravitons.

The hypothetical Higgs field is a single field that has no conjugate partner. Man-invented Higgs field does not have perturbations since a single field cannot be perturbed. Higgs bosons are defined as the perturbation or oscillations in the Higgs field. Higgs bosons have no existence, since there cannot be perturbations or oscillations in a single field such as the Higgs field. A single field cannot have an existence without being anchored to a source. There is no source for the Higgs field. A single field cannot exist without a source. The Higgs field has no existence since there is no Higgs source.

Lemma:

Higgs bosons have no existence since un-anchored Higgs fluctuations cannot exist in a single field.

Corollary:

The Higgs field has no existence since a static field has no existence without a source.

The Higgs field can neither propagate nor be disturbed since the Higgs field has no conjugate partner. A single field has no existence without being anchored to a source. It is only a conjugate pair of fields that can exist on their own without being anchored to a source. You cannot introduce the Higgs field without providing a source that generates the Higgs field. A field cannot generate a mass. A field cannot give an object a mass. A mass can generate a field. The interaction of masses and charges generate a field. A gravitational field gives a mass momentum. A gravitational field gives a weight to an existing mass. An electric field gives a charged particle momentum. The mass of a particle is a primary parameter, and it is unaffected by motion. Mass is not relative. Mass is absolute. A stationary mass does not have a speed c relative to light, $E \neq mc^2$.

Only the matter has a mass. Mass is the matter. Without matter, there is no mass. Without matter, there is no energy. A field has no energy. A field only has the potential to generate energy on a mass. It is only that a field can generate energy in the presence of a mass or a charge. Gravitational field itself has no energy. Electromagnetic field itself has no energy. Light has no energy, no temperature, no entropy. It is only that light can generate energy in the presence of a charge. Light has electromagnetic potential energy. Potential energy is not energy until it is converted into energy of a mass using charge particles of mass.

Light has no momentum. It is only that light can generate momentum in the presence of a charge. There is no light without a mass since there is no light without a charge and there is no charge in the absence of a mass. There is no field without a mass. There is no mass without matter. There are no particles without matter. There is no propagating wave without a conjugate pair of waves or fields. Massless waves have no momentum. Waves are not particles. A wave burst is not a particle. There is no massless momentum. It is only that a massless-wave can generate momentum in the presence of a charged mass, on the mass.

Microwaves have no temperature. Cosmic Microwave Background (CMB) temperature is self contradictory, an oxymoron. The claim that the Cosmic Microwave Background has a temperature is simply meaningless. If the Cosmic Microwave Background has a temperature, it is an indication that there are charge particles in the space. The Cosmic Microwave Background (CMB) is an indication that there are charge particles in the space and space is not a vacuum. It is the motion of these charge particles that generates these background cosmic microwaves.

There is nothing nonsensical and sillier than the claim that the Cosmic Microwave Background (CMB) is remnants from a big bang. Even more bizarre is the claim by physicists that the snow on an off-tune television channel is remnants from a big bang. Snow on an off-tune television is thermal noise, not a remnant from a big bang. If there is a microwave background in space and the empty space has a temperature, then, it means that the space is not empty. It indicates that there are charged particles in space that generate this microwave background and the temperature due to the collisions of the particles. It is the thermal noise that generates the CMB.

Nothing can propagate without subject to attenuation. Light is no exception. In addition to attenuation, light is also subject to wavelength redshift due to the density gradient of the medium. The density gradient is a result of the presence of gravitational objects. Every gravitational object surrounds a medium. A gravitational object generates a density gradient of the medium that it surrounds. Larger the gravitational object, the larger the density gradient of the medium. A massive star has a steep density gradient, which results in a wavelength redshift of light from that star. The larger the distance light travels in a decreasing density gradient, the larger the wavelength redshift. The maximum distance light can travel without being wavelength red-shifted outside the visible region represents the sphere of the visible universe. However, we do not have to be confined to the visible universe.

Instead of limiting to visible light, if we use the radio frequency region, we are able to allow light to travel until light is wavelength red-shifted into the radio frequency region, giving it a larger range. Using the radio frequency region, we are able to increase the range of the observable universe. The sphere of the explorable universe outside the visible region of light such as the radio frequency band is larger. The radio frequency universe is larger than the visible universe. The attenuation also decreases with the increase of the wavelength giving the radio frequency universe a much larger range. The range of the infrared universe lies in between the range of the radio frequency universe and the visible universe. Visible universe, infrared universe, and radiofrequency universe exist relative to an observer. The sphere of the observable universe of an observer moves with the motion of the observer. It says nothing about the observer's past. It says how far into the distance (the range) we can observe our neighbors. It is the observable bubble observers carry with them [5].

Definition: Visible Universe

The visible universe is the maximum distance light can travel without being wavelength red-shifted outside the visible band of the spectrum due to the net negative density gradient of the medium from the star to the observer.

Definition: Infrared Universe

The Infrared Universe is the maximum distance infrared waves can travel without being wavelength red-shifted outside the infrared band of the spectrum due to the net negative density gradient of the medium from the star to the observer.

Definition: Radio Frequency Universe

The Radio Frequency Universe is the maximum distance light can travel without being wavelength red-shifted outside the radio frequency band of the spectrum due to the net density gradient of the medium from the star to the observer.

By observing the light from distant stars, we are not looking into our own past. By observing the light from the distant stars, we are only looking into our neighbors' past. The star redshift is not the Doppler effect. The redshift of light from distant stars is due to the density gradient of the medium. It is only the wavelength of light from the stars that is red/blue shifted depending on whether the net density gradient is negative or positive. If the net density gradient from a star to the observer is negative, it is red shifted. If the net density gradient from a star to the observer is positive, it is blue shifted. The frequency is unaltered.

The redshift of light from a star in a galaxy cannot be attributed to the motion of the galaxy itself since the redshift of all the stars in the galaxy cannot be the same. If the redshift of a star is due to the motion of the galaxy, all the stars in the same galaxy must have the same redshift; this is not possible. Not only can a galaxy contain the stars with different redshifts, but also can contain stars with blue shifts if the net density gradient from a star in the galaxy to the observer is positive. The star redshift cannot be attributed to the galaxy itself. The star redshift cannot be used to claim the universe is expanding. Universe cannot expand. Space cannot expand.

The density of the medium surrounding stars increases with time due to the ejection of the matter by the stars. As the stars eject more and more matter, the medium density surrounding a star increases with time. The increasing redshift of the stars is due to the increase in the density gradient of the medium. The increasing redshift of the stars cannot be used to claim the universe is accelerating. Universe is not accelerating. Space cannot move. If space is expanding, light cannot have a constant speed. The speed of light in a vacuum cannot remain constant if the space is expanding. You cannot move space in a box either as Einstein tried to do in 1952. By moving an empty box, you are not moving the space. A moving box moves in space. A moving box does not move the space. Expanding universe cannot alter the mutual separation between gravitationally bound objects. Galaxies are gravitationally bound. Objects are not anchored to space. Light is not anchored to space. Expanding universe cannot change the wavelength of light. Space cannot expand. Universe is not expanding [5].

XII. OPERATORS ARE DETERMINED BY THE PARTICLE WAVE ASSUMPTION; WE CANNOT DEFINE OPERATORS AS WE DESIRE

The fundamental premise of Quantum Mechanics is the assumption that a particle behaves as a wave and then the representation of the observables by the operators using the plane wave for a particle. The operator representation of the observables is a direct result of the assumption that a particle behaves as a wave. Without the assumption that a moving particle behaves as a wave, there is no operator representation. Operators stem from the particle wave assumption. It is the plane wave, which is assumed to represent the behavior of a particle, that generates the operators of the observables. We do not have the freedom to define operators of the observables as we desire. All the operators must abide by the plane wave for a particle. If any of the operators is defined to be the observable itself (a trivial operator) then, the particle cannot be assumed to behave as a wave.

The claim in Quantum Mechanics that when we measure an observable what we get is one of the eigenvalues of the operator of that observable is incorrect. An eigenvalue of an operator represents the observable only when the state of the particle overlaps the eigenvector/eigenfunction of that eigenvalue. It is not necessary for the state of a particle to overlap with an eigenvector/eigenfunction of operators of the observables. It is only that the state of a particle can be represented in the eigenspace of an observable since a non-trivial Hermitian operator provides a complete orthonormal eigenspace. Eigenvalues have nothing to do with this eigenspace representation.

Eigenvalues are not unique and cannot be used for estimation of observables. It is only the eigenvectors that can be used to represent a state of a particle since the eigenvectors of a non-trivial Hermitian operator are unique.

Irrespective of how nonsensical and bizarre the particle wave assumption since a mass cannot behave as a propagating wave, once it is assumed that a particle at position x and momentum p behave as a wave described by the plane wave under the hypotheses that the energy of a particle is quantized and given by the energy quanta $E_p=hf$, and the wavelength is given by the $\lambda=h/p$, we have no freedom to define the operators the way we desire. The operator $\mathbf{X}$ for the position x and the operator $\mathbf{P}$ for the momentum p are determined by the plane wave for the position x and the momentum p of the particle, $\phi(x,p,E_p,t)=\exp((j/\hbar)px)\exp(-(j/\hbar)E_pt)$. All the operators are naturally presented to us by the plane wave equation for a particle of momentum p at position x with energy E_p at time t,

$$\phi(x,p,E_p,t)=\exp((j/\hbar)px)\exp(-(j/\hbar)E_pt) \quad (12.1)$$

$$\mathbf{P}=-j\hbar\partial/\partial x \quad \text{(momentum operator)} \quad (12.2)$$

$$\mathbf{X}=-j\hbar\partial/\partial p \quad \text{(position operator)} \quad (12.3)$$

$$\mathbf{E_p}=j\hbar\partial/\partial t \quad \text{(kinetic energy operator)} \quad (12.4)$$

$$\mathbf{T}=j\hbar\partial/\partial E_p \quad \text{(time operator)} \quad (12.5)$$

There should be a complementary symmetry between the position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$ since there is a symmetry between the position and the momentum in the plane wave equation for a particle if a particle is assumed to behave as a wave. Similarly, there should be a complementary symmetry between the kinetic energy operator $\mathbf{E_p}$ and the time operator $\mathbf{T}$. One should be able to obtain one operator from the other simply by exchanging the observables. Neither position x nor momentum p has special status in the plane wave equation; they both have equal status in $\phi(x,p,E_p,t)=\exp((j/\hbar)px)\exp(-(j/\hbar)E_pt)$.

As a result, if the momentum operator $\mathbf{P}$ is given by the partial differential of $\phi(x,p,E_p,t)$ with respect to the position x, equivalently, the position operator $\mathbf{X}$ must be given by the partial differential of $\phi(x,p,E_p,t)$ with respect to the momentum p. Any other definition for the position operator **X** will be a contradiction to the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ as well as to the assumption that a particle behaves as a wave. A particle cannot be assumed to behave as a wave for any other operators.

There is an inherent symmetry between the position operator **X** and the momentum operator **P** when a particle is assumed to behave as a wave. The wave $\phi(x,p,E_p,t)=\exp((j/\hbar)px)\exp(-(j/\hbar)E_pt)$ represents the eigenbasis for all the operators of the observables associated with the wave $\phi(x,p,E_p,t)$. The operators are a product of the plane wave equation. Without the assumption that a particle behaves as a wave, there will be no operators. So, any operator must obey the plane wave for a moving particle. An operator that does not agree with the plane wave equation is invalid. The position operator as the position itself $\mathbf{X}=x\mathbf{I}$ cannot be a legitimate operator of the plane wave of a particle if the particle is assumed to behave as a wave, $\phi(x,p,E_p,t)=\exp((j/\hbar)px)\exp(-(j/\hbar)E_pt)$.

Lemma:

The legitimate position operator **X** that agrees with the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is $\mathbf{X}=-j\hbar\partial/\partial p$.

Corollary:

The position operator $\mathbf{X}=x\mathbf{I}$ is invalid and it is a contradiction to the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$. It also contradicts the particle wave assumption.

The state $|\Phi>$ of a particle is the eigenfunction of the Hamiltonian $\mathbf{H}=\mathbf{E}_p+V(x)$ of the particle. When a particle is free-moving ($V(x)=0$), the state of the particle $|\Phi>$ is also the particle wave $\phi(x,p,E_p,t)$, where $\phi(x,p,E_p,t)=\exp((j/\hbar)px)\exp(-(j/\hbar)E_pt)$. For a free-moving particle $|\Phi>=\phi(x,p,E_p,t)$. For a free-moving particle, where the potential $V(x)=0$, the wave function $\psi(x)$ is the same as the state of the particle, $\psi(x)=|\Phi>$ and hence, $\psi(x)=A\exp((j/\hbar)px)\exp((-j/\hbar)E_pt)$ for $V(x)=0$.

When the state of a particle $|\Phi>$ is projected onto the eigenbasis of the operator of an observable, we have the wavefunction in the domain of the observable. When the state $|\Phi>$ is projected, in an increasing order of x, onto the eigenbasis of the position operator, what you get is the wavefunction $\psi(x)$ in the position domain. Since the eigenspace $|x>$ of the position operator **X** is also the same as the eigenspace $|p>$ of the momentum operator **P**, the wavefunction $\psi(x)$ in the position domain is the same as the wavefunction $\Psi(p)$ in the momentum domain,

$\psi(x)\equiv\Psi(p)$, $\psi(x)=<x|\Phi>$, and $\Psi(p)=<p|\Phi>$.

Even when we incorrectly assume the position operator to be position itself, $\mathbf{X}=x\mathbf{I}$, in Quantum Mechanics, we cannot prevent the eigenspace of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ from being the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ also since the eigenspace of any operator that is defined to be the observable itself is not unique. As a result, the wavefunction $\Psi(p)$ in the momentum domain is the same as the wavefunction $\psi(x)$ in the position domain even when the position operator is assumed to be position itself, $\mathbf{X}=x\mathbf{I}$.

In other words, the position operator and the momentum operator have a shared eigenspace even when the position operator is assumed to be position itself $\mathbf{X}=x\mathbf{I}$ since the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is not unique. The eigenspace of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ resulting in them having a shared eigenspace. Since the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ and the position operator $\mathbf{X}=x\mathbf{I}$ have a shared eigenspace, the momentum p and position x are simultaneously measurable to any achievable precision. Both the position x and the momentum p can be measured precisely and simultaneously without any precision tradeoff.

Lemma:

The measurement of the precise location of a particle does not preclude the precise measurement of the momentum and vice versa.

In Quantum Mechanics and in Heisenberg Uncertainty Principle in particular, the position operator is defined as the position itself, $\mathbf{X}=x\mathbf{I}$, against the obvious fact that we have no freedom to define the position operator as we want since the position operator is fixed naturally by the particle wave itself once a particle is assumed to behave as a wave. Once the momentum operator is described by $\mathbf{P}=-j\hbar\partial/\partial x$, the position operator has been automatically assigned $\mathbf{X}=-j\hbar\partial/\partial p$. The definition of the position operator as position itself, $\mathbf{X}=x\mathbf{I}$, contradicts the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$. When the position operator is ill-defined as position itself $\mathbf{X}=x\mathbf{I}$, it contradicts the founding assumption that a particle behaves as a wave $\phi(x,p,E_p,t)=\exp((j/\hbar)px)\exp(-(j/\hbar)E_pt)$.

In Quantum Mechanics, the choice of momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is in compliance with the plane wave equation $\phi(x,k,\omega,t)=\exp(jkx)\exp(-j\omega t)$ with $k=2\pi/\lambda$, $\lambda=h/p$, and $f=E_p/h$, which is the particle wave $\phi(x,p,E_p,t)=\exp((j/\hbar)px)\exp(-(j/\hbar)E_pt)$. The kinetic energy operator $\mathbf{E}_p=j\hbar\partial/\partial t$ agrees with the wave equation when $E_p=hf$. The position operator $\mathbf{X}=-j\hbar\partial/\partial p$ is in compliance with both the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ and the assumption that a particle behaves as a wave given by $\phi(x,p,E_p,t)=\exp((j/\hbar)px)\exp(-(j/\hbar)E_pt)$. However, the definition of the position operator as position itself, $\mathbf{X}=x\mathbf{I}$, contradicts the primary assumption in Quantum Mechanics that a particle behaves as a wave $\phi(x,p,E_p,t)=\exp((j/\hbar)px)\exp(-(j/\hbar)E_pt)$. A particle cannot be assumed to behave as a wave if the position operator is defined as the position itself, $\mathbf{X}=x\mathbf{I}$ and vice versa.

More importantly, when the position operator is defined as the position itself, $\mathbf{X}=x\mathbf{I}$, the eigenspace of the position operator is not unique. The trivial solution delta function $\delta(x)$ that the Quantum Mechanics is built on is not the only eigenspace of the operator $\mathbf{X}=x\mathbf{I}$. Quantum Mechanics and the Heisenberg Uncertainty Principle in particular forces the eigenspace to be the delta function $\delta(x)$ when in fact the eigenspace of any Hermitian operator including the momentum operator

$\mathbf{P}=-j\hbar\partial/\partial x$ can also be an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$.

We cannot uniquely define the eigenspace of the position operator as the delta function $\delta(x)$ as it is done in Quantum Mechanics. Eigenspace of the ill-defined position operator $\mathbf{X}=x\mathbf{I}$ is not unique. There is no special reason to choose the delta function as the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ since the eigenspace of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is also an equally legitimate eigenspace. A system has no way of selecting an eigenspace of an operator, when the eigenspace of that operator is not unique.

Lemma:

Non-uniqueness of the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is a good indication that Quantum Mechanics is a false theory.

It is the arbitrary choice of the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ as the delta function $\delta(x)$ that made the wavefunction $\psi(x)$ in position domain and the wavefunction $\Psi(p)$ in momentum domain a Fourier Transform pair. When the eigenspace of the position operator is arbitrarily chosen to be the delta function $|x\rangle\equiv\delta(x)$ out of many equally valid eigenspaces, and the unique eigenspace $|p\rangle$ of the properly defined momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is given by $|p\rangle=\exp((j/\hbar)px)$, we have,

$\langle p|x\rangle=\exp((-j/\hbar)px)$

$\langle x|p\rangle=\exp((j/\hbar)px)$.

It is this arbitrary choice of the eigenspace $|x\rangle$ of position operator $\mathbf{X}=x\mathbf{I}$ as the delta function $|x\rangle\equiv\delta(x)$ that made the wavefunction $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain a Fourier Transform pair. Without the arbitrary choice of the eigenspace $|x\rangle$ of the wrongly defined position operator $\mathbf{X}=x\mathbf{I}$ as the delta function $\delta(x)$, the wavefunction $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain will not be a Fourier Transform pair. Fourier Transform would never have come to the seen without $|x\rangle=\delta(x)$; this choice cannot be made since the eigenspace $|x\rangle$ is not unique. The eigenspace $|x\rangle$ can also be given by the eigenspace of the momentum operator, $|x\rangle=|p\rangle$ just as it can be $|x\rangle=\delta(x)$.

The wavefunction $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain cannot be a Fourier Transform pair. A particle does not know which eigenspace to choose when there are many eigenspaces for the position operator $\mathbf{X}=x\mathbf{I}$. If a particle of momentum p at position x is assumed to behave as a wave, the correct operator $\mathbf{X}$ for the observable x is never the position itself, $\mathbf{X}\neq x\mathbf{I}$. The correct choice of operators commute.

Natural systems do not have non-commuting operators. If operators are non-commuting, it is an indication that some of the assumptions are wrong. If a particle is assumed to behave as a wave, all the natural operators arising from that assumption commute. All the operators must have a shared eigenspace for a real system. If any two operators do not commute, the system is not real, Quantum Mechanics is not real.

When the position x and the momentum p are not a Fourier Transform pair, there would be no inherent uncertainty of position and momentum; there is no tradeoff between the achievable precision of the position and the precision of the momentum. Since the eigenspace of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$, the position x and momentum p of a particle are simultaneously measurable. There is no Heisenberg Principle at work in nature. The position x and the momentum p of a particle can be measured to any achievable precision simultaneously without any tradeoff.

Lemma:

The Heisenberg Uncertainty Principle is false.

If we falsely assume a particle to behave as a wave with wavelength $\lambda=h/p$ and frequency $f=E_p/h$, we do not have a choice for the position operator $\mathbf{X}$ or in fact a choice for any operator. All the operators of the observables are predetermined by the wave equation $\phi(x,p,E_p,t)=\exp((j/\hbar)px)\exp(-(j/\hbar)E_pt)$. We cannot define the position operator as position itself, $\mathbf{X}\neq x\mathbf{I}$. The position operator is given naturally as $\mathbf{X}=-j\hbar\partial/\partial p$ by the wave equation itself just as the momentum operator is given naturally as $\mathbf{P}=-j\hbar\partial/\partial x$ by the plane wave equation. Both position operator $\mathbf{X}=-j\hbar\partial/\partial p$ and the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ share the same eigenspace and that eigenspace is unique. The eigenspace of any Hermitian operator is unique except when the operator is observable itself as in the case of the incorrectly chosen position operator $\mathbf{X}=x\mathbf{I}$ in Quantum Mechanics.

It is also noteworthy that if the wavefunction $\psi(x)$ in position domain and the wavefunction $\Psi(p)$ in momentum domain are a Fourier Transform pair, a particle must be in multiple positions and in multiple momenta simultaneously, which no particle (a mass) can satisfy. The concept of a particle behaving as a wave is simply nonsensical and goes against scientific thinking, and crosses the boundary into mysterious voodoo-domain, into voodoo-physics.

A wave is not a particle. A wave burst is not a particle. There are no massless particles. A single wave or a field cannot propagate. Wavefunction $\psi(x)$ is a single wave; it has no conjugate partner. A wave cannot propagate without a conjugate partner. Wavefunction $\psi(x)$ cannot propagate. A particle cannot behave as a wave. A mass cannot behave as a wave. A mass cannot propagate. Masses move. Conjugate pair of waves propagate. It is only that a vibrating charged particle (mass) generates electromagnetic waves that propagate and interfere.

There is no separate entity called energy. Energy exists in association with particles of mass. Temperature exists in association with particles of mass. The energy is the kinetic energy of particles of mass. The rest of the energies refer to potential energy. Light has electromagnetic potential. Potential energy is not energy until it is converted into kinetic energy. Light has no energy. In the presence of charge particles, electromagnetic potential can be transformed into kinetic energy, the energy.

Potential energy has no temperature. Light has no temperature. Without temperature, there is no entropy. There is no entropy without particles of mass. Light has no entropy. It does not matter how much electromagnetic waves are present in a vacuum cavity, a vacuum cavity has no temperature. A vacuum cavity of a blackbody has no entropy, no temperature, and hence Einstein's photon derivation is invalid. There are no photons or light quanta, or light particles. There are no massless particles. If light had energy, space would not be so cold. Very low Cosmic Microwave Background Temperature is an indication that space has very low concentration of matter. It is the motion of charged particles in the very low concentration of matter in space that generates the Cosmic Microwave Background, not some hypothetical big bang.

Since there is no independent entity called energy, energy quantum has no existence. The energy quantum $E=hf$ is meaningless. $E=hf$ is meaningless for light or electromagnetic waves. $E=hf$ is meaningless for gravitational potential energy since gravitational potential energy has no association with frequency. $E=hf$ is meaningless for kinetic energy of a mass. When we refer to energy, what we are referring to is the kinetic energy of particles of mass. Energy is associated with particles of mass.

Any entity that has no independent existence cannot come in quanta. Energy has no existence without the association of matter. Energy has no independent existence. Any entity that has a belonging cannot come in quanta since quantum has no way to carry belonging information without a header. Energy is not quantized. Energy cannot be quantized. Momentum and angular momentum of an object cannot come in quanta since they are vectors associated with a mass. Vectors cannot be quantized. Amplitude of a vector cannot come in quanta without an inherent blueprint to how individual quanta are put together for one whole, the vector. Any entity associated with a mass cannot be quantized.

If a moving charge particle is stopped, decelerated, or accelerated, it generates electromagnetic waves. These generated electromagnetic waves as a result of the motion of a charge particle are not particle waves. To falsely justify Quantum Mechanics, these generated electromagnetic waves by the motion of charge particles have been misinterpreted as particle waves in the Double-Slit experiment for a beam of electrons. It is this misinterpretation of the Double-Slit experiment and also the misinterpretation of the Stern-Gerlach experiment that derailed physics into the realm of voodoo-physics.

Irrespective of the size of a particle, a particle cannot be in multiple places at the same time. A particle cannot have multiple speeds or at multiple positions simultaneously. For position and momentum to be a Fourier Transform pair, for a given position, a particle must be able to have multiple momenta, which is not possible for a mass. Similarly, for a given momentum, a particle must also be able to be at multiple positions at the same time, which is also not possible for a mass. No mass can have multiple speeds or multiple positions simultaneously at any given time. The position and the momentum of a particle cannot be a Fourier Transform pair logically, theoretically, or in reality. Voodoo-assumptions such as a particle behaving as a wave has no place in science or anywhere.

For Quantum Mechanics to be at least correct as a theory, eigenspaces of operators must be unique. If the eigenspace of any operator is not unique, Quantum Mechanics fails as a theory. If the eigenspace of an operator is not unique, it is the definition of the operator that is at fault. If Quantum Mechanics cannot do without an ill-defined operator with non-unique eigenspace, Quantum Mechanics cannot exist as a theory.

Quantum Mechanics has made the mistake of defining a false position operator. The definition of the position operator as position itself goes against the momentum operator since there is an inherent symmetry of the position and the momentum in the wave equation. You cannot define position operator as the position itself, $\mathbf{X}=x\mathbf{I}$, while claiming that the momentum operator is $\mathbf{P}=-j\hbar\partial/\partial x$; they are contradictory; they cannot co-exist. When the position and the momentum operators are correctly defined in the way they can coexist, one operator should be able to obtain from the other simply by exchanging the position and momentum. When operators are properly defined, they commute and Quantum Mechanics ceases to exist.

Lemma:

The position operator $\mathbf{X}=x\mathbf{I}$ and the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ cannot coexist.

Lemma:

If the momentum operator is $\mathbf{P}=-j\hbar\partial/\partial x$, then the legitimate position operator is $\mathbf{X}=-j\hbar\partial/\partial p$. They can coexist. They commute.

Corollary:

The definition of position operator as the position itself $\mathbf{X}=x\mathbf{I}$ contradicts the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ and the assumption that a particle behave as a wave of wavelength $\lambda=h/p$.

If the wavefunction $\psi(x)$ in the position domain represents the probability of finding the particle at position x as $Prob(x)=\psi^*(x)\psi(x)$, then the probability of finding a particle at x where $\psi(x)=0$ will be zero. If this is the case, a particle cannot cross zero points of the wavefunction $\psi(x)$. As a result, the wavefunction $\psi(x)$ in the position domain cannot be a probability distribution since the particle will be trapped between the zeros of the wavefunction or between x values where $\psi(x)=0$. If $\psi(x)=0$ at $x=a$ and $x=b$, and the particle is at x where $a<x<b$, then the particle has no way out of the region, out of that prison. That prevents

the position of the particle being probabilistic.

For the position of a particle to be probabilistic, the particle must be able to be at any position without a restriction for the whole range of x. For an observable of a particle to be probabilistic, the particle must have the equal ability to be at any value in the range of the observable without a restriction. Since a wave function ψ can have one or more zeros, the wave function ψ cannot represent a probability distribution.

A probability distribution cannot be a propagating wave since any propagating wave is subjected to propagation loss. On the other hand the wave function $\psi(x)$ cannot propagate since $\psi(x)$ has no conjugate partner. Propagation without a conjugate partner is not possible.

Quantum Mechanics answers the zero crossing problems associated with the claim that the probability of observing x is given by the $Prob(x)=\psi^*(x)\psi(x)$ by making another unrealistic disappearing and reappearing act. Quantum Mechanics claims, when a particle moves from one position to another position, the particle disappears from its current position and reappears at another position without crossing in between positions, which can be appropriately be called Houdinification. This shows how desperate physicists are when it comes to justify Quantum Mechanics. They are ready to leave behind the logic, and not ashamed to embrace any voodoo-act to justify Quantum Mechanics. Houdini-fication is magic; it does not take place in reality. If such a disappearing and reappearing act is taking place in Quantum Mechanics, the derivatives are not defined and hence the operators no longer exist. For the momentum operator to exist the variation of x must be continuous. If such a disappearing and reappearing act is taking place, a particle cannot be assumed to behave as a wave.

If a particle moves from one position to another position, the particle must pass through all the in-between positions sequentially from the starting position to the destination position on any path. In Quantum Mechanics, for a particle to move from one position to another position, the particle must disappear from the current position and somehow miraculously reappear in the new position. That means the position x is not continuous. If the position of a particle is not continuous, the momentum operator is not defined.

If the position of a particle is probabilistic, the position x is not continuous and hence the derivative $\partial/\partial x$ does not exist. As a result, the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is not defined if the position x is probabilistic. On the other hand, if the position and momentum of a particle are probabilistic, a particle cannot be assumed to behave as a wave. The variation of the position and the momentum of a wave must be continuous for a particle to be assumed to behave as a wave. Quantum Mechanics is full of contradictions to be a valid theory. Quantum Mechanics is not even a theory since the eigenspaces of all the operators are not unique. For Quantum Mechanics to be a valid theory, the eigenspaces of all the operators must be unique.

In the Bohr atom, if an electron has to move from one energy level to another, the electron has to somehow engage in a disappearing and reappearing act is an indication that Bohr hasn't got the atomic model correct. Whenever we have to use a disappearing and reappearing act to explain how a particle moves from one position to another position in a working model, that model cannot be correct, and a new realistic model that does not require such a Houdini-act for a particle to move from one position to another is required.

No mass can simply disappear and reappear someplace else except in human psychics. No mass can be at multiple places simultaneously except in human psychics. No mass at a position can have multiple momenta simultaneously except in human psychics. It does not matter how well or how often you can show that your model fits with the experimental observations, if the model you are using is based on voodoo-acts, your interpretation of the experiment proves nothing.

Fitting the experimental observation to a model based on voodoo-acts does not substantiate the model. The claim of the sighting of Virgin Mary by a village idiot cannot be used to claim God exists. Such misinterpretations neither validate some archaic religious text nor a Quantum Mechanics text that are completely hypothetical. Quantum Mechanics is not science; it is voodoo science. If people are not paid to do Quantum Mechanics, there would be no Quantum Mechanics believers just as there will be no priests if they are not paid. If people are not paid to do Special Relativity and General Relativity, there will be no believers of Special Relativity and General Relativity. Quantum Mechanics, Special Relativity, and General Relativity are not valid theories [3,5].

XIII. PLANCK SPECTRUM IS INCORRECT $E\neq hf$, ENERGY CANNOT COME IN QUANTA

Lemma:

If energy is quantized, and an energy quantum is given by $E=hf$, the energy of any spectrum that is continuous would be infinite.

Between any two frequencies of a continuous spectrum, there are infinitely many frequencies. If energy comes in quanta $E=hf$, each frequency of a nonzero spectrum has nonzero energy. When there are infinite frequencies with nonzero magnitude, each frequency should contain at least one quanta of energy, and hence the energy of the spectrum would be infinite. If the energy comes in quanta $E=hf$, the energy of a spectrum of even the narrowest band will be infinite. The energy cannot be infinite and hence the energy cannot be quantized by an energy quantum $E=hf$ as it is claimed in Quantum Mechanics, $E\neq hf$.

The energy cannot come in energy quantum $E=hf$. If energy comes in energy quanta $E=hf$, what would be the energy of light? If energy comes in quanta $E=hf$, the energy of light would be infinite, unbounded. Why?

Because the spectrum is continuous. If energy comes in quanta, the electromagnetic spectrum cannot be continuous. If energy comes in quanta E=hf, the energy of even a narrowest band of electromagnetic waves will be infinite.

Why do physicists love blackbody cavities? Why do physicists have to analyze a blackbody cavity to obtain a blackbody spectrum? What does a blackbody spectrum have to do with a cavity? There is something fishy here? Why are they hiding in a closet (cavity) when they want to obtain a blackbody spectrum, which has nothing to do with a cavity?

The answer is simple. If the energy comes in quanta E=hf, there is only one place where energy of a spectrum is finite; it is inside a cavity. Inside a cavity, the spectrum is discrete. If the energy comes in quanta E=hf, the only place where the energy is finite is inside a cavity since the spectrum is discrete. As long as you stay in the cavity (closet), you can claim the energy is quantized. That is why physicists prefer to hide in a cavity. But you have to face the reality if you venture outside the cavity. Because, in the outside world, the spectrum is not discrete. Outside a cavity, the electromagnetic spectrum is continuous. It is a different world outside a cavity (closet), no longer discrete. Anywhere outside a cavity, the energy is not finite if the energy comes in quanta E=hf. That is the primary reason why the blackbody spectrum is obtained by analyzing the spectrum inside a cavity. That is the only place the energy is finite if energy comes in energy quantum E=hf.

The spectrum of what is coming out a blackbody cavity cannot be described by analyzing what is inside a cavity. Because, the inside and outside spectra do not match. The spectrum inside a cavity is discrete while the spectrum through a hole on the wall of a cavity is continuous. The only thing that is common between the spectra is that the discrete spectral components present inside the cavity are also present in the continuous spectrum observed through a hole on the blackbody cavity. The spectrum observed through a hole on a blackbody cavity is not the same as the spectrum inside a blackbody cavity. The spectrum outside a blackbody cavity is continuous. Spectrum through a hole on a blackbody cavity is continuous.

Corollary:

If the spectrum is continuous, the energy cannot come in energy quantum E=hf. If the energy comes in quanta E=hf, the spectrum cannot be continuous.

Consider a spectrum of even a narrowest band electromagnetic wave. How many frequencies are there within even the narrowest band wave? There are infinitely many frequencies. If the energy comes in quanta E=hf and there are infinitely many frequencies in the spectrum, the energy will be infinite, not finite. The blackbody spectrum you develop for a blackbody cavity does not apply outside a blackbody or through a hole on a blackbody cavity. The energy quantum E=hf does not apply outside a cavity. As we are going to see, the energy quantum E=hf does not apply even inside the cavity [1].

The representation of energy quantum E=hf is the foundation of Quantum Mechanics. Planck made the assumption that the energy comes in quanta given by E=hf in order to derive the blackbody radiation spectrum from the experimental data obtained through a hole on a blackbody cavity. Although the dimension of the cavity is not directly present as a part of the spectrum, the effect of the dimension of the cavity is indirectly present as a part of the multiplication factor of the frequency function [1].

The Planck spectrum depends on the geometry of the blackbody cavity. The Planck spectrum of a spherical cavity is not the same as the Planck spectrum of a cubic cavity or of any other shape of a cavity. The correct blackbody spectrum must be independent of the geometry of the cavity. The dependence of the Planck spectrum on the geometry of the cavity is an indication that the Planck spectrum is incorrect although the frequency function of the Planck spectrum is correct. The derivation of the Planck's Blackbody Spectrum is incorrect [1]. The correct frequency function is necessary for a spectrum to be correct, but not sufficient.

What is observed through a hole on a blackbody cavity is not what is present inside the cavity. What is inside the cavity cannot be observed through a hole on the surface of a cavity. Spectrum observed through a hole is continuous even though the spectrum inside a cavity is discrete. As a result, it is not possible to obtain the spectrum of a blackbody cavity by counting the modes or the allowed discrete frequencies in a cavity.

Further, the mode counting used in the Planck spectrum is incorrect. Not any integer multiple of primary frequency can reside in a cavity. It is only the integers that satisfy the Pythagoras quadruples that can represent the harmonics present in a cavity [1]. The Planck spectrum is not a spectrum.

The relationship E=hf is meaningless. If the relationship E=hf holds, the amplitude has to be determined by the frequency. However, frequency has no existence without amplitude and hence the amplitude and energy cannot be determined by frequency. Frequency of a wave itself has no energy. What light has is the electromagnetic potential energy. Potential energy of electromagnetic waves cannot be determined by frequency. It is only that the electromagnetic waves can generate kinetic energy in the presence of charge particles, and that kinetic energy generated by the electromagnetic waves per cycle is proportional to the frequency [1]. Electromagnetic wave is an energyless intermediary that can transfer kinetic energy of an oscillating mass at one location to a distant charged mass. And that transferred kinetic energy per cycle is proportional to the frequency. Proportionality parameter depends on the amplitude of the oscillation and the mass. Per cycle energy is not a quantum.

It is only a mass m oscillating at frequency f that has energy per cycle proportional to frequency f.

Electromagnetic waves have no energy. Light has no energy. Light has no momentum. Light has no temperature. Light has no entropy. Potential energy has no temperature. Potential energy has no entropy. Potential energy is an energy potential. Potential energy is not energy until it is converted to energy.

There is no massless energy. If a blackbody cavity is a vacuum, it does not matter how much electromagnetic radiation is present in the cavity, the cavity has no energy, no temperature, no entropy. There is no temperature without the collision of masses. It is only that the light can generate energy in the presence of charge particles and that the generated energy per cycle is proportional to the frequency of the light as well as to the square amplitude of the light.

The Boltzmann entropy that was developed for particles of mass has no place in light since light is massless. Einstein's use of entropy for the derivation of light particles or photons is simply false and meaningless. Light has no entropy. The energy cannot be quantized. Electromagnetic potential energy as well as gravitational potential energy cannot be converted into energy without a mass. There is no massless energy.

Energy is the kinetic energy. The rest of energies are potential energies. Potential energy is not energy until it is converted to kinetic energy by particles of mass or charged mass. Energy has no independent existence without mass and hence mass cannot be converted to energy. Mass must be conserved. Mass cannot be converted to energy since energy has no existence without mass. Kinetic energy of a mass is a function of the mass and hence if energy comes in quanta, the mass must be associated with each and every quantum, which is not possible since the mass of a particle is unique and cannot be associated with each energy quanta.

If energy comes in quanta $E=hf$, then the kinetic energy of a mass can have a fixed frequency f since h is a constant. The kinetic energy can also appear as $E=nh(f/n)$ with frequency f/n, where n is an integer. As a result, the energy quanta for a given energy is not unique. There is no way of determining the frequency of an energy quantum uniquely. If energy is quantized as $E=hf$, the energy quantum is not unique since $E=hf$ is also equivalent to $E=nh(f/n)$ for any n. The frequency of an energy quantum is ambiguous if energy comes in quanta $E=hf$.

The kinetic energy of a mass cannot be linked to a fixed frequency as suggested by $E=hf$ since we can convert the kinetic energy of a mass to any frequency we want with appropriate mechanisms. As a result the energy cannot be given by $E=hf$. Kinetic energy of a mass has no associated frequency and hence energy quantum $E=hf$ is meaningless. Potential energy is not energy until it is converted into energy and hence potential energy cannot come in quanta $E=hf$. Potential energy comes in different flavors, and the energy of different flavors cannot come in common quantum $E=hf$. Potential energy has no associated frequency and hence energy quantum $E=hf$ is meaningless for potential energy. Kinetic energy of a mass has no associated frequency, and hence energy quantum $E=hf$ is meaningless for kinetic energy. There is no energy without an association of a mass and hence energy cannot come in quanta $E=hf$ since a mass cannot be associated with each quantum.

The energy cannot come in quanta. Any entity with a belonging cannot come in quanta since energy quantum has no identification header. What is $E=hf$ is not an energy quantum. The $E=hf$ is the energy per cycle generated by electromagnetic waves or light in the presence of charge particles [1]. The parameter h depends on the square amplitude of light. The h is not a universal constant. Since the Planck spectrum is incorrect, the assumption that the energy comes in quanta of $E=hf$ is invalid.

Einstein's claim that the light comes in quanta of energy $E=hf$ is invalid since light has no entropy or a temperature. Planck's claim that the energy comes in energy quanta E=hf is incorrect since energy is a property of particles of mass. There is no independent entity called energy. Energy has no existence without particles of mass. Light cannot come in particles. Particles cannot propagate. Particles move. Light propagates. It is the light bursts as a whole that move relative to observers, not the propagating waves [3]. Maxwell equations apply to propagation of light, not for the motion of light bursts. Motion of light bursts is relative, propagation of light is not. Speed of the propagation of light is a constant determined by the medium. The path of the light is fixed, and can only be altered by the medium. Observers cannot alter the path of light. Observers cannot derail trains.

Lemma:

The speed of an object and the direction of that object cannot be changed relative to observers. It is the path that moves relative to observers while the object on that path remains unaltered relative to the observer.

The speed of any entity on a fixed path is independent of observers. The path of light is relative just as a mountain is relative to an observer. It is the fixed-path of a light burst that moves relative to a moving observer just as a mountain moves relative to a runner. It is always a fixed entity associated with a moving object that moves relative to a moving observer, never the moving object itself. It is the train track moves relative to a runner, never the train on the track.

The speed of propagation of light on its constant path remains unaltered relative to a moving observer. It is the speed of motion of a light burst that depends on the observer. The speed of propagation of light on its constant path remains unaltered relative to observers [3]. No Special Relativity is required since light propagates at constant speed on a constant path determined by the medium. In fact, the Galileo Relativity is incorrect.

If kinetic energy of a mass comes in quanta, the mass must be associated with each quantum, which is not possible. Energy cannot come in quanta since mass cannot be associated with each quantum. There is no massless energy. Potential energy is not energy unless it is converted to kinetic energy of particles of mass. Light has no energy. It does not matter how much light is there in a vacuum, there is no temperature in a vacuum. Energy has no existence without temperature. Entropy has no existence without temperature. Light has no entropy. Energy has no existence without particles of mass.

The energy quantum $E=hf$ is ambiguous since it is also equivalent to $E=nh(f/n)$. If energy comes in quanta, the energy quantum cannot be ambiguous. It is not just Planck's derivation of the blackbody spectrum, which led to the energy quantum $E=hf$, that is wrong, the energy quantum $E=hf$ itself is meaningless and cannot exist. You do not need anything more than the fact that frequency has no existence without amplitude to see the mockery of the energy quantum $E=hf$. Frequency has no energy. There is no frequency without amplitude. Electromagnetic waves have no existence if energy comes in quanta $E=hf$.

XIV. GALILEO RELATIVITY IS INCORRECT (IF GALILEO RELATIVITY HOLDS, TRAINS WILL DERAIL AND PLANETS WILL DEORBIT RELATIVE TO OBSERVERS)

Observations:

- Moving vehicle remains on the road relative to any observer irrespective of the direction of the observer motion. Observers cannot ditch (de-road) a car.
- Moving train remains on the track relative to any observer irrespective of the direction of the observer motion. Observers cannot derail a train.
- A planet remains in orbit relative to any observer irrespective of the direction of the observer motion. Observers cannot deorbit planets.
- Light propagates on its fixed path determined by the medium relative to any observer irrespective of the direction of the observer motion. Observers cannot bend light.

Lemma:

Observers cannot alter the path of a moving object by running towards or away from it. Galileo Relativity is incorrect.

Corollary:

If Galileo Relativity is correct, trains will derail, vehicles will end up in ditches, planets will deorbit relative to observers.

Lemma:

The velocity of any moving entity on its path is independent of the observer motion. It is the path that moves at the speed of the observer against the direction of the observer, not the moving entity on its path [3].

According to Galileo relativity, if vehicle-A travels at velocity $\mathbf{u}$ and vehicle-B travels at velocity $\mathbf{v}$, the relative velocity $\mathbf{w}$ of vehicle-A relative to vehicle-B is given by the simple vector addition, $\mathbf{w}=\mathbf{u}-\mathbf{v}$. This Galileo relative velocity of vehicle-A relative to vehicle-B given by $\mathbf{w}=\mathbf{u}-\mathbf{v}$ is incorrect, $\mathbf{w}\neq\mathbf{u}-\mathbf{v}$. The relative velocity $\mathbf{w}$ of vehicle-A relative to vehicle-B cannot be given by simple vector addition since vehicle-A has no existence outside its path, $\mathbf{w}\neq\mathbf{u}-\mathbf{v}$.

There is no road along the direction $\mathbf{w}$ for the vehicle to travel. It does not matter what the direction of motion and the speed of motion of an observer are, a moving vehicle must remain on the road relative to any observer. A train must remain on its track relative to any observer irrespective of the direction of motion and the speed of motion of the observer. Light must travel on the path determined by the medium relative to any observer irrespective of the direction of motion and the speed of the observer. The relative speed of an entity relative to an observer cannot be obtained by velocity vector addition. No moving object can move out of its path relative to observers since the object has no existence out of its path.

If Galileo relativity is correct, it will lead to disaster. Any moving object will be out of its path relative to observers if the Galileo-Newton relativity holds. If Galileo-Newton relativity holds, I should be able to derail a train simply by running, but it does not happen in my eyes no matter in which direction at what speed I run. Galileo and Newton failed to realize that an observer cannot change the direction of an object. Galileo and Newton failed to notice that an observer cannot change the speed of an object on its path. Observers cannot derail a train. It is only the train track that moves relative to observer motion, not what is moving on the track. It is my distance to the train track that changes by my running. It is the train track that is relative, not the train on the track.

If the Galileo-Newton relativity is correct, all the vehicles will end up in ditches relative to observers. If the Galileo-Newton relativity is correct, all the trains will be derailed relative to observers. If the Galileo relativity is correct, all the planets will deorbit relative to observers. It does not matter what velocities observers are traveling, planets do not deorbit relative to observers. Vehicles do not end up in ditches relative to observers. Observers cannot derail a train. Observers cannot direct vehicles into ditches. The path (the track) of a moving object does not change relative to observers. It is only the distance to the path that varies with the observer motion.

The speed of a moving entity relative to a moving observer is not a simple velocity vector addition. It is only the fixed path that moves relative to observers, not what is traveling on the fixed path [3]. The speed and the direction of an entity on its path is independent of observers. A train traveling on its track remains traveling at the same speed and direction on its track relative to any observer irrespective of the speed of the observer and the direction of the observer motion.

Although no vehicle ends up in a ditch relative to observers, if you use the velocity vector addition for obtaining the relative speed of a moving object, all the vehicles end up in ditches; that is exactly what is supposed to happen according to the Galileo Relativity. Galileo Relativity derails trains. Galileo Relativity is incorrect. That is also what happens in Einstein's Special Relativity and General Relativity since both Special Relativity and General Relativity are based on the Galileo Relativity. Einstein derailed light. Observers cannot change the path of light, which is determined by the medium. The path of light cannot be altered without change of the medium. Observers cannot bend light. Gravity cannot bend light. Gravity cannot affect massless. Gravity alters the density gradient of the medium surrounding the gravitational object and the density gradient of the medium bends light. The effect of gravity on light is always through a medium. The path of light is unaltered near a gravitational object if the gravitational object is in a vacuum.

The velocity of an object on its path is unaffected by the motion of the observers. If the speed of the observer is **v**, it is only that the path (the track) as a whole with the moving object on it travels against the observer at speed **v**. In other words, relative to the observer, the path as a whole, with the moving object on it, travels at velocity **-v**. In relativity, we cannot add the velocities to obtain the relative velocity since that will derail the object, which does not and cannot take place. Observers cannot derail a moving object.

In relativity, all we can say is that the velocity of a moving object on its path is unaltered relative to any moving observer. However, the path itself has an additional velocity **-v** relative to the observer. In relativity, we have to treat the moving object on its path as a bulldozer or an armored tank where the object and its path are attached, or the moving entity and its path together form a single entity. It is this single entity (Caterpillar or Bulldozer) that moves at speed -v relative to an observer while the speed and the direction of the moving entity (Caterpillar or Bulldozer) on its path remain unaltered relative to an observer.

If a Bulldozer (a vehicle and its track as a single entity) is moving at velocity **u** and an observer is moving at velocity **v**, the Bulldozer moves at velocity **u** unaltered on its track relative to the observer. However, the Bulldozer as a whole moves at velocity **-v** relative to the observer. We cannot say the Bulldozer moves at relative velocity $\mathbf{w}=\mathbf{u}-\mathbf{v}$ relative to the observer as Galileo, Newton, and Einstein claimed since the observer cannot change the path of the Bulldozer, $\mathbf{w}\neq\mathbf{u}-\mathbf{v}$. Relative to any observer, a train must remain on its track irrespective of the velocity of the observer.

Lemma:

Observers cannot derail a train by running away from it.

Galileo Relativity appears to work correctly only for the cases where observer motion is in the direction of the motion of the object or against the direction of the motion of the object. In other words, Galileo Relativity appears to work right when the path of the observer motion is parallel to the path of the motion of the object. The Galileo Relativity does not apply for the cases where the path of the observer is not parallel to the path of the motion of an object. However, even when the observer motion is parallel to the motion of the object, it is always the path that moves against the observer motion, not the moving object. The direction and the speed of an object on its path are unaltered relative to observers. It is only for the case where the observer motion is parallel to the motion of an object that the motion of the path of an object relative to an observer is indistinguishable from the motion of the object itself relative to the observer and hence Galileo Newton relativity appears to work properly; there is no derailment when the paths are parallel. When the direction of motion of the observer is not parallel to the motion of an object, Galileo Newton relativity does not hold since it results in a derailment, which cannot take place.

The speed of an object and the direction of that object on its path cannot be changed relative to observers. It is the path that moves relative to observers while the motion of the object on its path remains unaltered relative to observers. Galileo and Newton derailed trains relative to observers, which is prohibited in nature. Have you seen trains derailing while you are running? Observers cannot derail a train. Observers cannot alter the direction of motion of an object. Observers cannot change the speed of an object on its track. Newton derailed the train relative to observers. Einstein derailed the train relative to observers. Einstein derailed light in Special Relativity relative to observers, which is prohibited by nature. Special Relativity is not required. Galileo and Newton Relativity is false and must be corrected.

No object can have speed c (the speed of light) relative to light, the massless. Relativity does not apply to massless. Nothing can travel relative to an entity that has no standstill existence. For relative speed to exist relative to an entity, that entity must be able to be stopped. Light cannot be stopped. Light has no standstill existence. Nothing can travel relative to light. A mass m cannot have rest kinetic energy $E=mc^2$ relative to light since light is not relative, $E\neq mc^2$. Observers cannot derail light. The speed of light on its path is independent of observers naturally. You cannot force the light, the massless, to behave as golf balls. Light does not behave as golf balls. Einstein made the mistake of forcing light to behave as golf balls in Special Relativity. Special Relativity is false.

Propagation of light is not relative [4]. It is not just the speed of light that is observer independent, the path of light is also observer independent. Lorentz Transform requires the velocity of light (both the direction of light and the speed of light on its track) to be observer independent. In Special Relativity and General Relativity, it is only the speed of light that is kept constant, but the path of light is allowed to vary with the observer motion. Special Relativity and General Relativity derailed the light (train). Special Relativity and General Relativity and their conclusions thereof are a result of misapplication of the Lorentz Transform. Light cannot travel on geodesics. The direction of light is determined by the density gradient of the medium, not by observers.

Lorentz Transform is not unique. Light cannot be transformed onto moving frames [4]. Light is not relative. When light is not relative, Special Relativity and General Relativity do not hold, and hence $E \neq mc^2$. A mass does not have rest kinetic energy. A stationary mass does not have speed c relative to light since light has no standstill existence. The rest energy (kinetic energy of a rest mass, $E=mc^2$) of a mass is an oxymoron. There is no independent entity called energy. Energy is the kinetic energy of particles of mass. Energy cannot exist without an association of a mass. A mass cannot be converted into energy since energy has no independent existence without mass. Mass must be conserved. Mass and energy are not equivalent. Mass cannot be converted to energy and energy cannot be converted to mass. There is no massless energy or massless temperature. Temperature and energy are synonymous.

The claim in Special Relativity that the mass of an object depends on its speed, $m'=\gamma m$, is false, where $\gamma=1/\mathrm{sqrt}(1\text{-}v^2/c^2)$, m′ is the mass of the moving object and m is the mass when the object is stationary. The mass of an object is unaltered with its speed, $m' \neq \gamma m$. If the mass of an object depends on its speed, the mass will be directional. The mass of an object cannot be directional. Mass is observer independent. Time is observer independent, $t'=t$, $t' \neq (1/\gamma)t$, where t′ is the time on a moving frame relative to an observer on a stationary frame, and t is the time on a stationary frame. Time is observer independent. A clock does not define time. Clock displays the time we have defined. Time does not exist until we define it. The time, a day or a year, is independent of clocks. Clocks are engineered to break down the time, a day or a year, into subintervals, hour, minutes, and seconds. The time, a day or a year, is not determined by clocks. The year, one orbit of the earth, is not determined by clocks. The day, one spin of the earth is not determined by the readings on clocks. We do ot grow old by the clocks we have engineered. We cannot engineer time. We define the time. We engineer devices to break down the time we have already defined into smaller intervals. The time, the day or the year, is not determined by clocks.

Lemma:

The speeds of clocks do not determine the time, the day or the year. The speeds of the clocks must be in synchrony with the time, the day or the year, for the clocks to be considered valid and correct.

Lemma:

Any moving entity travels or propagates on a fixed track. The speed and the direction of motion or propagation of any entity (light, trains, vehicles, planets, galaxies, etc.) on a fixed track is independent of observers. Observers cannot derail light, trains, vehicles, planets, galaxies, etcetera.

Corollary:

The speed of light is naturally independent of observers since the light propagates on a fixed path that can only be altered by the medium. No Special Relativity is required to keep the speed of light constant relative to observers. Observers cannot alter the direction of light [3].

Theorem: Relativity

The velocity of an object on its path is observer independent. It is the path of the moving object that moves relative to the observers, not the moving object itself.

Lemma: Lorentz Transform

In the Lorentz Transform, it is not just the speed of light that is observer independent, the path of light is also observer independent. It is the velocity of light that is observer independent in the Lorentz Transform.

Lemma:

The Lorentz Transform cannot exist since the Lorentz Transform is not unique [4].

XV. **APOCRYPHAL PHOTON** $E \neq hf$

Theorem:

$E \neq hf$. The energy quanta $E=hf$ is meaningless and cannot exist since frequency f has no existence without amplitude. Energy cannot come in quanta $E=hf$.

Lemma:

Light cannot consist of light quanta or photons. If light comes in energy quanta $E=hf$, the energy of the light spectrum will be infinite.

Lemma:

If light comes in energy quanta $E=hf$, light has no existence, electromagnetic waves have no existence.

Frequency has no energy. Frequency is not energy. To claim that the energy is given by energy quanta $E=hf$, the frequency must have an independent existence. Problem is that the frequency has no independent existence. Frequency has no existence without amplitude and hence energy must be a function of the amplitude. Whether it is a wave of frequency f or an oscillating mass at frequency f, the energy cannot be given by $E=hf$. It is only that the frequency of an electromagnetic wave can be converted into energy by charge particles. The relationship $E=hf$ does not apply for light since light has no energy. In the case of an oscillating particle at frequency f, the energy is a function of the oscillator amplitude as well as the mass of the oscillating object.

Frequency of a wave has no energy. Frequency has no existence without the amplitude of a wave. Frequency cannot be a determining factor of energy when frequency has no existence without amplitude. Energy quantum $E=hf$ cannot hold since frequency has no existence without amplitude. Amplitude of an electromagnetic wave determines the potential energy. Potential energy is not energy until it is converted into kinetic energy of objects of mass. When we say energy, it has one meaning, the kinetic energy of particles of mass.

The claim that the frequency of a wave determines its energy is simply meaningless. How long does one have to wait to get that energy $E=hf$? One cycle, two cycles, or forever. Certainly, two cycles have more energy than one cycle. Frequency of light has no energy. It is only that the light can generate kinetic energy $E=hf$ per cycle in the presence of electrons. The h is not a universal constant [1]. Light cannot generate energy in the absence of mass since an electric charge has no existence without mass. On the other hand, there is no light without mass since it is the motion of charged particles that generates light. Light has no effect on electrically neutral fundamental particles.

It is doubtful that there are electrically neutral fundamental particles. Although the neutrinos are considered to be electrically neutral fundamental particles, and there are claims that they have been observed experimentally, the mass discrepancy used to claim the existence of neutrinos could be a result of our false faith in the scale or the devices used for measuring mass. The measuring device depends on the environment it is in. A measuring device does not give the same reading for different environments. Environment of pre neutron decay is different from the environment of the post decay of a neutron and hence the measuring device may not perform equally. The relativity of the measuring device to the environment it is operated on can get transferred on to what is being measured unknowingly leading to false claims and interpretations, which may result in the introduction of false particles that are non-existent; neutrinos could very well be such a mishap.

Engineered devices that we use for measuring mass are not universal. The mass discrepancy between the pre neutron decay and the post neutron decay could be the result of the dependence of the measuring device in the two situations rather than the presence of neutrinos. Most probably, the neutrinos could be a result of experimental misinterpretation. It is highly unlikely that there are neutral fundamental particles such as neutrinos. It is most likely that all the fundamental particles carry an electric charge.

It has been claimed that the neutrinos have very small mass and they travel close to the speed of light. They also claimed to pass through the earth and our bodies with no interaction; if there is any interaction it is considered to be very rare. If the Special Relativity holds and mass is relative, and neutrinos travel close to the speed of light, the mass of neutrinos should be quite large, infinitely large, not small. The mass cannot be relative. Special Relativity is invalid. The neutrinos are most probably hypothetical and do not exist. It certainly must be a result of misrepresentation of the measuring device discrepancy of mass, not an actual mass difference between the pre and post neutron decay.

Since the Planck spectrum that depends on the geometry of a cavity is not a valid spectrum and its derivation is incorrect, its assumption that the energy comes in quanta of $E=hf$ is incorrect, $E\neq hf$. Since light itself has no temperature and hence no entropy, Einstein's derivation of photon based on Boltzman's entropy relationship is false. When light itself has no energy, light cannot be claimed to consist of particles or quanta, $E\neq hf$. There are no light particles, light quanta, or photons. Light comes in wave bursts. These wave bursts are not particles. When an electron moves from a higher energy level to a lower energy level, it releases a wave burst, not a particle. These wave bursts do not have energy. These wave bursts cannot generate a temperature in a vacuum. Energy has no existence without temperature. There is no energy without the motion of particles of mass. The energy is the kinetic energy of particles of mass. Light waves have no energy. Electromagnetic potential energy of waves can be converted into energy by charge particles. The energy gained by a charge particle in the presence of electromagnetic waves is a function of frequency as well as the amplitude, not just the frequency alone. Wave bursts propagate, particles do not propagate.

If gravitational potential is assumed to be quantized $mgy=nhf$, then, height y is quantized and given by $y=nhf/mg$, where n is an integer. The height y cannot be discrete. Height cannot change from one level to another without passing all the points in between. In addition, potential energy has no association with frequency, and hence the representation of potential energy as integer multiple of energy quantum $E=hf$ has no meaning. Beside its meaninglessness, if the potential energy is assumed to be quantized, the distance cannot be continuous. If the potential energy is assumed to be quantized, the space cannot be continuous. Space cannot be discrete. Space cannot be warped, it is a medium that can be warped by a gravitational object.

Wave requires the amplitude to vary continuously. Without the continuous variation of the amplitude, there will be no waves. If the amplitude is quantized, waves have no existence. If amplitude of a wave is quantized, the position x and momentum p and time t cannot have continuous variations in a wave. There is no wave unless x, p, and t are continuous. There will be no light if the light consists of particles or photons.

The waves $\phi(x,p,E_p,t)=A \exp((j/\hbar)px)\exp((-j/\hbar)E_p t)$ and $\phi(x,k,\omega,t)=A \exp(jkx)\exp(-j\omega t)$ have no existence if energy is quantized as $E=hf$. Because, if $E=hf$, then the frequency has to determine the amplitude of a wave, which is impossible since frequency has no existence without the amplitude. Amplitude of a wave and the frequency are independent. Potential energy of an electromagnetic wave is not determined by frequency. Amplitude of a wave cannot be determined by its frequency; it is not possible.

Further, the wave amplitude-A cannot be continuous if the energy is quantized as $E=hf$. If the energy is quantized the amplitude-A must also be quantized. The amplitude of a wave cannot come in quanta. The amplitude of a wave must be continuous for a wave to exist and to propagate. The x, k, p, ω, and t cannot be continuous if the amplitude-A is quantized. There is no wave or wave propagation without x, k, p, ω, and t being continuous. If light consists of light particles or photons of energy $E=hf$, light itself has no existence.

Lemma:

The claim that the light comes in light quanta or photons of energy $E=hf$ precludes the very existence of light itself. Light cannot come in quanta of energy $E=hf$.

Similarly, if the kinetic energy of a mass moving at constant speed is quantized or $(1/2)mv^2=nhf$, the speed of a mass cannot be continuous since $v=sqrt(2nhf/m)$ and n is an integer. If the speed is quantized, the space must also be quantized. If the kinetic energy comes in quanta, the space cannot be continuous. As it was the case for gravitational potential, a particle moving at constant speed has no association with frequency, and hence the representation of kinetic energy of a moving particle as integer multiples of energy quantum $E=hf$ has no meaning. The energy quantum $E=hf$ is meaningless.

If the electromagnetic potential energy is assumed to be quantized and represented as integer multiples of energy quantum $E=hf$, then, the amplitude of the electromagnetic field cannot be continuous. The amplitude of the electromagnetic field has to come in quanta if light comes in energy quanta $E=hf$. If the amplitude of the electromagnetic field comes in quanta, without a mechanism to assemble the amplitude quanta into an electromagnetic vector field, the propagation of electromagnetic waves is not possible. If electromagnetic energy comes in quanta $E=hf$, the amplitude of an electromagnetic wave becomes dependent on the frequency f. Amplitude cannot be dependent on frequency since frequency has no existence without amplitude. As a result, the claim that the electromagnetic energy comes in energy quanta $E=hf$ is a self contradiction. If energy comes in quanta $E=hf$, a wave of frequency f has no existence. A child has no existence without parents. If the existence of parents depends on the existence of their child, parents have no existence.

Lemma:

If the energy comes in quanta $E=hf$, the amplitude must depend on frequency. But, if the amplitude of a wave depends on its frequency, the wave has no existence since frequency has no existence without amplitude.

Electromagnetic waves do not have energy. What electromagnetic waves have is the potential energy. Potential energy has no association with frequency. Potential energy is independent of frequency. Potential energy depends on the amplitude. Electromagnetic potential energy cannot come in energy quanta $E=hf$. For electromagnetic potential energy to come in quanta, the amplitude of the electromagnetic field has to come in quanta. Electromagnetic field is a vector. Vectors cannot come in quanta. For vectors to come in quanta, there must be an identification header with each quantum. Electromagnetic vector fields cannot come in quanta without a header associated with each quantum for the assembly of the field. Einstein's claim that light comes in light quanta $E=hf$ or photons is false and his derivation of photons is incorrect.

Electromagnetic waves cannot come in energy quanta or photons. Light is not particles. Light consists of wave bursts that are continuous. Wave bursts are not particles. Einstein's derivation of photons is incorrect since light has no entropy. Light has no temperature. Light has no kinetic energy. What light has is electromagnetic potential energy. Potential energy is not energy until it is converted into energy in the presence of charge particles (matter).

Electromagnetic potential has no temperature. Gravitational potential has no temperature. Potential energy can be converted into kinetic energy in the presence of particles of mass generating temperature and hence entropy. There is no entropy without a mass. There is no energy (kinetic energy) without a mass. Boltzmann entropy derived for particles of mass cannot be applied to light. Einstein's derivation of photon or light particles is a result of applying Boltzmann entropy to light. Entropy does not apply to massless. The concept of photons or light particles is a result of both theoretical and conceptual mistakes made by Einstein in his derivation of photons [1].

The potential energy has no association with frequency and hence the potential energy cannot be represented as $E=hf$. A particle moving at constant speed has no association with a frequency and hence the energy of a particle moving at constant speed cannot be represented as $E=hf$. The claim that the energy comes in quanta of frequency f is meaningless since all the energies are not associated with a frequency. The $E=hf$ applies only for a mass oscillating at frequency f. The parameter h is not a universal constant, and depends on the square amplitude of the oscillation and the mass of the oscillating particle [1]. The $E=hf$ is the kinetic energy of an oscillating mass per unit cycle.

Lemma:

The energy per cycle of a mass oscillating at frequency f is given by $E=hf$. Per cycle energy $E=hf$ of an oscillating mass is not a quantum. The h depends on the mass m and the square magnitude of the oscillation.

Lemma:

The energy cannot come in energy quanta $E=hf$. If energy comes in energy quanta $E=hf$, the energy of the light spectrum will be infinite since the spectrum is continuous.

Corollary:

If energy comes in energy quanta $E=hf$, the energy of even the narrowest band electromagnetic wave will be infinite since there are infinite discrete frequencies in any continuous frequency band.

One cannot refrain from asking the question, "Why do you have to consider a cavity to develop the blackbody spectrum?". The answer is simple. It is only inside of a cavity that we have a discrete spectrum. If the energy comes in energy quanta $E=hf$, a cavity is the only place where energy will be finite. As long as you are living in a cavity, you can go on claiming energy comes in quanta $E=hf$. As soon as you come out of the cavity, energy quantum $E=hf$ no longer holds. The energy quantum $E=hf$ does not apply for a continuous spectrum. Besides, as we have seen, the derivations of all the blackbody spectra are false [1]. The energy quantum $E=hf$ does not apply for a continuous spectrum. Vectors cannot come in quanta. Angular momentum and momentum cannot come in quanta. The amplitude of a wave cannot come in quanta.

Lemma:

Frequency must have an independent existence for the energy to be quantized as $E=hf$. But, frequency has no existence without amplitude, and hence the energy cannot come in energy quanta $E=hf$. The energy must depend on the amplitude, $E\neq hf$.

XVI. FOUNDATIONAL MISTAKES IN QUANTUM MECHANICS

a). Position operator cannot be position itself:

Quantum Mechanics defines the momentum operator $\mathbf{P}$ and the Position operator $\mathbf{X}$ as,

$$\mathbf{P}=-j\hbar\partial/\partial x \quad (16.1.1)$$

$$\mathbf{X}=x\mathbf{I}. \text{ (this } \mathbf{X} \text{ contradicts } \mathbf{P}) \quad (16.1.2)$$

These definitions of operators are contradictory. If the momentum operator is $\mathbf{P}=-j\hbar\partial/\partial x$, then the position operator is already determined by it. We cannot define it as position itself, $\mathbf{X}\neq x\mathbf{I}$.

If $\mathbf{P}=-j\hbar\partial/\partial x$, the eigen-decomposition is given by,

$$\mathbf{P}\phi=p\phi \quad (16.1.3)$$

$$-j\hbar\partial\phi/\partial x=p\phi \quad (16.1.4)$$

$$(1/\phi)\partial\phi=(j/\hbar)p\partial x \quad (16.1.5)$$

$$\phi=\exp((j/\hbar)px) \quad (16.1.6)$$

The partial derivative of the eigenfunction ϕ of $\mathbf{P}$ with respect to the momentum p gives,

$$\partial\phi/\partial p=(j/\hbar)x\phi \quad (16.1.7)$$

$$-j\hbar\partial\phi/\partial p=x\phi \quad (16.1.8)$$

$$\mathbf{X}\phi=x\phi \quad (16.1.9)$$

Where, the position operator $\mathbf{X}$ is given by,

$$\mathbf{X}=-j\hbar\partial/\partial p. \quad (16.1.10)$$

The position operator cannot be the position itself,

$$\mathbf{X}\neq x\mathbf{I}. \quad (16.1.11)$$

The definition of the position operator as the position itself, $\mathbf{X}\neq x\mathbf{I}$, is one of the foundational mistakes in Quantum Mechanics. Once a particle is assumed to behave as a wave of $\lambda=h/p$, the operators are handed to us by the plane wave equation. We cannot define them. The definition of position operator as position itself in Quantum Mechanics is wrong and it is blindly ill-conceived.

b). Position and momentum are simultaneously measurable:

If a particle with momentum p at position x behaves as a wave $\phi(x,p)$, where, $\phi(x,p)=\exp((j/\hbar)px)$, then, there is a mirror-symmetry between x and p. The operators $\mathbf{X}$ and $\mathbf{P}$ of the observables x and p are given by,

$$\mathbf{X}=-j\hbar\partial/\partial p \quad (16.2.1)$$

$$\mathbf{P}=-j\hbar\partial/\partial x. \quad (16.2.2)$$

The operators $\mathbf{X}$ and $\mathbf{P}$ commute,

$$[\mathbf{XP}-\mathbf{PX}]=0, \quad (16.2.3)$$

$$[\mathbf{X},\mathbf{P}]=0. \quad (16.2.4)$$

This is obvious since the operators $\mathbf{X}$ and $\mathbf{P}$ resulted from the same plane wave that resulted from the assumption that a particle behaves as a wave $\phi(x,p)$ of wavelength $\lambda=h/p$. In fact, the plane wave $\phi(x,p)$ is the eigenfunction of both operators $\mathbf{X}$ and $\mathbf{P}$.

The position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$ have a shared eigenspace $\phi(x,p)$. When operators have a shared eigenspace, they are simultaneously measurable without any precision tradeoff. The position x and momentum p of a particle are simultaneously measurable.

c). There is no Heisenberg Uncertainty:

When the position an the momentum operators are correctly derived from the plane wave under the assumption that a particle behave as a wave, we have,

$$\mathbf{X}=-j\hbar\partial/\partial p \quad (16.3.1)$$

$$\mathbf{P}=-j\hbar\partial/\partial x \quad (16.3.2)$$

The delta function $\delta(x)$ is not an eigenfunction of the position operator $\mathbf{X}$ and as a result, position x and momentum p are not a Fourier Transform pair. The position operator $\mathbf{X}=-j\hbar\partial/\partial p$ and momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ commute,

$$[\mathbf{X},\mathbf{P}]=0 \quad (16.3.3)$$

When the position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$ commute, the precision of the position x measured is unaffected by the precision of the momentum p measured. There is no tradeoff between the achievable precision of the position x and the achievable precision of the momentum p. The wavefunction in the position domain is the same as the wave function in the momentum domain, $\psi(x)\equiv\Psi(p)$.

The wave functions $\psi(x)$ and $\Psi(p)$ are not a Fourier Transform pair. There is no probability here. If the position x and momentum p are probabilistic, x and p cannot be continuous and hence the partial derivative with respect to x or p have no existence. As a result, the position $\mathbf{X}$ and the momentum $\mathbf{P}$ operators cannot be defined if x and p are probabilistic. If position x and momentum p are probabilistic, a particle cannot be assumed to behave as a wave and vice versa. There is no Heisenberg Uncertainty. Both x and p are measurable simultaneously to any achievable precision. There is no precision compromise between observables. There is no tradeoff between the measurable precision of the position and the measurable precision of the momentum.

d). **There is no Heisenberg Uncertainty even if the position operator is incorrectly defined as position itself**, $\mathbf{X}=x\mathbf{I}$:

Since the momentum operator is $\mathbf{P}=-j\hbar\partial/\partial x$,

$$\mathbf{P}|p>=p|p> \quad (16.4.1)$$

The eigenspace $|p>$ is unique.

By the invalid definition of $\mathbf{X}$ as the position itself,

$$\mathbf{X}|x>=x|x> \quad (16.4.2)$$

The eigenspace $|x>$ is not unique, and hence the eigenspace of any Hermitian operator can also be an eigenspace of the position operator $\mathbf{X}$. The eigenspace $|p>$ of the momentum operator $\mathbf{P}$ is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$, and hence,

$$\mathbf{X}|p>=x|p> \quad (16.4.3)$$

The operators $\mathbf{X}$ and $\mathbf{P}$ do not commute,

$$[\mathbf{XP}-\mathbf{PX}]=j\hbar\mathbf{I} \quad (16.4.4)$$

However, the eigenspace of the position operator is not unique, and hence the unique eigenspace $|p>$ of the momentum operator is also a valid eigenspace of the position operator; the position and momentum have a shared eigenspace $|p>$, $\mathbf{P}|p>=p|p>$, $\mathbf{X}|p>=x|p>$,

$$[\mathbf{XP}-\mathbf{PX}]|p>=j\hbar|p> \quad (16.4.5)$$

If $\mathbf{L}$ and $\mathbf{P}$ are two Hermitian operators, then, the commutation of two operators is necessary and sufficient for the simultaneous measurability of two observables $\mathbf{L}$ and $\mathbf{P}$ only if neither of the two operators is the observable itself, $\mathbf{L}\neq\ell\mathbf{I}$ and $\mathbf{P}\neq p\mathbf{I}$.

However, when one of the two operators is the observable itself, the commutation of the operators is sufficient but not necessary. Even when the operators $\mathbf{L}$ and $\mathbf{P}$ do not commute, they are simultaneously observable if $\mathbf{P}\neq p\mathbf{I}$ and $\mathbf{L}=\ell\mathbf{I}$ or $\mathbf{P}=p\mathbf{I}$ and $\mathbf{L}\neq\ell\mathbf{I}$.

The position x and momentum p of a particle are simultaneously measurable even when the position operator $\mathbf{X}$ is incorrectly assumed to be the position itself, $\mathbf{X}=x\mathbf{I}$, in Quantum Mechanics.

e). **Time variation of the average observables in Quantum Mechanics does not agree with the Classical Mechanics when the position and the momentum operators are correctly defined.**

The correctly defined position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$ that are consistent with each others as well as with the assumption that a particle behave as a wave are given by,

$$\mathbf{X}=-j\hbar\partial/\partial p \quad (16.5.1)$$

$$\mathbf{P}=-j\hbar\partial/\partial x \quad (16.5.2)$$

The eigen-representations of $\mathbf{X}$ and $\mathbf{P}$ are given by,

$$\mathbf{X}|x>=x|x> \quad (16.5.3)$$

$$\mathbf{P}|p>=p|p> \quad (16.5.4)$$

The $|x>$ is the eigenfunction or the eigenvector corresponding to the eigenvalue x. $|x>$ is a function of both x and p.

Multiplying equation (16.5.3) by $<x|$, we have,

$$<x|\mathbf{X}|x>=x<x|x> \quad (16.5.5)$$

For an orthonormal basis $<x|x>=1$ and hence,

$$<x|\mathbf{X}|x>=x \quad (16.5.6)$$

This only says that if the state $|\Phi>$ of the particle coincides with the eigenvector $|x>$, then, the corresponding eigenvalue is the position x. If the state $|\Phi>$ of the particle does not coincide with $|x>$, then, we have to project the state $|\Phi>$ onto $|x>$ for a given p, take the square magnitude, sum them up for all p and then for all x, and take the square root of the sum to get the position x.

Similarly, for the momentum p, we have,

$$<p|\mathbf{P}|p>=p \quad (16.5.7)$$

This only says that if the state $|\Phi>$ of the particle coincides with the eigenvector $|p>$, then, the corresponding eigenvalue is the momentum p. If the state $|\Phi>$ of the particle does not coincide with $|p>$, then, we have to project the state $|\Phi>$ onto $|p>$ for a given x, take the square magnitude, sum them up for all x and then for all p, and take the square root of the sum to get the momentum p.

For any observable ℓ with operator $\mathbf{L}$, we have,

$$<\ell|\mathbf{L}|\ell>=\ell \quad (16.5.8)$$

This only says that if the state $|\Phi>$ of the particle coincides with the eigenvector $|\ell>$, then, the corresponding eigenvalue is the observable ℓ. If the state $|\Phi>$ of the particle does not coincide with $|\ell>$, then, we have to project the state $|\Phi>$ onto $|\ell>$ for any other given observables that the eigenvector $|\ell>$ is a function of, take the square magnitude, sum them up for all the other observables that the eigenvector $|\ell>$ is a function of and then for all ℓ, and take the square root of the sum to get the observable ℓ.

When the state of a particle aligns with the eigenvector/eigenfunction of the observable, the observables x and p are given by,

$$x=<\phi|\mathbf{X}|\phi> \quad (16.5.9)$$

$$p=<\phi|\mathbf{P}|\phi> \quad (16.5.10)$$

The speed v and the force $F=-\partial V/\partial x$, where V is the potential, are given by,

$$v=d[<\phi|\mathbf{X}|\phi>]/dt \quad (16.5.11)$$

$$v=dx/dt \quad (16.5.12)$$

$$F=d[<\phi|\mathbf{P}|\phi>]/dt \quad (16.5.13)$$

$$F=dp/dt \quad (16.5.14)$$

The change of an observable ℓ of operator $\mathbf{L}$ with time t is given by the commutation of the operator $\mathbf{L}$ of the observable ℓ with the kinetic energy operator $\mathbf{E}_p$,

$$d\ell/dt=(-j/\hbar)<\phi|[\mathbf{L},\mathbf{E}_p]|\phi> \quad (16.5.15)$$

$$\ell=<\phi|\mathbf{L}|\phi> \quad (16.5.16)$$

Both operators $\mathbf{X}=-j\hbar\partial/\partial p$ and $\mathbf{P}=-j\hbar\partial/\partial x$ commute with the kinetic energy operator $\mathbf{E}_p$,

$$[\mathbf{X},\mathbf{E}_p]=0 \quad (16.5.17)$$

$$[\mathbf{P},\mathbf{E}_p]=0 \quad (16.5.18)$$

As a result, we have,

$$d[<\phi|\mathbf{X}|\phi>]/dt=0 \quad (16.5.19)$$

$$d[<\phi|\mathbf{P}|\phi>]/dt=0 \quad (16.5.20)$$

Since $x=<\phi|\mathbf{X}|\phi>$ and $p=<\phi|\mathbf{P}|\phi>$,

$$dx/dt=0 \quad (16.5.21)$$

$$dp/dt=0 \quad (16.5.22)$$

$$dx/dt\neq v \quad (16.5.23)$$

$$dp/dt\neq F \quad (16.5.24)$$

where,

$$F=-\partial V/\partial x \quad (16.5.25)$$

$$d[<\phi|\mathbf{X}|\phi>]/dt\neq v \quad (16.5.26)$$

$$d[<\phi|\mathbf{P}|\phi>]/dt\neq F \quad (16.5.27)$$

If the position and momentum operators are correctly defined so that $\mathbf{X}=-j\hbar\partial/\partial p$ and $\mathbf{P}=-j\hbar\partial/\partial x$ under the assumption that a particle behave as a wave given by $\phi(x,p)=\exp((j/\hbar)px)$, the time variation of the position x, $d[<\phi|\mathbf{X}|\phi>]/dt$ in Quantum Mechanics does not agree with the speed v in Classical Mechanics, $d[<\phi|\mathbf{X}|\phi>]/dt\neq v$. Similarly, the time variation of the momentum p, $d[<\phi|\mathbf{P}|\phi>]/dt$ does not agree with the force $F=-\partial V/\partial x$ in Classical Mechanics, $d[<\phi|\mathbf{P}|\phi>]/dt\neq F$.

The results of Quantum Mechanics do not agree with the Classical Mechanics when the position operator is properly obtained without any contradiction to the momentum operator, $\mathbf{X}=-j\hbar\partial/\partial p$ and $\mathbf{P}=-j\hbar\partial/\partial x$, which is indeed understandable since $\mathbf{X}$ and $\mathbf{P}$ commute. There is no Quantum Mechanics when $\mathbf{X}$ and $\mathbf{P}$ commute. When $\mathbf{X}$ and $\mathbf{P}$ are properly defined so that they are congruent with the assumption that a particle behaves as a wave, they commute.

f). **Neither Position x nor Momentum p Can be an independent Variable if a Particle is Assumed to behave as a wave $\phi(x,p)=\exp((j/\hbar)px)$:**

In the wave equation for a particle of momentum p at position x, $\phi(x,p)=\exp((j/\hbar)px)$, the position x and the momentum p are on equal footing. We cannot claim that the position x is the independent variable and choose the position operator as the position itself. Since there is a complementary mirror symmetry in the position and the momentum in the plane wave equation, there must also be a complementary symmetry in the position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$. Replacing one observable with the other observable in an operator, we should be able to change the operator of one observable to the operator of the other observable.

If we claim the position x is the independent variable and choose the position operator as the position itself, we can also claim the same for the momentum p since there is no reason to treat position x differently from the momentum p. The position and the momentum hold equal status in the plane wave equation $\phi(x,p)=\exp((j/\hbar)px)$.

For $\phi(x,p)=\exp((j/\hbar)px)$ to be a plane wave for a particle, both position x and the momentum p must be mutually independent. The position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$ must be complementary. One operator should be able to be generated from the other simply by changing one observable by the other. It is not possible to claim the position x to be an independent variable and choose the position operator as position itself as it is done in Quantum Mechanics. If the position x is the independent variable in $\phi(x,p)=\exp((j/\hbar)px)$, then, $\phi(x,p)$ is a function, not a wave. For $\phi(x,p)$ to be a wave both x and p must be independent variables.

Since Quantum Mechanics choses the position operator as the position itself, $\mathbf{X}=x\mathbf{I}$, while the momentum operator is $\mathbf{P}=-j\hbar\partial/\partial x$, the eigenspace of the momentum operator given by $\phi(x,p)=\exp((j/\hbar)px)$ is not a wave. The choice of position x as the independent variable goes against the assumption that the x and p behave as a wave.

There is no Quantum Mechanics if the position operator $\mathbf{X}$ is correctly chosen as $\mathbf{X}=-j\hbar\partial/\partial p$ according to the assumption that a particle behaves as a wave $\phi(x,p)=\exp((j/\hbar)px)$ of wavelength $\lambda=h/p$ without contradicting the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$. When the position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$ are correct, they commute $[\mathbf{X},\mathbf{P}]=0$.

XVII. PARTICLE IS NOT IN SUPERPOSITION IN EIGENSPACE REPRESENTATION

Consider the position operator $\mathbf{R}$ of a particle, where, $\mathbf{R}$ is a diagonal matrix of order 3×3,

$$\mathbf{R}=\mathrm{diag}(x_1,x_2,x_3) \quad (17.1)$$

The eigenvalue eigenvector representation of $\mathbf{R}$ is given by,

$$\mathbf{R}|x_i>=x_i|x_i> \quad (17.2)$$

The $|x_i>$ is the ith eigenvector of the operator $\mathbf{R}$ corresponding to the eigenvalue x_i $\forall$ i,

$$|x_1>=(1,0,0) \quad (17.3)$$

$$|x_2>=(0,1,0) \quad (17.4)$$

$$|x_3>=(0,0,1) \quad (17.5)$$

The state of a particle given by the position $|r>$ can be written as,

$$|r>=(x_1,x_2,x_3) \quad (17.6)$$

We can use the eigenbasis to represent the state of a particle given by position $|r>=(x_1,x_2,x_3)$.

$$|r>=\sum\psi(i)|x_i> \quad (17.7)$$

Where $\psi(i)$ is the projection given by,

$$\psi(i)=<x_i|r> \quad (17.8)$$

Since $\mathbf{R}|x_i>=x_i|x_i>$, $\forall$ i,

$$x_i=<x_i|\mathbf{R}|x_i> \quad (17.9)$$

Now, we have,

$$|\psi>=(\psi(1),\psi(2),\psi(3)) \quad (17.10)$$

Where, $\psi(1)=x_1$, $\psi(2)=x_2$, $\psi(3)=x_3$.

The wavefunction for the system is given by,

$$|\psi>=(x_1,x_2,x_3) \quad (17.11)$$

The wavefunction $|\psi>$ is also the position state of the particle,

$$|\psi>=|r> \quad (17.12)$$

Where,

$$|r>=(\psi(1),\psi(2),\psi(3)) \quad (17.13)$$

a). **Observed Value of Position r is Given by the Wavefunction:**

The observed value r is given by,

$$r=\mathrm{sqrt}(<r|r>) \quad (17.1.1)$$

Since $|\psi>=|r>$, we have the observed value r given by the wavefunction $|\psi>$,

$$r=\mathrm{sqrt}(<\psi|\psi>) \quad (17.1.2)$$

$$r=\mathrm{sqrt}(\psi^2(1)+\psi^2(2)+\psi^2(3)) \quad (17.1.3)$$

$$r=\mathrm{sqrt}[\sum\psi^2(i)],\ \forall i \quad (17.1.4)$$

Once we have the coordinates of the observable in the eigenspace, which are given by the wave function, the measured value of the observable is given by the Pythagoras theorem. The measured value of the observable r is simply the square root of the sum of the square components of the wave function $|\psi>$. There is no probability here. There is no probability involved in orthonormal representation of the state of a particle.

Eigenspace representation is just an alternative orthonormal representation, and it is no different from 3D representation of the position of a particle. Any orthonormal representation cannot be any different from 3D representation. If eigenspace representation involves probability, 3D representation of the position of a particle must also have a probabilistic interpretation. We know that any such probabilistic interpretation is meaningless in 3D representation of the position of a particle. There is no probability involved in the orthonormal representation of the state of a particle. The probabilistic interpretation in Quantum Mechanics is simply weird and meaningless.

Extending to a more general case, where the observable x of a moving particle is given by operator $\mathbf{X}$, the state of a particle $|\Phi\rangle$ can be represented as the coordinates on the eigen-axes,

$$|\Phi\rangle=\sum\psi(x_i)|x_i\rangle \quad (17.1.5)$$

Where $|x_i\rangle$ is the ith eigenvector corresponding to the eigenvalue x_i. Since the eigen-axes are orthonormal and $\psi(x_i)$ is the projection of the state $|\Phi\rangle$ on the eigen-axis $|x_i\rangle$, we have,

$$\psi(x_i)=\langle x_i|\Phi\rangle \quad (17.1.6)$$

The particle is on the state $|\Phi\rangle$. It is not on any of the eigen-axes. When the particle is on the state $|\Phi\rangle$, it is never on any of the orthonormal basis vectors. The projections of the state $|\Phi\rangle$ on eigen-axes are just the coordinates on that eigen-axes representation. A particle on the state $|\Phi\rangle$ is never on basis vectors of eigenspace of the observable just as a particle at the state $|r\rangle$ in 3D space is not on x, y, or z axes. Eigenspace representation is just another orthonormal coordinate representation, no difference. A particle can be on any of the eigen-axes $|x_i\rangle$ if an only if state of the particle coincides with one of the axes, $|\Phi\rangle\equiv|x_i\rangle$.

Lemma:

The observable is given by the eigenvalue of the operator of an observable if and only if the state of the particle coincides with the corresponding eigenvector of the observable.

The projection of the state of a particle onto an eigenvector of the orthonormal basis of an observable does not mean that the particle is on that eigenvector with a probability expressed by the wavefunction in the domain of the observable. There is never a probability of a particle being on any of those eigen-axes if the state of the particle $|\Phi\rangle$ is not on any one of them. A particle cannot be at several places simultaneously. A particle cannot be at x_i and at x_j simultaneously, where $i\neq j$. There is no superposition in an orthonormal representation.

b). **Observed Value x from the Wavefunction ψ**

In Quantum Mechanics, for observable x with the wavefunction $|\psi(x)\rangle$, the observed value of the position is given by,

$$x=\mathrm{sqrt}(\langle\psi(x_i)|\psi(x_i)\rangle) \quad (17.2.1)$$

$$x=\mathrm{sqrt}(\psi^2(1)+\psi^2(2)+\psi^2(3)+\ldots) \quad (17.2.2)$$

where, $\psi(i)=\psi(x_i)$, $\forall i$

$$x=\mathrm{sqrt}[\sum\psi^2(i)],\ \forall i \quad (17.2.3)$$

For continuous x, we have,

$$x=\mathrm{sqrt}(\int\psi^2(x)dx) \quad (17.2.4)$$

Similarly, for the momentum p with wavefunction $\Psi(p)$,

$$p=\mathrm{sqrt}(\langle\Psi(p_i)|\Psi(p_i)\rangle) \quad (17.2.5)$$

$$p=\mathrm{sqrt}(\Psi^2(1)+\Psi^2(2)+\Psi^2(3)+\ldots) \quad (17.2.6)$$

where, $\Psi(i)=\Psi(p_i)$, $\forall i$

$$p=\mathrm{sqrt}[\sum\Psi^2(i)],\ \forall i \quad (17.2.7)$$

For continuous p, we have,

$$p=\mathrm{sqrt}(\int\Psi^2(p)dp) \quad (17.2.8)$$

The measured value of an observable is simply the normalization factor of the wavefunction of the observable that is discarded in Quantum Mechanics as useless. Probability plays no part here. Wavefunction is not a probability distribution.

c). **Probabilistic Interpretation of Wave Function is Meaningless and Weird (It Contradicts the Foundational Assumption that Particles Behave as Waves)**

If a particle is assumed to behave as a wave, the position and momentum of the particle cannot be probabilistic. If the position and momentum of a particle are probabilistic, the particle cannot be assumed to behave as a wave. If the position and the momentum of a particle is probabilistic, the derivative operators are not defined and hence the momentum operator in QM cannot exist. Without momentum operator, QM has no existence. If the position and the momentum are probabilistic, QM has no existence.

In Quantum Mechanics, what is observed are the eigenvalues of the operator of an observable. The normalized square wavefunction in the domain of the observable at the observed eigenvalue provides the probability of observing that eigenvalue in Quantum Mechanics.

In the case of position x, what is observed is the eigenvalue x of the operator $\mathbf{X}$. In Quantum Mechanics, if the wavefunction in the position domain is $\psi(x)$, the probability of observing eigenvalue x, $\mathrm{Prob}(x)$, is claimed to be given by,

$$\mathrm{Prob}(x)=(1/\alpha^2)\psi^*(x)\psi(x) \quad (17.3.1)$$

Where, α is the normalization factor given by,

$$\alpha=\mathrm{sqrt}(\int\psi^2(x)dx) \quad (17.3.2)$$

Note that, when $\mathbf{X}=x\mathbf{I}$, the state of the particle $|\Phi\rangle$ is also equal to the wave function $\psi(x)$. In Quantum Mechanics, the wave function in the position domain, $\psi(x)$ is also the state of the particle $|\Phi\rangle$.

So, In Quantum Mechanics, the position x is claimed to be observed with probability $\mathrm{Prob}(x)$ given by,

$$\mathrm{Prob}(x)=(1/\alpha^2)\psi^*(x)\psi(x) \quad (17.3.3)$$

If the experiment is repeated many times with ith observation being x_i, the average position $\mathrm{Ave}(x_i)$ is given by,

$$\mathrm{Ave}(x_i)=\sum x_i\mathrm{Prob}(x_i),\ \forall i \quad (17.3.3)$$

$$\mathrm{Ave}(x_i)=(1/\alpha^2)\sum x_i\psi^*(x_i)\psi(x_i),\ \forall i \quad (17.3.4)$$

If the experiment is run many times, as $i\rightarrow\infty$, $\mathrm{Ave}(x_i)\rightarrow x$; at least, that was the idea; in fact, it is a proclamation in Quantum Mechanics.

Now, if we consider our 3D example, we can see how meaningless this is. Anything we do in eigenspace representation must also have a 3D representation counterpart. In the 3D example, we represented the position $|r\rangle=(x_1,x_2,x_3)$ as eigenvalues of operator $\mathbf{R}=diag(x_1,x_2,x_3)$. The wavefunction $|\psi\rangle$ was given by,

$$|\psi\rangle=(\psi(1),\psi(2),\psi(3)) \tag{17.3.5}$$

where, $\psi(1)=x_1$, $\psi(2)=x_2$, $\psi(3)=x_3$.

Now, according to the probability representation of Quantum Mechanics, the r has to be given by the average x_i, which is $Ave(x_i)$,

$$Ave(x_i)=\sum x_i Prob(x_i),\ \forall i \tag{17.3.6}$$

$$Ave(x_i)=(1/\alpha^2)\sum x_i\psi^*(x_i)\psi(x_i),\ \forall i \tag{17.3.7}$$

$$\alpha=sqrt[(x_1)^2+(x_2)^2+(x_3)^2] \tag{17.3.8}$$

$$Ave(x_i)=(1/\alpha^2)\sum x_i|\psi(x_i)|^2,\ \forall i \tag{17.3.9}$$

$$Ave(x_i)=(1/\alpha^2)[x_1(x_1)^2+x_2(x_2)^2+x_3(x_3)^2] \tag{17.3.10}$$

This average from the probabilistic interpretation of the wavefunction is meaningless; it is not r. This indicates that the probabilistic interpretation of wavefunction in Quantum Mechanics is meaningless.

You may claim that it is experimentally proven, but the probabilistic explanation as a concept does not mean anything sensible theoretically. Probability has been injected into Quantum Mechanics as a life support system. There is nothing probabilistic in eigenspace representations of operators. Probability interpretation in Quantum Mechanics is totally artificial, no theoretical justification for it.

Experimental misinterpretation is not a justification. Experimental misinterpretation is not a rare occurrence in physics; it has happened quite often. Some of the other experimental misinterpretations include, but not limited to, the use of Double Slit experiment with a beam of electrons for the justification of particle waves, and the use of Stern-Gerlach experiment to claim that the spin of a particle is probabilistic and spin state is 2D. There are no particle waves. The spin of a particle is deterministic and the state of a spin is 3D. There are no 2D spins [2].

When we project the state onto an eigenvector, what you get is not the observable. What you get is a component or the projection of the observable on that axis. To get the value of the observable you have to use the Pythagoras theorem on all the projections. The state of a particle is not on any of the orthonormal axes. What is on those axes are the coordinates or the projections of the state. Irrespective of whether it is a 3D representation or orthonormal eigen-axis representation, when you project a state onto axes of an orthonormal basis, what you get is the coordinates of the state on those axes, which is the wavefunction. To get the state, you have to square all the coordinates on the eigen-axes, sum them up, and take the square root. That gives the value of the observable. The particle is on none of the eigen-axes. Particle is at the position given by the coordinates of the eigen-axes. These coordinates are given by the wavefunction.

In 3D representation of the position $|r\rangle=(x_1,x_2,x_3)$ of a particle, particle is not on $\mathbf{x}$-axis, not on $\mathbf{y}$-axis, not on $\mathbf{z}$-axis. The particle is not at all 3-axes $\mathbf{x}$, $\mathbf{y}$, and $\mathbf{z}$ simultaneously with probabilities x_1, x_2, and x_3 respectively; a particle cannot be at multiple places simultaneously. Position of a particle is unique irrespective of the size of the particle. In the 3D orthonormal representation, claiming a particle is at all 3-axes simultaneously is meaningless. The particle is at position $|r\rangle=(x_1,x_2,x_3)$, which is unique, not on any of the $\mathbf{x}$, $\mathbf{y}$, and $\mathbf{z}$ axes. It is no different for any eigenbasis representation. A particle cannot be at multiple places simultaneously.

Wavefunction is not unique since the order of the coordinates in the function does not matter in the orthonormal representation of the state of the particle. Change the order, you get a different wavefunction. Order of the coordinates does not affect the state representation although it changes the wavefunction. In which order you arrange the projections of the state onto the orthonormal eigen-axes is immaterial. Wavefunction of a particle is not unique.

If it is the position wavefunction $\psi(x)$, the normalization factor $\alpha=sqrt(\int\psi^2(x)dx)$ is the observed value, $x=\alpha$, the measurement. If it is the momentum wave function $\Psi(p)$, the normalization factor $\alpha=sqrt[\int\Psi^2(p)dp]$ or $\alpha=sqrt[\sum\psi^2(p_i)]\ \forall i$ is the observed value, $p=\alpha$, the measurement. The normalization factor of the wavefunction of an observable that is considered useless in Quantum Mechanics is the most important quantity; the normalization factor is the measured value of an observable.

Lemma:

The average observation as defined in Quantum Mechanics does not represent the observable.

Theorem:

The normalization factor of a wavefunction is the observable, the measured value.

XVIII. ROTATING THE EIGENSPACE TO ALIGN WITH THE STATE OF A PARTICLE

If an observable ℓ with operator $\mathbf{L}$ of a particle has eigenvalue-eigenvector pair $(\lambda,|\lambda\rangle)$, then, the observable $\ell=\lambda$ is measured or observed if the state $|\Phi\rangle$ of the particle overlaps with corresponding eigenfunction $|\lambda\rangle$ of the operator $\mathbf{L}$. If the particle is at a state $|\Phi\rangle$ that does not coincide with an eigenfunction $|\phi\rangle$, then, we can use a unitary transformation $\mathbf{U}$ on the eigenspace of the particle $|\lambda\rangle$, which is simply a rotation of the eigenspace $|\lambda\rangle$, so that the rotated eigenvector $|\lambda\rangle$ of the observable $\mathbf{L}$ overlaps the state of the particle $|\Phi\rangle$,

$$\mathbf{U}|\lambda\rangle=|\Phi\rangle \tag{18.1}$$

Since $\mathbf{U}$ is a unitary rotation operator,

$$\mathbf{U}^H\mathbf{U}=\mathbf{I} \tag{18.2}$$

Multiplying equation (18.1) by $\mathbf{U}^H$, we have,

$$|\lambda\rangle=\mathbf{U}^H|\Phi\rangle \tag{18.3}$$

The original eigen-representation of the observable $\mathbf{L}$ is given by,

$$\mathbf{L}|\lambda\rangle=\lambda|\lambda\rangle \tag{18.4}$$

Since $|\lambda\rangle=\mathbf{U}^H|\Phi\rangle$, we have,

$$\mathbf{LU}^H|\Phi\rangle=\lambda\mathbf{U}^H|\Phi\rangle \quad (18.5)$$

Multiplying by **U**, we have,

$$\mathbf{ULU}^H|\Phi\rangle=\lambda\mathbf{UU}^H|\Phi\rangle \quad (18.6)$$

$$\mathbf{ULU}^H|\Phi\rangle=\lambda|\Phi\rangle \quad (18.7)$$

If **L** is an operator of an observable ℓ with eigenvalue λ, and eigenvector |λ>, then, the operator $\mathbf{ULU}^H$ has the eigenvalue-eigenvector pair (λ,|Φ>) provided that the unitary rotation operator **U** satisfied the relationship **U**|λ>=|Φ>.

An eigenbasis of an operator can be rotated so that an eigenvector/eigenfunction of the operator |λ> aligns with the state of a particle |Φ>. The measured or observed value of the observable on the state |Φ> is the eigenvalue λ of the operator of the observable **L** when the state |Φ> aligns with the eigenvector |λ>. When the whole eigenbasis is rotated so that one basis vector |λ> is aligned with the state |Φ> of the particle, **U**|λ>=|Φ>, where $\mathbf{U}^H\mathbf{U}=\mathbf{I}$, the observed value will be the same as the corresponding eigenvalue of that aligned eigenbasis vector given by the eigendecomposition of the operator $\mathbf{ULU}^H$. There is no role of uncertainty or probability here.

Lemma:

The value of an observable is given by an eigenvalue of the operator of the observable if and only if the state of the particle coincides with the corresponding eigenvector.

Corollary:

An eigenvalue of the operator of an observable does not represent the observable when the state of the particle does not overlap with the corresponding eigenvector of the observable.

Theorem:

If the state of a particle is |Φ> and the operator of an observable is **L**, the observable ℓ is given by the eigenvalue λ of the operator $\mathbf{ULU}^H$, where **U** is such **U**|λ>=|Φ> and $\mathbf{U}^H\mathbf{U}=\mathbf{I}$.

XIX. **OBSERVED VALUE WHEN STATE IS NOT IN COINCIDENCE WITH AN EIGENVECTOR**

If the state of a particle overlaps an eigenvector of the operator of an observable, we know that the observed value of the observable is the eigenvalue corresponding to that eigenvector. Now the question is, when the state of a particle is not in coincidence with an eigenvector of the operator of an observable, what is the value of the observable in Quantum Mechanics?

If a particle is at a general state |Φ>, the state of the particle is not on any of the eigenbasis vectors. The eigenvalue of an operator of an observable only tells us that the value of the observable is the eigenvalue if and only if the particle is in the eigenstate corresponding to that eigenvalue. The eigenvalue says nothing more.

In fact, eigenvalues are not unique since they are affected by a scaling factor. It is only the eigenvectors of a nontrivial operator that are unique. Eigenvalues have no real use except when you want to separate the signal space from the noise, or if the eigenvalue is complex and the information of interest is in the phase as in the case of the estimation of direction of arrival of signals using antenna arrays.

"Eigenvalues are useful for separating the signal space from noise. Eigenvalues are also useful for estimating the Direction Of Arrival (DOA) of signals in antenna arrays. Other than that, the only use of eigenvalues is for the determination of eigenvectors."

The eigenvalue-eigenvector pair (λ,|λ>) of the operator of a non-trivial observable tells us the observed value of the observable is λ if the state of the particle |Φ> overlaps with the corresponding eigenvector |λ>, in other words when |Φ>≡|λ>. Since the eigenspace |λ> of the Hermitian operator of a non-trivial observable gives a complete unique orthonormal basis, the observable ℓ at any general state |Φ> is given by,

$$\ell=\mathrm{sqrt}[\sum|\langle\lambda_i|\Phi\rangle|^2],\ \forall i \quad (19.1)$$

Since $\psi(i)=\langle\lambda_i|\Phi\rangle$, we have,

$$\ell=\mathrm{sqrt}[\sum\psi^*(i)\psi(i)] \quad (19.2)$$

When $|\Phi\rangle\equiv|\lambda_i\rangle$, we have,

$$\ell=\lambda_i,\ \forall i \quad (19.3)$$

When $|\Phi\rangle\neq|\lambda_i\rangle$,

$$\ell=\mathrm{sqrt}[\langle\psi^*(i)\psi(i)\rangle] \quad (19.4)$$

The operator **L** of an observable ℓ has eigenvalue eigenvector pair $(\lambda_i,|\lambda_i\rangle)$, ∀i does not mean that the observable ℓ can only take the values λ_i, ∀i. It only says that the state of a particle can be represented by the orthonormal basis $|\lambda_i\rangle$ ∀i, which is unique. It also says that if the state coincides with any of the basis eigenstate $|\lambda_i\rangle$, then the value of the observable in that state is λ_i. The value of the observable at any general state |Φ> is given by the Pythagoras theorem with wavefunction ψ, as in the case of any 3D projection, where,

$$\ell=\mathrm{sqrt}[\sum\psi^*(i)\psi(i)] \quad (19.5)$$

In this case, the particle is at state |Φ> and not on any of the eigenstates $|\lambda_i\rangle$, ∀i. The ψ(i), ∀i are just the coordinates of the state vector on orthonormal vectors in the eigenspace of the operator of an observable. The observable is given by the Pythagoras theorem. A particle is never at multiple states simultaneously. The concept of a particle of mass being multiple states simultaneously is silly, voodoo-physics, not science.

"In 3D space, a particle at position **r**=(x,y,z) in 3D space does not mean the particle is simultaneously at x on **x**-axis, at y on **y**-axis, and at z on **z**-axis. The particle is not on the **x**-axis, not on the **y**-axis, not on the **z**-axis. The particle is at **r**=(x,y,z), which is unique."

The same is the case for any orthonormal representation including the orthonormal eigenspace representation. The claim in physics that a particle can be at multiple states simultaneously is voodoo-physics, not physics; it is not science; it is meaningless from any perspective. A particle cannot be in multiple states simultaneously; it is common sense. If it defies common sense, it is a religion. Quantum Mechanics is a religion, no different from any other religion. The claim in physics that a particle can be at multiple states simultaneously is fundamentally wrong, pure insanity of physics and physicists.

In the case of a particle moving with momentum p at position x, we have the wavefunction $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain. So, the position-momentum pair (x,p) is given by,

$$x=\text{sqrt}[\int\psi^*(x)\psi(x)dx] \quad (19.6)$$

$$p=\text{sqrt}[\int\Psi^*(p)\Psi(p)dp] \quad (19.7)$$

$$\psi(x)=<x||\Phi> \quad (19.8)$$

$$\Psi(p)=<p||\Phi> \quad (19.9)$$

where $|\Phi>$ is the state of the particle given by the eigenfunction/eigenvector of the Hamiltonian $\mathbf{H}$ of the particle.

The eigenvalue-eigenvector representations of observables $\mathbf{X}$ and $\mathbf{P}$ are given by,

$$\mathbf{X}|x_i>=x_i|x_i> \quad (19.10)$$

$$\mathbf{P}|p_i>=p_i|p_i> \quad (19.11)$$

The eigenspace $|x_i>$ provides a complete unique orthonormal basis if and only if the position operator $\mathbf{X}$ is not the position itself, $\mathbf{X}\neq x\mathbf{I}$.

The eigenspace $|x_i>$ provides a complete unique orthonormal basis when the position operator $\mathbf{X}$ is correctly chosen as $\mathbf{X}=-j\hbar\partial/\partial p$ according to the assumption (although the particle wave assumption is a bizarre and meaningless assumption) that a particle behaves as a wave $\phi(x,p)=\exp((j/\hbar)px)$ of wavelength $\lambda=h/p$ without contradicting the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$. The operators $\mathbf{X}=-j\hbar\partial/\partial p$ and $\mathbf{P}=-j\hbar\partial/\partial x$ are in harmony with each other as a wave. The operators $\mathbf{X}=x\mathbf{I}$ and $\mathbf{P}=-j\hbar\partial/\partial x$ are not in harmony with each other as a wave; they contradict the particle wave assumption; they contradict each other too. If $\mathbf{X}=x\mathbf{I}$ and $\mathbf{P}=-j\hbar\partial/\partial x$, then, a particle cannot be assumed to behave as a wave given by $\phi(x,p)=\exp((j/\hbar)px)$.

When the operators $\mathbf{X}$ and $\mathbf{P}$ are properly given by $\mathbf{X}=-j\hbar\partial/\partial p$ and $\mathbf{P}=-j\hbar\partial/\partial x$ as they should if a particle is assumed to behave as a wave, the eigenspace $|p_i>$ provides a complete unique orthonormal basis for both position $\mathbf{X}$ and momentum $\mathbf{P}$ operators. We can represent any state of a particle in either of the eigenspaces since they have a common eigenspace, which is unique. Then, what do the eigenvalues corresponding to each eigenvector tell us when the operators $\mathbf{X}$ and $\mathbf{P}$ are properly given by $\mathbf{X}=-j\hbar\partial/\partial p$ and $\mathbf{P}=-j\hbar\partial/\partial x$?

The eigenvalue x_i corresponding to the eigenvector $|x_i>$ only tells us that the observed position x is given by $x=x_i$ only if the state $|\Phi>$ overlaps the eigenstate $|x_i>$, nothing more. Eigenvalues of the operator $\mathbf{X}$ do not tell us anything about what we would observe if the state of the particle $|\Phi>$ does not overlap any of the eigenstates $|x_i>$, $\forall i$. If the state of the particle $|\Phi>$ does not overlaps any of the eigenvectors $|x_i>$, then the state $|\Phi>$ on the eigenbasis of position operator $\mathbf{X}$ is given by,

$$|\psi>=(\psi(1),\psi(2),\psi(3), \dots) \quad (19.12)$$

where, $\psi(i)=\psi(x_i)$, $\forall i$, i=1, 2, 3, … and,

$$\psi(i)=<x_i|\Phi> \quad (19.13)$$

The actual observed position x of the state $|\Phi>$ is given by the Pythagoras theorem on the coordinates of the position eigenbasis,

$$\mathbf{x}=(\psi(1),\psi(2),\psi(3), \dots) \quad (19.14)$$

The observed position x is given by the Pythagoras theorem,

$$x=\text{sqrt}[|\psi(1)|^2+|\psi(2)|^2+|\psi(3)|^2+ \dots] \quad (19.15)$$

$$x=\text{sqrt}[\sum\psi^*(i)\psi(i)], \forall i. \quad (19.16)$$

For continuous x,

$$x=\text{sqrt}[\int\psi^*(x)\psi(x)dx] \quad (19.17)$$

This is the normalization factor of the wavefunction. The observed position x is the normalization factor that is discarded in Quantum Mechanics. The quantity that is thrown away as useless in Quantum Mechanics is in fact the observed value of the observable.

Similarly, for the case of momentum, the observed momentum p is given by its coordinates in the eigenspace of the momentum operator $\mathbf{P}$, which is the wavefunction $\Psi(p)$ in the momentum domain,

$$\mathbf{p}=(\Psi(1),\Psi(2),\Psi(3), \dots) \quad (19.18)$$

where, $\Psi(i)=\Psi(p_i)$, $\forall i$, i=1, 2, 3, … and,

$$\Psi(i)=<p_i|\Phi> \quad (19.19)$$

The observed momentum p is given by,

$$p=\text{sqrt}[|\Psi(1)|^2+|\Psi(2)|^2+|\Psi(3)|^2+ \dots] \quad (19.20)$$

$$p=\text{sqrt}[\sum\Psi^*(i)\Psi(i)], \forall i, i=1, 2, 3, \dots \quad (19.21)$$

For continuous p,

$$p=\text{sqrt}[\int\Psi^*(p)\Psi(p)dp] \quad (19.22)$$

The observed momentum of a particle is the normalization factor of the wavefunction that is discarded as useless in Quantum Mechanics.

Representation in the orthonormal eigenbasis is no different from the 3D representation of position $\mathbf{r}$ using the coordinates (x,y,z) on $\mathbf{x}=(1,0,0)$, $\mathbf{y}=(0,1,0)$, $\mathbf{z}=(0,0,1)$ axes, where the magnitude of $\mathbf{r}$ is given by $r=\text{sqrt}(x^2+y^2+z^2)$. For any orthonormal representation, once the coordinates or the projections of the state on orthonormal axes are known, the value is given by the Pythagoras theorem on the coordinates of the momentum eigenbasis, not by probability.

The position x in Quantum Mechanics should be given by the Pythagoras theorem once the coordinates, which are the projections on the eigen-axes in the position domain or the wavefunction $\psi(x)$, are known. It is the same for the momentum. The momentum p is given by the Pythagoras theorem once the coordinates, which are the projections on the eigen-axes in the momentum domain or the wavefunction $\Psi(p)$, are known.

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Quantum Mechanics and Heisenberg Uncertainty Principle in particular make the assumption that the position x is the independent variable and the momentum p is a dependent variable even though there cannot be any independent and dependent variables in a wave if the position x and momentum p of a particle is assumed to behave as a wave. So, in the very foundation of Quantum Mechanics, the definition of the position operator as position itself contradicts the assumption that a particle behaves as a wave. If the position operator is defined to be position itself, a particle cannot be assumed to behave as a wave and vice versa.

It is true that the momentum cannot exist without position, and the position can exist without momentum, and hence we should be able to consider the position x as the independent variable. However, if a particle is assumed to behave as a wave, and the position x and momentum p are assumed to be a Fourier Transform pair, the position x and momentum p must also be mutually independent despite the fact that the momentum cannot exist without position and the position can exist without momentum.

If a particle is assumed to behave as a wave, neither the position x itself nor the momentum p itself can be independent; they both must be mutually independent. In a particle wave, both position x and momentum p must be independent variables, even though such an assumption is unrealistic. In a wave, neither x nor p can be special. So, when a particle is assumed to behave as a wave, we are already in an imaginary and unrealistic domain, completely disconnected with reality. Quantum Mechanics is outside the bounds of reality by its assumptions. When a theory is outside the bounds of reality in its foundation, it cannot be justified with experiments.

The position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$ are defined in Quantum Mechanics as,

$\mathbf{P}=-j\hbar\partial/\partial x$ and $\mathbf{X}=x\mathbf{I}$.

Quantum Mechanics is based on these two operators $\mathbf{X}$ and $\mathbf{P}$. Now, the question is, what are the fundamental mistakes and oversights that led to the Quantum Mechanics and Heisenberg Uncertainty Principle:

a). **Eigenspace of $\mathbf{X}$ is Not Unique**

The delta function $\delta(x)$ is an eigenspace of the position operator $\mathbf{X}$, not the only eigenspace. Eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is not unique. Quantum Mechanics has treated the eigenspace $\delta(x)$ of the position operator $\mathbf{X}$ as unique. There are many valid eigenspaces for the position operator $\mathbf{X}=x\mathbf{I}$. Quantum Mechanics cannot exist without the operators with unique eigenspaces. The Heisenberg Uncertainty Principle cannot exist without a position operator $\mathbf{X}$ with a unique eigenspace given by the delta function $\delta(x)$, which is impossible.

b). **Eigenspace of the Momentum Operator P is also an Eigenspace of Position Operator $\mathbf{X}=x\mathbf{I}$**

Since the position operator in Quantum Mechanics is falsely and artificially defined to be the position itself, $\mathbf{X}=x\mathbf{I}$, the eigenspace of any Hermitian operator is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$. The eigenspace of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$. The Momentum operator $\mathbf{P}$ and the position operator $\mathbf{X}$ have a shared eigenspace. When the operators $\mathbf{X}$ and $\mathbf{P}$ have a shared eigenspace, the position x and the momentum p are simultaneously measurable.

c). **Wavefunction $\psi(x)$ in the Position Domain and the Wavefunction $\Psi(p)$ in the Momentum Domain are Not a Fourier Transform Pair**:

The position operator $\mathbf{X}=x\mathbf{I}$ can have multiple eigenspaces and each eigenspace is a complete basis. The trivial eigenspace of the operator $\mathbf{X}=x\mathbf{I}$ is the delta function $\delta(x)$. Out of many other equally valid eigenspaces, it is only when the eigenspace delta function $\delta(x)$ is chosen, for no special reason, that the wavefunction $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain become a Fourier Transform Pair.

For the wavefunction $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain are to be a Fourier Transform Pair, having the delta function $\delta(x)$ as an eigenspace of $\mathbf{X}$ is not sufficient, the eigenspace given by the delta function $\delta(x)$ must also be unique. Since the eigenspace of $\mathbf{X}$ is not unique, the wavefunction $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain cannot be a Fourier Transform Pair.

Lemma:

For the wavefunction $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain to be a Fourier Transform Pair, the eigenspace delta function $\delta(x)$ of the position operator must be unique, but it is not unique.

To claim that the wavefunction $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain a Fourier Transform Pair, eigenspaces of both $\mathbf{X}$ and $\mathbf{P}$ must be unique. If the position operator $\mathbf{X}$ is handpicked to be position itself $\mathbf{X}=x\mathbf{I}$ in contradiction to the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$, eigenspace of $\mathbf{X}$ is not unique, and hence $\psi(x)$ and $\Psi(p)$ are not a Fourier Transform pair.

On the other hand, there would be no Quantum Mechanics if the position operator had not been wrongfully chosen to be position itself $\mathbf{X}=x\mathbf{I}$ and the fact that the eigenspace of the position operator is not unique had not been disregarded either knowingly or unknowingly. Quantum Mechanics is a false human illusion that nature has no clue, neither does any fair-minded person. Nature does not know which eigenspace to choose when the position operator $\mathbf{X}=x\mathbf{I}$ has equally valid multiple eigenspaces.

d). **Uncertainty Principle is False with Certainty**

For the Heisenberg Uncertainty Principle to hold, the wavefunction $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain must be a Fourier Transform Pair. We have already seen that the wavefunction $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain cannot be a Fourier Transform Pair since the eigenspace $\delta(x)$ of the position operator $\mathbf{X}=x\mathbf{I}$ is not unique. When the wavefunction $\psi(x)$ in the position domain and the wavefunction $\Psi(p)$ in the momentum domain cannot be a Fourier Transform Pair, there is no Uncertainty Principle and that is certain indeed.

e). **Position and Momentum of a Particle can be Measured to any Achievable Precision**

Since the eigenspace of the momentum operator can also be an eigenspace of the position operator, the momentum operator **P** and the position operator **X** have a shared eigenspace. When the observables **P** and **X** have a shared eigenspace, the observables are simultaneously measurable. There is no tradeoff between the achievable precisions of the position and the momentum. The position and the momentum of a particle can be measured simultaneously to any achievable precision. The precision of position is independent of the precision of the momentum and vice versa. Both position and momentum can be obtained using just a single electromagnetic wave burst. The time delay of a reflected wave burst provides the position information while the frequency shift provides the momentum information.

f). **Two Operators do not have to Commute for Simultaneous Observability if One Operator is the Observable Itself**

The commutation of the operators of observables is sufficient but not necessary for the simultaneous measurability of the observables without precision tradeoff. The operator **L** of the observable ℓ and the operator **P** of the observable p must commute for the simultaneous measurability of observables ℓ and p if neither of the two operators is the observable itself. If **L**=ℓ**I**, then, ℓ and p are simultaneously measurable irrespective of whether **L** and **P** commute or not since the eigenspace of operator **P** is also an eigenspace of operator **L**.

Lemma:

The non-commutation of **X**=x**I** and **P**=-jħ∂/∂x has no effect on the simultaneous measurability of x and p. Position x and momentum p are simultaneously measurable.

g). **Eigenbasis of a Hermitian Operator**

The eigenbasis of a nontrivial operator is Simply an alternative Unique Coordinates System in the domain of the operator, nothing more. It is no more different than a 3D coordinate system. Any given state is represented as the coordinates of the eigenvectors/function.

An eigenvalue of an operator of an observable is simply the value of the observable if the state of the particle |Φ> overlaps the corresponding eigenvector or eigenaxis. The values an observable can take are not limited to the eigenvalues of the operator of an observable. The coordinates of any state of a particle in the eigen-axes representation is the projections of the state on the eigen-axes, which is the wavefunction. Since there is no unique arrangement or a unique sequence for the projections in the representation of a state of a particle, if the projections, arranged in any arbitrary sequence, are referred to as the wavefunction, the wavefunction of a particle in the domain of an observable is not unique. The wavefunction of a particle by definition is not unique since any reshuffled wavefunction is an equally valid wave function if x and p are discrete or probabilistic.

If the wavefunction in the momentum domain is Ψ(p), then the observed momentum p is given by, p=|**p**|=sqrt[<Ψ(p)|Ψ(p)>],
p=|Ψ(p)>, |Ψ(p)>=(Ψ(1),Ψ(2), Ψ(3), …).
Any reshuffled Ψ(p) is also a valid wave function for discrete x and p or probabilistic x and p, and hence Ψ(p) is not unique. Although the wave function of an operator is not unique, the observable p given by a wave function is unique. However, the wavefunction of any operator has no real existence since it is not unique. The wavefunction of an operator cannot also be a propagating wave since it is single and not unique. Single waves cannot propagate. Wave Functions that are not unique cannot exist.

Lemma:

Wave function of a particle in the domain of any operator is not unique and hence it has no real existence.

Similarly, if the state of a particle |Φ> is represented as the coordinates in the eigen-axes of the position operator **X**=x**I**, the order of the arrangement of the coordinates or the arrangements of the projections are not unique. As a result, the wave functions ψ(x) and Ψ(p) are not unique. In addition, the eigenspace of the position operator is also not unique and hence the wavefunction ψ(x) in any given arrangement is also not unique. The position x is given by the coordinates, which is the wavefunction ψ(x) in any arbitrarily chosen eigenspace for no apparent reason out of many valid eigenspaces,
x=|**x**|=sqrt[<ψ(x)|ψ(x)>],
x=|ψ(x)>, |ψ(x)>=(ψ(1),ψ(2), ψ(3), …),

The observable, the position of a particle is not limited to the eigenvalues of the position operator **X**. Similarly, the observable momentum is not limited to the eigenvalues of the momentum operator **P**. The eigen-bases of the Hermitian operator of a non-trivial observable provides a unique coordinate system that can represent the state |Φ> of a particle. A trivial operator such as **X**=x**I** does not provide a unique eigen-basis.

If the coordinates of a state |Φ> on an orthonormal representation is known as the wave function, the Pythagoras theorem provides the value of the observable. The square root of the sum of the squares of the coordinates provides the actual observed value of the observable. In other words, the square root of the sum of the squares of the wavefunction, which is also the normalization factor of the wavefunction in Quantum Mechanics, is the observed value of the observable.

There is no probability here. Everything is deterministic. Probability has no place in eigenspace representation of an observable of a particle. If the position x and momentum p are probabilistic, the momentum operator is not defined since the gradient with respect to position is not defined unless x and p are continuous. If the position x and momentum p are probabilistic, a particle cannot be assumed to behave as a wave and vice versa. A particle is not on any of the eigen-axes unless the state |Φ> of the particle coincides with an eigen-axis |x>. It is only if the state |Φ> of a particle coincides with an eigenvector or eigenfunction |x> that the value of the observable is the corresponding eigenvalue; otherwise, eigenvalues have nothing to do with the observables. In any case, eigenvalues of an operator are not unique since any scalar multiplied eigenvalue can also be an eigenvalue, and hence cannot be used in the estimation of the observables.

Lemma:

The values an observable can take are not limited to the eigenvalues of the operator of an observable. An eigenvalue of an operator is not an observable unless the state |Φ> of the particle coincides with the corresponding eigenvector.

h). **There are No Particle Waves or Wave Particles; Particle Wave and Wave Particle are Oxymorons**

Particles are not waves. Waves are not particles. Waves propagate. Particles cannot propagate. Wave bursts are waves, not particles. Massless are not particles. Claim in physics that particles behave as waves is weird, nonsensical and meaningless. It does not matter how microscopic a particle is, any entity with a mass cannot behave as waves. Any entity with momentum cannot propagate since the motion in propagation is orthogonal to the direction of propagation.

Light has no momentum, no kinetic energy, no temperature, no entropy. Light has electromagnetic potential energy. Potential energy is not energy until it is converted to energy. It is only that the light can generate momentum on a charged particle. It is only that the potential energy of light can be transformed into energy in the presence of charge particles. There is no light without matter. There is no energy as an independent entity. There is no energy without matter. Energy always refers to the kinetic energy of particles of mass. It doesn't matter how much light is there in a vacuum, there is no temperature, no entropy. Einstein's use of the Boltzmann entropy for light in deriving the photons, or light particles is invalid. The Boltzmann entropy does not apply for light. There are no light particles or photons [1].

The intensity of light at a source (intrinsic intensity) is not determined by the amplitude. Irrespective of the type of light source, all the light sources have the same amplitude of light at the source. Intrinsic amplitudes of all the light sources are the same. Amplitude of light changes due to partial reflection, diffraction, and attenuation along the path.

The intrinsic brightness of a light source is not determined by the amplitude of light since the amplitude of light is the same for all sources. The intensity or brightness of light at a source (intrinsic brightness) is determined by the number of light wave bursts that are released by a source per second or the rate of light bursts of a source. By dimming a light source, what we are doing is reducing the number of light bursts released by a source.

If we dim a light source low enough, we are able to reduce the rate of light burst released from a source to a level that we can observe the separate light bursts. A light burst is what is released from a source when an electron changes energy level to a lower energy level, and it is independent of the source at any given frequency. Light burst is a wave, not a particle.

Consider a supernova, a star, the sun, an atomic bomb blast, a firecracker, forest fire, living room fireplace, kerosene lamp, 1000 Watts bulb, 10 Watts bulb, a candle light. What do they have in common? They all have the same amplitude of light at the source. How do they differ? They differ by the number of wave bursts released per second. The rate of light burst of a source varies from source to source. The rate of light burst released from a source determines the brightness or the intensity of a source. They have different intensities of light. They have different brightness. The apparent brightness is related to the distance to the source. The apparent brightness is the rate of light bursts per unit surface area. Apparent brightness is proportional to the inverse square distance.

By dimming a light source, you are varying the burst rate of light or the intensity. If you dim a light source low enough, you can see the separate light bursts since by dimming a light source you can reduce the rate of light bursts to the level you can observe the separate light bursts. These separate light bursts are not particles, they are wave bursts. A light burst does not have kinetic energy; they have no momentum, no temperature, no entropy. What a burst of light has is electromagnetic potential energy. Electromagnetic potential energy is not energy until it is converted into energy with the interaction with matter, charge particles.

A wave burst can transfer its electromagnetic potential energy into kinetic energy in the presence of charge particles, a charged mass or electrons. The kinetic energy generated by a light burst in the presence of a charge particle, on the charged particle, is a function of frequency. Light has no energy; there are no light energy quanta. Electromagnetic potential energy of light cannot be quantized. Frequency has no energy. $E=hf$ is meaningless [1].

The electric and magnetic fields that light consists of are vectors. Vectors cannot be quantized. The light bursts released from a source when electrons move from higher energy level to a lower energy level are not particles, they are wave bursts. Light is a wave, not a particle. The electromagnetic potential of a light burst is not proportional to frequency. Potential energy is related to amplitude, not to frequency. It is the kinetic energy transferred from an oscillating source charged particle at frequency f to a distance charge particle via electromagnetic waves of frequency f generated by the oscillating source particle that is proportional to the frequency [1]. It is the oscillation of electrons in their orbits that causes the energy level transfer, not an act of disappearing and reappearing. Bohr's atomic model based angular momentum quantization is invalid since angular momentum cannot be quantized. Angular momentum is a vector. Vectors cannot come in quanta. Bohr's claim that an electron changes orbit by disappearing from one energy level and reappearing in another energy level is voodoo-physics, not science.

Electromagnetic potential energy cannot be quantized without the amplitude of light being quantized. If the amplitude is quantized, the amplitude will be discrete; the amplitude of a wave must be continuous. If amplitude is quantized, nature has no mechanism to assemble quanta and glue them together to form one whole. The electric field and the magnetic field of an electromagnetic wave are vectors. If the electromagnetic potential energy is quantized, the magnitude of the electric field and the magnetic field must also be quantized. Electric field is a vector and hence the magnitude of an electric field cannot come in quanta. Similarly, the magnetic field is a vector and hence the magnitude of a magnetic field cannot come in quanta. Vectors cannot be quantized.

Particles are not waves. The claim that a moving particle behaves as a wave of de Broglie wavelength $\lambda = h/p$ is meaningless. No particle with momentum p has energy required to be at de Broglie wavelength since no particle can move at a constant speed from the start. Particles move. Particles cannot propagate. A particle can undergo harmonic motion. However, a particle undergoing harmonic motion is not a propagating wave.

Although a particle is not a wave, a moving charged particle can generate electromagnetic wave bursts if it is stopped, accelerated, or decelerated. The wavelength of that generated electromagnetic wave bursts is inversely proportional to the momentum of the particle, $\lambda \propto 1/p$. This generated electromagnetic wave is not a particle wave or a probability distribution; it is not anchored to a particle; once generated, it has nothing to do with the particle; it is a propagating wave completely independent of the electron (or charged mass) that generated it.

You can generate shorter and shorter wavelength electromagnetic bursts by accelerating charged particles to higher and higher speeds and bringing them in a collision. However, these generated wavelengths are no different from the wavelengths available for free in the form of cosmic rays. You do not need a multi-billion dollar particle accelerator to generate the wavelengths that are available for free. These shorter wavelengths may not be available on the earth due to the protective ozone layer, but they are available in space.

The assumption in Quantum Mechanics that a particle with momentum p behaves as a wave is invalid and meaningless. It is a result of the misinterpretation of the double-slit experiment. Interference pattern in the double-slit experiment for a beam of particles is a result of the electron beam being stopped by the double-slit barrier. When moving electrons are stopped at the double-slit barrier, it generates electromagnetic waves that pass through the slits and interfere, generating an interference pattern on the screen behind the double-slit barrier. All the electrons are stopped at the double-slit barrier. No electron can pass through the slits since the slits are at an offset to the direction of the beam.

It is the electromagnetic waves generated as a result of moving charge particles being stopped at a barrier that generate an interference pattern in the double-slit experiment; these waves are not particle waves. All the electrons are stopped by the double slit barrier. No electrons can land on the other side of the barrier at the screen. Once the electromagnetic waves are generated by a moving charge particle, the propagation of these electromagnetic waves are independent of the particle that generated them; they are not anchored to the electrons that generated them. The concept of Particle waves and wave particles is an oxymoron. There are no massless particles. There is no massless momentum. There is no wave-particle duality.

Lemma:

Amplitude of light at a light source is source independent. A supernova, a star, a light bulb, a candle light have one thing in common; they all have the same amplitude of light at the source. It is the rate of light burst released by a source that is source dependent. The intensity of a light source is the rate of light burst of the source.

Corollary:

By dimming a light source, what is reduced is the rate of light burst released from the source, not the amplitude of light. Amplitude of light cannot be changed by dimming light.

Corollary:

Amplitude of light can only be changed along the path of light by a medium through attenuation, and partial reflection and diffraction.

i) **Fundamentally Invalid Relationships**

Special Relativity does not work for regular one directional time given by clocks. Special Relativity runs on a manufactured time. In Special Relativity time is defined as the mean return time of a beam of light. Time has nothing to do with the propagation of light unless the clock is designed based on the propagation of light. Special Relativity is consistent only for mean return time of a beam of light. No clock operates on a mechanism based on the mean return time of a beam of light.

Special Relativity cannot maintain consistent time in all directions unless time is given by the mean return time of a beam of light. Nature does not care about the mean return time of a beam of light. Mean return time of a beam of light can only be calculated off-line. No real time system can operate on the mean return time of a beam of light. Special Relativity and

General Relativity that run on mean return time of a beam of light cannot be realtime natural systems. Special Relativity and General Relativity cannot be applied to systems that run on one-way time given by clocks.

Time has nothing to do with the speed of light unless the clock design is based on the propagation of light. Speed of light has nothing to do with the motion of objects. Speed of light cannot limit the speed of objects of mass. The speed of light as well as the direction of light are constant in the vacuum and affected by a medium, not just the speed of light. Any entity that is determined by a medium is observer independent. It is the velocity of light that is observer independent, not just the speed of light. When the velocity of light is determined by a medium, no Special Relativity is required.

The Lorentz Transform is not unique. Light cannot be transformed onto moving inertial frames. Light is not relative [4]. The relationship $E=mc^2$ stems from the assumption that a stationary particle of mass m has speed c relative to the light. No mass can start at constant speed from the start. For a mass to be relative to a moving entity, that moving entity must have a standstill existence. Light has no standstill existence.

Since light is not relative, Special Relativity is invalid, and no mass can move relative to light. As a result, the relationship $E=mc^2$ is invalid, $E\neq mc^2$. The relationship $E=mc^2$ meaningless. Speed of light is the speed of light, nothing more. Speed of light cannot limit the speed of other entities. There is no speed limit in the universe. Since light travels at a constant speed on a constant path determined by the vacuum and affected only by a medium, speed of light is the same relative to any inertial frame. It is the path of light that moves relative to observers while the direction and the speed of light on the path remains unaltered. The path of light shifts relative to observer motion while the movies or propagation on the fixed path remains unaltered [3].

The derivation of blackbody radiation is incorrect. Planck's derivation of the blackbody spectrum is cavity dependent. Planck's blackbody spectrum is not a spectrum. The assumption of energy quantum $E=hf$ is incorrect and meaningless, $E\neq hf$ [1]. Frequency has no energy. Energy is not quantized. There is no energy without the association of mass and hence the energy cannot come in quanta. Energy cannot come in quanta in a continuous spectrum. If energy is quantized, the energy of a continuous spectrum would be infinite. Any entity with a belonging cannot be quantized. Vectors cannot be quantized.

If the amplitude of the electric field of an electromagnetic wave is A and the potential energy is quantized, we have $A^2/2=nhf$, where n is an integer. That means, for the potential energy E to be given by $E=hf$, the amplitude itself must be quantized so that $A=\mathrm{sqrt}(2nhf)$. If the energy is quantized, the plane wave equation with amplitude A is given by,

$$\phi(x,t)=\mathrm{sqrt}(2nhf)\exp(jkx)\exp(j2\pi ft).$$

Here, if energy comes in quanta $E=hf$, the maximum amplitude is determined by the frequency, but frequency has no existence without amplitude. To have a frequency, there must be an amplitude first. You need chickens to have eggs. As a result, waves cannot exist if energy comes in quanta $E=hf$.

If energy comes in quanta $E=hf$, we also need a mechanism to glue the quanta to make a one whole amplitude, otherwise there would be no coherent directional wave. If the energy comes in quanta $E=hf$, the amplitude is quantized and hence without a mechanism to assemble amplitude quanta to one whole electric field vector, there will be no electric field or magnetic field. Nature has no mechanism to assemble magnitude quanta to a one whole field vector since quantum has no header to carry belonging information.

Vectors cannot be quantized. Vectors cannot come in quanta without a mechanism to carry the direction information and belonging information. The energy cannot come in quanta $E=hf$. Planck conjecture is incorrect, $E\neq hf$. In fact the relationship $E=hf$ is meaningless since frequency has no energy. It is only that when an electron in an atom moves from higher energy level to a lower energy level, it releases a wave burst of frequency f, the potential energy of that frequency burst is source independent. The kinetic energy generated by that wave burst in the presence of an electron is independent of the source that generated the wave.

Light has no kinetic energy and hence light has no temperature. Without temperature, light has no entropy. The Boltzmann entropy formula cannot be applied to light and hence Einstein's derivation of light particles or photons is invalid. Frequency has no energy. The light quantum or photon of energy $E=hf$ is invalid and meaningless, $E\neq hf$. Light cannot be a particle. Light is always a wave. Light comes in wave bursts. These wave bursts are not particles. They have no momentum. Light has no momentum and hence light does not behave as golf balls. In Einstein's vertical light beam in a horizontally moving train thought experiment, the path of light relative to a passenger in the train cannot be vertical since light is not relative; the path relative to an external observer cannot be angular since observers cannot bend light or change the direction of light [4,8].

With Special Relativity, we also inherited the relationship, $E^2=(mc^2)^2+(pc)^2$. Although particle physicists cannot live without this relationship, this relationship is invalid. This relationship was derived by applying the Lorentz Factor $\gamma=\mathrm{sqrt}[1/(1-v^2/c^2)]$ for an accelerating mass. The Lorentz factor only holds for objects moving at constant speed v. The Lorentz factor does not apply for a mass accelerating from standstill to attain a constant speed v as it is used in the derivation of $E=\gamma mc^2$. The relationship that describes the energy of a particle, $E^2=(mc^2)^2+(pc)^2$, is a result of $E=m'c^2$ and $p=m'v$, where $m'=\gamma m$. The mass of an object cannot depend on speed.

Mass of an object is not relative. As a result, the equation $E^2=(mc^2)^2+(pc)^2$ is incorrect and meaningless. The relationship $p=m'v$ is incorrect since a mass cannot depend on the speed. The relationship $E=m'c^2$ is meaningless since mass is not relative. The derivation $E=m'c^2$ is a result of applying the Lorentz factor to an accelerating object. The Lorentz factor cannot be applied to an accelerating object. The Lorentz factor is limited to inertial frames. The relationships $E=m'c^2$ and $p=m'v$ are a result of the invalid assumption in Special Relativity that the light is relative and behaves as golf balls.

If experiments indicate that the measured mass m of a moving object depends on the speed v, then it is the method of measuring the mass that is speed v dependent, not the mass itself. The mass of an object cannot be speed dependent. Mass is speed independent. It is the measuring device that is speed dependent, not the mass itself. It is the clocks that are relative, not the time itself. Time and mass do not depend on speed.

Whether you measure the mass of the sun from earth or from any other planet, the measured value of the mass of the sun should be the same, it should not depend on the speed of the planet you measured it from. Mass of any object must be speed independent. If your measurement indicates that the mass varies with the speed, then it is not the mass that is relative, it is the method used to measure the mass that is relative. Mass is absolute.

Light only has electromagnetic potential energy. Light itself has no kinetic energy. Light itself has no momentum. As a result $E=pc$ is invalid and meaningless, $E\neq pc$, where p is the momentum. You cannot apply $E=pc$ to particles of mass; this is where de Broglie wavelength went wrong. A particle cannot have two speeds, speed c and speed v simultaneously as it is indicated in $E=pc$. $E\neq pc$. An object of mass, a particle, has nothing to do with speed of light c unless the object is moving at speed c. There is nothing to prevent an object of mass from traveling at the speed of light c.

When $E\neq mc^2$, $E\neq hf$, and $E\neq pc$. De Broglie wavelength does not exist, $\lambda\neq h/p$. No particle has energy required to be at de Broglie wavelength since no mass can travel at constant speed from the start. Particles are not waves. Waves are not particles. Quantum Mechanics is a mathematically invalid hypothetical mental exercise that exists in human imagination and on notebooks, not in reality. The claims of application confirmations of Quantum Mechanics are experimental misinterpretations.

Modern Physics founded on the Holy Trinity, $E=mc^2$, $E=hf$, and $\lambda=h/p$, is a religion, a nonsense. Modern Physics has nothing to do with reality just as any religion. If a theory is based on the idea that a particle is at multiple states concurrently, and an electron has to disappear from one energy level an reappear in another level if the electron has to change the energy level, then it is not science we are dealing with, it is voodoo-physics.

j). Spin of a Particle is Not an Abstract Concept; Spin states are 3D; There Cannot be 2D Spin States; (2×2) Pauli Matrix Operators Cannot Describe Spins.

Spin of a charged particle is real. Spin is not an abstract concept. It is the misinterpretation of the Stern-Gerlach experiment that turned the Spin into an abstract voodoo concept. There is no Up-state or Down-state as such. They are labels we attach on spins. Spins of adjacent electrons are opposite due to the magnetic coupling; we label them as Up and Down. The direction of the spin of an electron is not an inert state of the electron unless it is free of any external magnetic effect. Spin in itself has no Up or Down. Spin is Up or Down only relative to an external magnetic field. Up or Down is a forced state that is determined by the magnetic field of the environment an electron is in and by the neighboring electrons. Nature does not have Up and Down. Up and Down are observer perspectives that vary from observer to observer. You cannot measure the spin using an external magnetic field since the spin of a free-moving particle always aligns with the magnetic field.

Spin of a charged particle is the direction of the magnetic field of a spinning charged particle. Although the spin of a particle takes place on a plane or in 2D, spin cannot take place without the presence of a third dimension, without 3D. Spin cannot be modeled in 2D since spin cannot take place unless 2D spin takes place in 3D. There is no 2D without 3D. There are no 2D spin states. There are no 2D spin operators since 2D spin cannot exist.

Pauli matrices are 2D, and they cannot represent the spin operators for **x**, **y**, and **z** axes spin components σ_x, σ_y, σ_z, where spin $\boldsymbol{\sigma}=(\sigma_x,\sigma_y,\sigma_z)$. Although the determinants of Pauli's 2D matrices are non-zero, since no spin can take place without 3D, the determinant of the augmented 3D Pauli matrices will be zero since spin cannot take place without 3D. When Pauli matrices are augmented to 3D by padding zeros to represent a real spin, their determinants will be zero. Spin operators must be in 3D.

Spin cannot be modeled using Pauli matrices. State of a spin cannot be represented as a 2D vector since the state of a spin represents a direction in 3D. It is the misinterpretation of the Stern-Gerlach experiment that misleads to the Pauli matrices and to an abstract notion of non-existent two-dimensional spin states.

Up and Down spins cannot be orthogonal. Up and Down spin states are not mutually exclusive states even in the abstract sense since no Up state can exist without Down states. The Up and Down states are observer interpretations of a single spin with respect to an observer dependent reference direction. The Up state $|U\rangle$ is simply the reverse of the Down state $|D\rangle$ for a spinning charge particle, $|U\rangle=-|D\rangle$.

There are no Up and Down in nature. Up and Down exist relative to an observer only. Spin itself has no Up or Down. Up or Down of a spin depends on the observer's perspective. Observer-perceived Up and Down cannot be states of a system. The Up spin for one observer can be a Down spin for another observer. Although physicists are making every effort to interpret the state of a spin as a mysterious abstract entity completely separate from the direction of the spin, the fact is that the state of a spin is the direction of the spin, which is 3D. There cannot be 2D spin states. There are no 2D spin operators. 2D spin operators are hypothetical.

There is nothing probabilistic about the state of a spin. The state of a spin is deterministic since it is completely determined by the direction of the spin of a charged particle. There is nothing probabilistic in the Stern-Gerlach experiment. It is the misinterpretation of the Stern-Gerlach experimental result that has led to a false probabilistic interpretation of the spin. The result of the Stern-Gerlach experiment is completely deterministic. The split of a beam of electrons into two beams by a Stern-Gerlach device (one oriented towards the Stern-Gerlach magnetic field and the other against it) is determined by the magnetic coupling of the electron, which is deterministic. The first goes Up, the second goes Down, the third goes Up, … and so forth. There is no association of probability in the functioning of Stern-Gerlach devices.

If we place a spin in a magnetic field, the spin aligns with the magnetic field; there is nothing more to it. If we send a spin through a Stern-Gerlach device, it aligns with the magnetic field and drifts Up. There is no probability here. Behavior of a charged particle in a Stern-Gerlach device is completely deterministic. If we send two charged particles through a Stern-Gerlach device, the first one drifts Up while the second one drifts Down due to magnetic coupling between the two spins. There is no roll of dies in the Stern-Gerlach device.

If we have a beam of charged particles, the spin of the nearby particles will be opposite to each other due to magnetic coupling. As a result, when a beam enters a Stern-Gerlach device, the first particle will align with the magnetic field and drift up. Due to the magnetic coupling, the second particle will align against the magnetic field and drift Down. The motion of a particle Up or Down is not because they have an inert Up or a Down state. The motion of a particle Up or Down is solely determined by the external magnetic field and the magnetic coupling between the particles. The first particle moves Up, the second particle moves Down, the third particle moves Up, fourth particle moves Down, … and so on in a Stern-Gerlach device. All the odd numbered particles move Up while all the even numbered particles move Down. The behavior of a spin in a Stern-Gerlach device is completely deterministic [2].

It is we who define Up or Down. There is no Up or Down in nature. All the odd numbered particles in a beam drift Up in a Stern-Gerlach device while all the even numbered particles drift Down. In a beam of electrons, the spins are arranged in alternative Up and Down positions due to magnetic coupling of the neighbors. When the beam enters the Stern-Gerlach device, it does not separate some inherent hidden hypothetical 2D Up state of a spin into one beam, and some inherent hidden hypothetical 2D Down state of a spin into another beam. What Stern-Gerlach device does is that It rearranges odd numbered particles in an electron beam in the direction of the magnetic field of the Stern-Gerlach device, and the even numbered electrons in the beam in the direction opposite to the direction of the magnetic field of the Stern-Gerlach device. It is we who label the spins along the direction of the magnetic field of the Stern-Gerlach device as Up beam, and the spins against the direction of the magnetic field as Down beam. A spin in itself has no Up state or a Down state. A spin does not come with an Up or Down label. Once electrons leave the Stern-Gerlach device, they do not retain the spin they had inside the Stern-Gerlach device. The direction imposed on an electron by the Stern-Gerlach device is volatile. A single charged particle has no spin memory. The spin of a charged particle is whatever the direction of the magnetic field it is in.

When an electron beam enters the Stern-Gerlach device, irrespective of the direction of the spin of the first particle, it aligns with the magnetic field and moves Up. The rest follows in alternate order due to magnetic coupling giving one Up beam and one Down beam. Stern-Gerlach device does not separate some inherent hypothetical 2D Up-state into Up beam and some inherent hypothetical 2D Down-state into a Down beam. It rearranges a beam into Up beam and Down beam with the first electron moving Up and following electrons drifting alternatively, Down, Up, Down, and so on. Stern-Gerlach device rearrange the beam into Up and Down beam with half of the electron into Up beam with odd numbered (1, 3, 5, …) electrons in the beam and the other half of electrons into Down beam with even numbered (2, 4, 6, …) electrons in the beam simply because of the magnetic coupling between the adjacent electrons in the beam. The orientation of an electron or a beam of electrons is determined by the magnetic field of the environment they are in. The direction of the spin of an electron is not an intrinsic property of an electron; it is determined by the environment's magnetic field and/or by spin of the adjacent electrons.

When an Up beam from one Stern-Gerlach device is sent to a second Stern-Gerlach device placed in series with the magnetic fields in phase, then, the beam moves unaltered since the magnetic field of the second Stern-Gerlach device acts as a direct extension of the first. If the magnetic field of the second Stern-Gerlach device is out of phase with the magnetic field of the first Stern-Gerlach device, then the Up beam has to leave the magnetic field of the first Stern-Gerlach device in order to enter the magnetic field of the second Stern-Gerlach device. When an Up beam leaves the first Stern-Gerlach device, it no longer remains as an Up beam. The magnetic coupling will rearrange the beam so that the nearest neighbors have opposite Up and Down spins. When an Up beam leaves the Stern-Gerlach device, the outgoing beam will be with alternating Up and Down spins just like the one that entered the first Stern-Gerlach device, but with half the number of electrons in one beam.

When an Up beam is sent to a second Stern-Gerlach device that has the magnetic field out of phase with the first Stern-Gerlach device, what is entering the second Stern-Stern Gerlach device is not an Up beam, but a beam with alternating Up and Down spin neighbors (Up, Down, Up, Down, …) or (Down, Up, Down, Up, …). Now it is just like the beam that entered the first Stern-Gerlach device. A beam with alternating spins enters the second Stern-Gerlach device. So, the second Stern-Gerlach device does what any Stern-Gerlach device does. It will send electrons in odd numbers positions to an Up beam along the magnetic field of the second Stern-Gerlach device and the electrons in even numbered positions to a Down beam against the magnetic field. A half of the electrons will be in the Up beam and a half of the electrons will be in the Down beam. There is no probability involved in the Stern-Gerlach device. Everything is deterministic. There is no association of probability in spins.

If we place a spin in a magnetic field, it aligns with the magnetic field. It is the total spin that aligns with the magnetic field. If spin $\boldsymbol{\sigma}=(\sigma_x,\sigma_y,\sigma_z)$, you cannot align components σ_x, σ_y, or σ_z with an external magnetic field. The claim that the Hamiltonian of a spin in a magnetic field in the z direction is proportional to σ_z is false, $H\neq(\omega/2)\sigma_z$, where ω is a constant. The torque on a spin in a magnetic field will not be zero until the total spin $\boldsymbol{\sigma}$ completely aligns with the external magnetic field $\mathbf{B}$. You cannot align x, y, or z components σ_x, σ_y, or σ_z of a spin $\boldsymbol{\sigma}$ along an external magnetic field $\mathbf{B}$.

The claim that the Hamiltonian of a spin in a magnetic field in the z direction is proportional to σ_z is false, $H\neq(\omega/2)\sigma_z$; it is as false as the claim that the potential energy of a falling mass is a constant. When a spin is placed in a magnetic field, irrespective of the direction of the magnetic field, the torque will bring the total spin $\boldsymbol{\sigma}$ in alignment with the magnetic field, and hence σ_z is not a constant. The σ_z varies with the rotation of the spin $\boldsymbol{\sigma}$ towards the external magnetic field $\mathbf{B}$.

Lemma:

It is the total spin $\boldsymbol{\sigma}$ that aligns with an external magnetic field $\mathbf{B}$. A component σ_x, σ_y, or σ_z of a spin $\boldsymbol{\sigma}=(\sigma_x,\sigma_y,\sigma_z)$ along the axis x, y, or z cannot be aligned with an external magnetic field $\mathbf{B}$.

You cannot measure a spin of an electron using a magnetic field $\mathbf{B}$ since the spin $\boldsymbol{\sigma}$ will always align with the magnetic field $\mathbf{B}$ irrespective of what the direction of its own original spin before it entered the magnetic field. As long as an electron remains in the magnetic field $\mathbf{B}$, the spin $\boldsymbol{\sigma}$ remains in alignment with the magnetic field $\mathbf{B}$. If the electron has gone out of the magnetic field or if the magnetic field is turned off, the spin $\boldsymbol{\sigma}$ will no longer remain in the direction of the magnetic field $\mathbf{B}$ unless the ambient magnetic field is zero. If the ambient magnetic field is non-zero, as soon as the electron is out of the magnetic field $\mathbf{B}$, it will realign with the ambient magnetic field; the direction of the previous magnetic field is forgotten. The spin of an electron is the direction of the ambient magnetic field. The command of a magnetic field to spin is simple;

"You are either with us or against us (the Bushism); we do not care or are not aware what your original direction of affiliation is."

"The alignment of a spin with an external magnetic field is volatile. Once the spin is out of the magnetic field, it no longer retains the alignment towards the magnetic field. It reorient itself towards the magnetic field of the environment it is in."

Lemma:

You can neither set nor measure a spin using a magnetic field.

Corollary:

A Stern-Gerlach device cannot measure a spin of a particle. A Stern-Gerlach device has no clue to what the spin of a particle is.

Lemma:

A charged particle has no clue to whether its spin is Up or Down. Up or Down is an observer label, not an inert property of a charged particle.

You cannot set a spin in a desired direction permanently using an external magnetic field. The orientation of a spin toward an external magnetic field is volatile; the spin remains in the direction of the external magnetic field as long as the external magnetic field is present. If the external magnetic field is turned off or if the particle out of the external magnetic field, the spin is no longer in the set direction. The spin of a free moving charged particle always aligns with whatever the ambient magnetic field that the particle is in.

If we separate two magnetically coupled charged particles (two entangled particles) and measure the spin using a Stern-Gerlach device, you will see they are always in opposite alignment irrespective of the distance of separation not because they are in communication with each other but because you are using the Stern-Gerlach device with the same direction of magnetic field for both measurements. It is the use of the same direction of the magnetic field in the Stern-Gerlach device that makes them still magnetically coupled or entangled. When two magnetically coupled particles are separated in a vast distance, they do not communicate their spin. It is the use of the same direction of the magnetic field of the Stern-Gerlach device that gives the impression of communication. The hidden messenger is the direction of the magnetic field of the Stern-Gerlach device itself.

Spin can neither be measured nor be set by using an external magnetic field or by a Stern-Gerlach device. The recurrent claim in physics that you can measure and set a spin is false. The claim that you can set a spin to a desired direction permanently using an external magnetic field is false. The spin of a particle aligns with the ambient magnetic field it is in.

As a result, Bell's theorem is false and meaningless. A spin does not have an intrinsic direction of a spin.

There is nothing mysterious about spin. Spin of a charged particle is not an abstract concept. It is simply the direction of the magnetic field of a spinning charged particle. State of a spin can never be 2D. Up and Down are not the states of a spin itself. Up and Down exist relative to an observer. There is no Up without Down. There is no separate Up and Down. Down is the negative of Up and vice versa. Observer dependent Up and Down are not orthogonal; they are just opposite of each other or 180 degrees out of phase.

No spin can take place in 2D without 3D. Spin cannot be quantized. Spin is a vector. Vectors cannot be quantized. Any entity with a belonging cannot come in quanta without a mechanism to carry the belonging information. Nature has no mechanism for a quantum to carry belonging information and directional information. A Quantum without a header is not just useless, it is also not physically real.

The so-called spin entanglement is just the magnetic coupling. When two magnetically coupled particles are separated, what gives the impression of them communicating with each other irrespective of their distance of separation is the use of the same direction of the magnetic field in the Stern-Gerlach devices in both places. The information is transferred through the use of the Stern-Gerlach device; the use of the same direction of the external magnetic field in both places, not by mysterious spooky means. The use of the same direction of the external magnetic field in the two measuring devices in two locations gives the false impression that spins can communicate with each other even when they are worlds apart. Neither such communication is possible nor such communication is present between entangled particles. The messenger in this case is the Stern-Gerlach device itself.

It is important to stress that you cannot align x, y, or z spin components σ_x, σ_y, or σ_z of a spin $\boldsymbol{\sigma}=(\sigma_x,\sigma_y,\sigma_z)$ in the direction of an external magnetic field $\mathbf{B}$. If you place a spin in a magnetic field $\mathbf{B}$ oriented along the z axis, the Hamiltonian $H\neq B\sigma_z$. Although the initial potential energy $V=-B\sigma_z$, it changes as the spin component in the z direction, σ_z changes with the alignment of the total spin $\boldsymbol{\sigma}$ with the magnetic field $\mathbf{B}$. The final potential energy will be $V=-B\sigma$. The σ_z is not a constant, and is given by $\sigma_z=\sigma\cos(\theta(t))$, where $\theta(t)$ is the angle between $\mathbf{B}$ and $\boldsymbol{\sigma}$ at time t. The angle $\theta(t)$ varies as the spin $\boldsymbol{\sigma}$ aligns with $\mathbf{B}$ reaching $\theta(t)=0$ and $V=-B\sigma$, the lowest potential.

XXI. GRAVITY CANNOT BEND LIGHT; DIRECTION OF LIGHT IS NOT RELATIVE

Special Relativity forced the light to be relative by changing the direction of light relative to observers. In Special Relativity, light bends relative to observers, which is a fundamental mistake in Special Relativity. Observers cannot bend light. Although the Special Relativity is claimed to be based on the Lorentz Transform that transforms Maxwell's equations onto an inertial frame, the Lorentz Transform is limited to the cases where the velocity of light is unchanged relative to observers. Lorentz transform does not apply if the direction of light is different from the direction of the inertial frame relative to observers. If a theory is based on the Lorentz Transform, it is not just the speed of propagation of light that must be unchanged relative to observers, the direction of the propagation of light must also be unchanged relative to observers.

The Lorentz Transform transforms the Maxwell equations onto an inertial frame while maintaining the velocity of light unchanged. Einstein only adapted the Lorentz Transform partially into Special Relativity. He uses the fact that the speed of propagation of light is a constant in the Lorentz Transform while disregarding the fact that the Lorentz Transform cannot be applied to the cases where the path of light is observer dependent. In the moving cabin thought experiment, the path of light is observer dependent and hence Lorentz Transform cannot be applied.

Lemma:

In Special Relativity, the path of light is observer dependent and hence the Lorentz Transform cannot be applied in Special Relativity. The Lorentz Transform requires the velocity of light to be observer independent.

Light has no mass. Light has no momentum. Light cannot behave as golf balls. Observers cannot bend light. Gravity has no effect on light. Gravity cannot bend light. Despite the claim in Special Relativity, a vertical beam of light from the bottom of a horizontally moving train does not take an angular path relative to an outside observer since light does not behave as golf balls. Maxwell equations cannot be transformed onto inertial frames. No such transformation is necessary for light to have a constant speed and a constant direction relative to observers since light does not propagate relative to observers.

The velocity of light is independent of the frame of reference since light is not relative. Light propagates in space. Light does not propagate relative to moving frames. A mass move relative to inertial frames, light does not. The motion of a mass is independent of the frame of reference since the motion of a mass is relative. You do not have to force a false momentum on light for the speed of light to be independent of the frame of reference as Einstein did in Special Relativity. No Special Relativity is required since the speed of a train and the direction of the train are naturally independent of observers. It is the train track that moves relative to observers, not the train [3].

Lemma:

Neither the observers nor gravity can bend light.

Lemma:

The Doppler effect is for the observer's eyes and ears only. Neither the motion of the source nor the motion of the observer can change the speed, wavelength, and frequency of a wave. The Doppler effect is not a phenomenon of the wave. The Doppler effect is an observer phenomenon. The Doppler effect is not real [5].

a) The Claims that the Gravity Slows Time and Blueshifts Light are Contradictory.

General Relativity claims that gravity slows down time. According to General Relativity, the closer a clock to a gravitational object the slower it ticks. In other words, the closer it is to a gravitational object, the time period is larger. If time slows down and the time period becomes larger with gravity, the frequency is supposed to be decreased as light approaches a gravitational object. However, this is not what General Relativity claims about the frequency when light approaches a gravitational object. While General Relativity claims that the time slows with gravity, General Relativity also Claims that the light is blue shifted or frequency is increased when light approaches a gravitational object. These two claims in General Relativity are contradictory.

If time slows down with gravity, the time period of a wave increases due to the slowing down of the time with gravity, and as a result the effect would have been the decrease of frequency with gravity, not an increase of frequency with gravity. Gravity slowing down time in General Relativity is a direct opposite to the claim in General Relativity that the light is blue shifted by gravity. Slowing down time with gravity and the blueshift of frequency with gravity cannot co-exist.

The claim in General Relativity that gravity slows time is false. The time, a year, is unaffected by gravity. Clocks do not determine the time, a year, one orbit of the earth. A clock is a device engineered to break down the time into smaller intervals, hours, minutes, and seconds. It is the mechanism of a clock that is affected by gravity since a clock as a chunk of mass is affected by gravity. The time, a year, is unaffected by gravity. A slow-running clock cannot change the time, a year, one orbit of the earth.

The blueshift of light by gravity is not a result of gravity affecting the frequency of light. Gravity has no effect on light. Gravity has no effect on the massless. There is no blueshift of light near a gravitational object in the absence of a medium. Gravitational object generates a density gradient near a gravitational object. It is this density gradient that generates a blueshift of wavelength. The frequency is unaffected by a density gradient of the medium or by gravity. Gravity cannot change the frequency. There is no blueshift near a gravitational object in a vacuum. Gravity cannot slow down time. Time is unaffected by gravity. Time is unaffected by the motion of the observer.

Blueshift of light near a gravitational object is not a result of acceleration of photons or light particles. Gravity cannot accelerate light. In the presence of a medium, gravity generates an increasing density gradient towards a gravitational object. Increasing density gradient reduces the speed of light and as a result the wavelength is decreased or blueshifted as light travels towards a gravitational object since the frequency is unaltered.

Gravity reduces the speed of light in the presence of a medium when light travels towards a gravitational object, which results in a blueshift. Gravity has no effect on light in a vacuum. Gravity cannot accelerate the massless. Gravity accelerates the objects of mass. Light cannot consist of photons or light quanta of energy $E=hf$. Light cannot come in quanta. If light comes in quanta of energy e=hf, the energy of a continuous light spectrum will be infinite even for a wave of a narrow bandwidth. Light has no energy. Light has no momentum, $p \neq E/c$, Potential energy of light depends on the amplitude, not on the frequency. Potential energy of light cannot come in quanta since the amplitude cannot come in quanta. Frequency has no energy $E \neq hf$. Einstein's derivation of photons is incorrect and meaningless [1].

b) Pound-Rebka Experimental Observation is Not a Directly Effect of Gravity on Light

The Pound-Rebka experiment has always been used to substantiate the false claim that gravity affects light. Gravity has no effect on the massless. In the Pound-Rebka experiment, an electromagnetic wave sent downward from a four-story building has been blue shifted while a wave sent up from the ground has been red shifted. This experiment does not indicate the frequency shift is a direct result of gravity. If the experiment had been carried out in a vacuum, no such frequency shift would have been observed.

When the electromagnetic wave propagates downward toward the ground, the wave is propagating through an increasing medium density and hence the speed of light will gradually decrease as the wave travels down towards the ground in an increasing density gradient of the medium. Time is unaffected by gravity. Frequency is unaffected by gravity or by the change of the medium. As a result, for the speed of light to decrease as light propagates in a medium towards an increasing density gradient with the distance, the wavelength must decrease resulting in a blueshift of wavelength since the frequency is unaltered. This is exactly what was observed in the Pound-Rebka experiment for waves propagating towards the ground, a blueshift of wavelength.

When the electromagnetic wave propagates upward from the ground, the wave is propagating through a decreasing density and hence the speed of light will gradually increase as the wave travels up from the ground. Again, since the time is absolute, the frequency of the wave is unchanged. As a result, for the speed of light to increase, the wavelength must increase resulting in a redshift as the wave travels up from the ground in a decreasing density of the medium. This is exactly what was observed in the Pound-Rebka experiment for waves propagating upward from the ground, a redshift of wavelength.

The Pound-Rebka experiment clearly indicates that it is the change of the density gradient of the medium in the presence of a material medium that generates a frequency shift in electromagnetic waves. If the

Pound-Rebka experiment had been done in a vacuum, they would have not observed any frequency shift in both upward and downward direction. Since the experiment had been carried out from a 4-story building, they would have carried it out in a vacuum tube without much difficulty. However, if they have carried out the experiment, they would not be able to support their false claim that gravity bends light. So, one may wonder, if they have purposely avoided carrying it out in a vacuum.

A mass has no effect on massless entities. A mass has no effect on electromagnetic waves. It does not matter how big a mass is, a mass cannot change the path of light or the wavelength. Gravity cannot redshift or blueshift light. In the presence of a medium, gravity can change the density gradient of the medium. The density gradient of the medium can redshift or blueshift the wavelength of light; frequency is unaltered. A mass has no gravity. Gravity is always between masses. There is no gravity between a mass and massless light. Light has no mass, no kinetic energy, no temperature, no entropy. Light only has electromagnetic potential energy. Electromagnetic potential energy is not energy until it is converted into energy in the presence of electrons or charge particles. Gravity has no effect on light in the absence of a medium and vice versa.

c) **The Reason for Redshift, Blueshift, Diffraction of Light Near a Gravitational Object: not a direct result of gravity affecting light** [5]

When light moves from less dense medium to a denser medium, speed of light decreases. As a result, the wavelength must decrease since time is absolute and frequency is unchanged.

Assume light of frequency f with wavelength λ travels at speed c in the vacuum, and in a medium the same wave of frequency f travels with wavelength λ_m at speed c_m. Then, for the vacuum and the medium, we have,

$c=f\lambda$ and $c_m=f\lambda_m$

$c/c_m=\lambda/\lambda_m$.

Since the speed of light in a dense medium is less than the speed of light in a less dense medium or in the vacuum, $c/c_m>1$, and hence, we have,

$\lambda/\lambda_m>1$ or $\lambda>\lambda_m$.

The wavelength decreases when light propagates towards a denser medium. In other words, the wavelength of light is blue-shifted when light propagates in an increasing density gradient. The frequency is unaltered.

Gravitational object generates a density gradient in the presence of a medium. The density gradient decreases as the distance from the gravitational object increases. As a result, when light propagates toward a gravitational object in the presence of a medium, light is traveling in an increasing density gradient, which results in a wavelength blueshift. When light is traveling away from a gravitational object such as a star, light is traveling in a decreasing density gradient, which results in a wavelength redshift. There will be neither redshift nor a blue shift of wavelength in the absence of a medium. It is the wavelength that is redshifted or blueshifted in the presence of a density gradient of the medium, not the frequency. Frequency is unaltered by the change of medium, medium density gradient. Frequency is unaffected by gravity. Light is unaffected by gravity in a vacuum.

A gravitational object generates a density gradient in the medium. It is this density gradient in the medium that shifts the wavelength of light. It is this density gradient that bends light. It does not matter how big the gravitational object is, in the absence of a medium, there is neither a wavelength shift nor a bending of light. In the presence of gravitational objects, light travels in a vacuum on an unaltered path and at an unaltered speed with an unaltered wavelength. It is the density gradient of the medium that bends light. It is the density gradient of the medium that shifts the wavelength. Gravity has no influence on light in the absence of a medium.

Lemma:

Gravity cannot bend light. Gravity cannot alter the frequency of light. Gravity has no direct effect on light. Effect of gravity on light is always through a medium. It is the medium that mediates an interaction between gravity and light.

Lemma:

There is no blushift, redshift, or refraction of light near a gravitational object in the absence of a medium. It is the density gradient of the medium generated by a gravitational object that generates the blueshift or redshift of wavelength, and the diffraction of light. Frequency is unaltered.

d) **Galaxies Do Not Have a Radial Motion, Universe is Not Expanding** [5]

Property:

The propagation of light in a medium towards a positive density gradient of the medium results in a wavelength blueshift, while the propagation of light in the direction of a negative density gradient of the medium results in a redshift. Light bends or refracts in the presence of a density gradient. There is a density gradient of the medium surrounding any gravitational object. It is this density gradient, not the gravity, that affects the propagation of light.

Lemma:

The observed redshift/blueshift from a distant star or the bending of light near a gravitational object has nothing to do with Special Relativity, or General Relativity.

Corollary:

There is no redshift, blueshift, or bending of light near a gravitational object in the absence of a medium surrounding the object.

The wavelength redshift of light from a star in a galaxy cannot be attributed to a radial motion of the galaxy since all the stars in a galaxy are not redshifted by the same amount. The redshift of a star in a galaxy is not a doppler effect. The false concept of Expanding universe cannot explain the star redshift in a galaxy. Space cannot expand. Only the matter expands. If space expands, it is no longer a space. If space is made of matter, it is no longer a space. Space without matter is as real as matter itself. A mass cannot alter space.

The claim in General Relativity that the mass alters space falls apart since the warping of space by an object of mass m with volume v cannot be the same as the warping of the space by an object with the same mass m with different volume V. If the space is warpable, it must be the volume of the object that warps the space, not the mass of the object. It is the volume of the space that takes up space, not the mass. The mass of an object warps the material space surrounding the object generating a density gradient of the medium. Space is not warpable. A mass cannot bend space. A mass has no gravity. A mass cannot exert a force on a massless. A mass cannot generate a dent on a nearly massless trampoline. You cannot put a mass on a trampoline. If the space is warped by a mass, space is not empty. It is a medium in space that can be warped by a mass. Gravity cannot change the distance. It is only that gravity can change the length of matter, the length of the ruler. Gravity cannot change the time. Gravity can alter the reading on a clock, not the time itself. The change of a reading on a clock does not alter the time itself.

Galaxies are gravitationally bound. Expanding universe cannot change the distance between gravitationally bound objects. Expanding universe cannot change the wavelength of light since light is not anchored to space. Gravitational objects have a medium surrounding them. The medium density decreases as the distance from a gravitational object increases. Larger the mass of the gravitational object, the higher the change of density gradient near a gravitational object.

Assume that we are observing a star in a galaxy from earth. When light leaves the star, light is traveling along a strong negative density gradient near the star. When light is approaching the earth, light is traveling along a positive density gradient, which is not that strong. As a result, the light from a star generally undergoes wavelength redshift since the net effective density gradient of the medium from the star in the galaxy to an observer on earth is negative. Different stars in the same galaxy undergo different redshifts.

When light leaves a star, it travels a strong negative density gradient near the star and a weak positive density gradient near the earth. However, light also passes in between mediums of many light years on its way to earth. If the density gradient of the in-between mediums is such, the net overall density gradient from the star to the earth is positive, then, light undergoes a wavelength blueshift. Different stars in the same galaxy have different redshifts and different blueshifts.

It is also possible for some stars in the same galaxy to have different blueshifts while the rest of the stars in the same galaxy have different redshifts. The redshift from a star is much more common since light from a star travels a strong negative density gradient near the star. The strength of the negative density gradient varies from star to star and hence the star redshift varies from star to star irrespective of whether the stars are in the same galaxy or not.

The redshift of a star in a galaxy cannot be used to claim that the galaxy itself has a redshift since not all the stars in the same galaxy have the same redshift. The redshift of a star is not the Doppler effect. The redshift of a star in a galaxy cannot be used to claim the galaxy is moving away from us radially since not all the stars in the galaxy have the same redshift. And also, expanding space cannot alter the intergalactic distances between gravitationally bound galaxies. Expanding universe cannot alter the distances between gravitationally bound objects. Neither the stars nor the galaxies have a radial velocity. Star redshift cannot be attributed to a radial motion. Light from stars travels in inhomogeneous media and hence the redshift/blueshift cannot be attributed to the Doppler effect [5]. The Doppler effect requires a homogeneous medium. Universe is not expanding.

Lemma:

The redshift of light from a star in a galaxy cannot be attributed to the Doppler effect due to the radial motion of the galaxy since not all the stars in the galaxy have the same redshift.

Lemma:

The star redshift/blueshift cannot be attributed to the Doppler effect since light from a star travels in an inhomogeneous medium.

e) Light Does Not Bend Relative to Observers

In Einstein's thought experiment based on a light beam in a moving train, a vertical beam of light was assumed to move vertically relative to a passenger in the cabin while the beam was assumed to take an angular path relative to an observer outside on a stationary platform. This is where the problem lies. In Special Relativity, the direction of light is assumed to change relative to observers. A light beam cannot bend relative to observers. It is only that the path of a beam of light can shift relative to observers while keeping the direction of light constant [3,5].

A beam of light is not one continuous wave from the source. Light comes in wave bursts. A beam of light is a sequence of light bursts. A beam of light is not anchored to a source. A wave that is anchored to a source cannot propagate. Each individual wave burst in a light beam has a constant speed and a constant direction. Relative to an observer, it is the light burst that shifts relative to observers [3]. Propagation of light at constant speed in a constant direction on its constant path is independent of observers. No Special Relativity is required.

Light has no mass. Light has no kinetic energy.

Light has no momentum. The momentumless entities are not relative. Light is not relative [4]. Although the light pulse propagates vertically on its track, the whole track or the whole pulse cannot move vertically relative to a passenger in the cabin since light is not relative. A vertical light pulse cannot take a vertical path relative to an observer in the cabin. A vertical light burst propagates vertically while light burst as a whole shifts on an angular path. Since the whole light pulse shifts on an angular path while retaining the direction of propagation of the wave intact vertically, this is not a bending of light relative to an observer. Relative to a stationary observer outside the train, in other words relative to the vacuum, a light burst shifts vertically along the direction of propagation. For any moving observer outside the cabin, a light burst shifts as a whole in the opposite direction to the observer motion on an angular path. The direction of a light burst is unchanged relative to observers. Light does not derail relative to observers.

The claim in Special Relativity that the light bends relative to observers is incorrect. Further, a light burst shifts on an angular path relative to an observer in the cabin, not relative to an observer on an outside stationary platform. Relative to a stationary observer outside, a light burst shifts vertically in the direction of propagation. The direction of propagation of light and the path a light burst shifts as a whole are not the same relative to a moving observer.

Lemma:

It is a light burst as a whole that shifts against the motion of an observer relative to the observer, not the direction propagation of light. The direction of propagation of light on its fixed path is unaltered. It is the path as a whole that shifts against the motion of observers.

Corollary:

Light does not bend relative to observers moving at constant speed. It is just that a burst of light shifts on an angular path relative to observers moving at constant speed.

f) **Gravity Cannot Bend Light**

Einstein extended the Special Relativity for inertial frames into General Relativity for accelerating frames by proposing the equivalence principle. Equivalence principle states that the gravity and the acceleration are the same. Einstein claimed that an observer inside a cabin cannot distinguish if the cabin is at rest on a gravitational object or moving at an acceleration. Gravity is not the same as acceleration since there is no acceleration without motion, without the change of the position. Falling apple is at an acceleration. An apple on a tree is not at an acceleration. Acceleration requires the change of position.

A stationary cabin on a gravitational object has no change of position, and hence not under acceleration, although it is under gravity. Equivalence principle is incorrect. Gravity and acceleration are not the same. There is no acceleration without motion. A cabin at rest on a gravitational object is not at an acceleration. It is only that gravity can accelerate an object that is free to move. It is only for a free moving object under gravity that the gravity is the same as the acceleration. Newton's law $F=ma$ does not apply for an object of mass m at rest under gravity, where F is the force and 'a' is the acceleration.

Light is not relative and hence Special Relativity is incorrect. Spacetime function in Special Relativity is not unique. Space and time are mutually independent. The time, a year, cannot contract or dilate. Clocks do not determine the time, a year, one complete orbit of the earth. Mass of an object must be independent of its speed. The time, a year, is frame independent. If time is relative, time will be directional. Time cannot be directional.

The concept of gravity bending light was a result of Einstein's misinterpretation of a horizontal beam of light in a vertically accelerating cabin. If a light beam enters through a hole on the vertical wall of a vertically accelerating cabin, relative to an observer in the cabin, the light beam does not bend parabolically downward. It is only that the light burst shifts on a parabolic path downward while speed and the direction of propagation of light on its fixed horizontal path remains unaltered [3]. The path of a light burst cannot bend relative to observers. Observers cannot change the path of light.

Lemma:

The path of light cannot bend relative to observers. A horizontally propagating burst of light in a vertically accelerating cabin shifts on a parabolic path against the motion of the cabin relative to an observer inside the cabin while the speed of light and the direction of light on its fixed horizontal path remains unaltered.

The claim in General Relativity that a horizontal beam of light entered through a hole on the wall of the vertically accelerating cabin bends on a parabolic path downward relative to an observer inside the cabin is incorrect. The direction of propagation of light cannot be changed relative to observers (external or internal) irrespective of whether an observer is on an inertial frame or an accelerating frame; this is not possible. Observers cannot bend light. It is only that the path of a light burst shifts relative to the motion of an observer while the propagation of light on its fixed path remains unaltered relative to observers. Light is not relative. A beam of light in a moving cabin does not behave as a baseball since light has no mass, no momentum, no kinetic energy. Light does not propagate relative to moving frames [4]. Observers cannot derail a train [3].

Consider a vertically moving cabin at constant speed. If an observer inside the cabin fires a horizontal light burst, the light burst propagates horizontally relative to an observer outside. However, the light burst shifts against the motion of the cabin relative to an observer inside the cabin. Relative to an observer in a cabin moving vertically at constant speed, a light burst as a whole shifts downward on an angular path while the direction of propagation of light within the burst remains horizontal, unaltered. A light burst does not bend relative to an observer in a vertically moving cabin at constant speed, instead, what happens is that the path of the light burst shifts as a whole on an angular path against the motion of the cabin relative to an observer inside the cabin.

Einstein derailed the light. Observers cannot derail the light. Lorentz Transform cannot derail light. Lorentz Transform does not derail light. Einstein's thought experiment goes against the Lorentz Transform. In the Lorentz Transform, it is the velocity of light that is constant not the speed of light itself. Lorentz Transform is not unique [4]; it does not exist.

Now consider a vertically accelerating cabin. If we release a horizontal light burst, what happens relative to an observer in the cabin since light is not relative. Relative to an observer in the cabin, a horizontal light burst as a whole shifts downward on a parabolic curve while light is propagating unaltered horizontally within the burst. It is the path of the light burst that shifts on a parabolic curve. Light does not bend on a parabolic curve here; a horizontal wave burst propagates horizontally irrespective of what cabin or observers do. Observers cannot change the path of light. It is only that the whole path shifts relative to an observer while the speed and the direction of light on the path remain unaltered relative to the observer. Einstein derailed the light in formulating the Special Relativity and the General Relativity. Any entity moving or propagating on a fixed path is observer independent. No Special Relativity is required.

Now consider a stationary cabin, a cabin sitting on a gravitational object. Gravitational force has no effect on light since light has no mass, no momentum, not kinetic energy. Further, as we have seen before, there is no acceleration without motion, $a=0$ when $dx/dt=0$, where 'a' is the acceleration, dx is the displacement in the time interval dt. Acceleration of a stationary object is zero since there is no acceleration without a motion. The acceleration of a stationary cabin on a gravitational object is zero. The Newton law $m=F/a$ does not apply for $a=0$, where F is the force, m is the mass of the cabin.

So, an observer in a stationary cabin sees a horizontal light burst taking a horizontal path. More accurately, a horizontal wave burst shifts horizontally while the light is propagating horizontally relative to an observer in the cabin. Since the cabin is stationary, the shift of the wave burst relative to the observer is nil. A horizontal light burst in a stationary cabin under gravity remains horizontal without any shift relative to the observers inside the cabin. This scenario is completely different from the accelerating cabin, where a horizontal burst of light shifts as a whole downward on a parabolic path relative to an observer in a vertically accelerating cabin.

The path a burst of light shifts relative to an accelerating cabin is not the same as the path relative to a stationary cabin on a gravitational object. Gravity does not bend light. Accelerating object does not bend light. An inertial frame does not bend light. The velocity of light is observer independent naturally since light propagates on a fixed path at a constant speed. The speed and the direction of light are observer independent. It is only the whole path of a light burst that shifts relative to an observer while the speed and the direction on its fixed path remain unaltered. The direction of light is not altered relative to observers. It is the fixed path of light that shifts while maintaining the direction and the speed of light on its fixed path constants. Observers cannot derail trains. Observers cannot bend light. It is only a medium that can bend light. It is only a medium that can alter the speed of light on its fixed path.

An observer in a cabin can determine if the cabin is stationary, moving at constant speed or at an acceleration using a burst of light. The path, a burst of light shifts, depends on the state of the cabin. If there is no shift in the wave burst, the cabin is stationary. If the light burst shifts on an angular path, the cabin is moving at a constant speed against the angular path. If the light burst shifts on a parabolic path, the cabin is at an acceleration.

Lemma:

Gravity is not an acceleration since there is no acceleration without motion.

Lemma:

Gravity cannot bend light. Observers cannot bend light. Only a change of the medium can bend light.

Corollary:

Einstein's equivalence principle is incorrect. Gravity and acceleration are not the same. Apple on a tree has no acceleration. A falling apple has an acceleration.

g) A Mass Cannot Dent a Trampoline

If you refer to any General Relativity book or a lecture, you will come across a failed attempt to explain the curvature of the space in General Relativity using a picturesque dent created by a ball on a trampoline. We see the pictures of a nice curvy dent on the trampoline with the placement of a ball on it. Yes, a ball of mass generates a nice curvy dent if the trampoline is on earth. But if we consider a trampoline or a sheet of rubber in space, no matter how massive the object you put on it, it does not generate a dent on the trampoline or on a rubber sheet. A mass will generate a bump on the trampoline in space, not a dent.

You cannot even place an object of mass on a trampoline in space. Just as it is not possible for a mass to distort a nearly massless trampoline, a mass cannot distort space. It is only a material medium that a mass can distort. It is not the mass of an object that occupies the space, it is the volume of an object that takes up the space. Mass does not have any effect on space. A single mass has no gravity. A single mass cannot exert a force on the massless. It is the interaction of masses that generates gravity.

Space cannot distinguish between an object of smaller mass m of volume V and an object of a bigger mass M of the same volume V. As far as space is concerned, the effect of the mass m of volume V on the space is no different from the mass M of volume V, no difference. Space has no way of differentiating masses. Space is insensitive to the mass of an object. A mass cannot alter space. There is no way a mass can make the space feel its presence.

A ball on a trampoline on earth generates a dent due to the earth's gravitational force on the ball pulling the ball against the trampoline towards the earth. Without the earth's pull on the ball, there would be no dent on a trampoline. It does not matter how massive a gravitational object is, an object of mass by itself does not create a dent on a rubber sheet or on a trampoline.

If all you have is a single mass, there is no gravity. Gravity is always a result of an interaction between two masses. A single mass has no gravity. A single mass has no gravitational force. A single mass cannot create a dent on a trampoline or on a rubber sheet. If you bring a mass towards a trampoline, it will create a bump on the trampoline if the trampoline has a mass, not a dent.

"You cannot place a trampoline in between two unequal masses (a bowling ball and the earth) and use the effect on the trampoline to explain the effect of a single mass on a trampoline. A single mass cannot disturb a nearly massless trampoline. A single mass cannot generate a dent on a trampoline. It is even not possible to place a mass on a trampoline in space."

If the trampoline has a mass, if you bring a mass closer to it, what it creates is a bump, not a dent. If the mass of the trampoline is nearly zero, even if you put a mass on it, it does not create a dent. A massive object cannot warp anything. It requires a force to create a dent on a trampoline. A mass by itself does not have a force. A massive object cannot warp space. A massive object has no effect on nearly massless objects. For a mass to create a dent on a trampoline or on a sheet of rubber, there must be an object of a larger mass on the opposite side of the trampoline.

It does not matter how big a mass is, one object of mass by itself cannot warp anything that is warpable. A single object of mass has no gravity. A single object of mass has no gravitational force. A gravitational force requires interaction of two masses. A mass cannot bend anything that is massless. A mass has no effect on the massless. If the space is warpable, it is the volume of an object that can warp the space, not the mass. It is the volume of an object that occupies the space, not the mass. The mass of an object warps the medium that surrounds the object. The curvature of the medium or the density gradient of the medium depends on the mass of the object. Space is not warpable. Only the matter is warpable. If the space is warpable, the space is not a vacuum. The idea of a mass warping the space in General Relativity is simply meaningless, imaginary, hypothetical. Both Special Relativity and General Relativity are meaningless.

Lemma:

A single mass cannot generate a dent on a trampoline. If a mass is brought closer to a trampoline, what is generated on the trampoline is a bump, not a dent. If the trampoline is nearly massless, it does not matter how big a mass is, a mass has no effect on a trampoline.

Lemma:

A single mass has no gravity. Gravity is the interaction between two masses.

Lemma:

A mass cannot warp the massless. A mass cannot warp space. A mass has no force. It is the volume of an object that takes up space, not the mass of an object.

It is only that a mass can change the density of a material medium surrounding the mass. The medium density decreases with the increasing distance from the mass. It is the material medium surrounding a mass that is warped by the mass, not the space. It is this density gradient that refracts light near a massive object. In a vacuum, a gravitational object cannot bend light. A mass by itself cannot bend any entity, because a mass by itself cannot exert a force. A mass cannot bend light. A single mass has no gravitational force. Gravitational force is always present between two masses. A single mass has no gravity. There is no force between a mass and light. Light cannot be shifted by gravity.

A single mass has no gravitational field surrounding it. It is only when we place a unit mass at a distance from an object of mass that a gravitational field on that unit mass comes into existence. Without a unit mass present at any point, there would be no gravitational field. A single mass has no Gravity, no gravitational field.

"There is no attraction without having an object of mass to be attracted to. There is no force without having an object of mass to apply on to. There is no boss without a subordinate. There is no ruler without one to be ruled."

There is no gravitational potential surrounding a mass. A gravitational potential only exists between two masses separated by distance. There is no such gravitational potential energy density as such. A mass itself can exert no force. There is no such thing called the gravity of a mass.

An apple on a tree has a gravitational force. An apple on a tree has no acceleration. An apple on the ground has no acceleration. An apple on the ground has a gravitational force. A falling apple has gravitational force and acceleration. Newton's $F=ma$ applies for a falling apple; it does not apply for an apple on the ground or on a tree. The mass of an object is independent of its motion, its speed, the frame of reference.

Earth by itself has no gravity. Gravity is an interaction between two masses; there cannot be a gravitational potential energy density. Since a mass cannot exert a force by itself, a mass cannot distort the space. The concept of spacetime warping by a mass is meaningless. A mass can distort a material medium surrounding it making light to refract, to bend. If you want you can say a mass warps the density of the material medium it surrounds; that makes sense. A mass warping space makes no sense. Mass has no force to warp any entity that is massless. Mass can only warp medium of mass.

Lemma:

Gravity cannot bend light. Observers cannot bend light. It is only a density gradient of the medium that bends light. Light is unaffected by gravity in a vacuum.

Lemma:

A light burst as a whole shifts on a linear path relative to an observer at constant speed, and on a parabolic path relative to an accelerating observer, while the velocity (the direction and speed) of light remains unaltered relative to the observer.

h) Age is Not Determined By Clocks

We do not grow old by the clock. If we grow old by the clock, our age will be determined by the engineers who design the clocks. Clocks do not determine time. A measuring instrument does not determine what is being measured. Clocks are engineered to break down the time, a day or a year, into smaller intervals. Irrespective of the design of the clock, clocks have to run in synchrony with the day or the year for clocks to be a valid design. If clocks run asynchronously with the day or the year, fast or slow, then, those clocks do not represent the time. Clocks have no meaning for nature. Clocks have a meaning for only those who learned what they are and how to use them. Clocks have no meaning for a baboon or a caveman. We cannot engineer devices that determine our age externally. Clocks cannot determine the speed of our aging. Clocks are engineered to break down the time that has been already defined as the day or the year.

We cannot alter the day or the year by running or taking a space flight. A person taking a space flight ages at the same rate as his twin sister on earth. There is no twin paradox. You cannot alter how fast you age by running or taking a spaceship flight. A year is a year in earth years irrespective of what speed you are traveling at. The orbit of a planet and the spin of a planet are observer independent. We cannot derail a train by running away from it. We cannot deorbit a planet by taking a space flight. The speed and the direction of any moving entity is observer independent. It is the path that shifts relative to an observer, not the object traveling on the path. It is the path that is relative, not the speed and the direction of the object on its path. It is the train track that moves relative to observers, not the train on the track [3,5].

There is space. We can move in space. There is no time until we define the time. Time is an entity we defined. There are objects moving in space. We use motion to define time. There are recurring changes taking place in the space. We use the recurring changes to define time. Time is not where the changes in the universe take place. Time exists because of the changes taking place in space. The changes of the universe take place in one direction, and as a result the definition of time based on the changes in the universe is one directional. There are no backward changes in the universe and hence there is no backward time or negative time.

The motion of an object on its path is observer independent. The speed and the direction of a train on its track is observer independent. It is the railway track that shifts relative to observer motion, not what is moving on the track. It is the distance to the rack that varies relative to observer motion, not the train itself. Since the motion of an object on its path is observer independent, the definition of time based on the motion of an object is observer independent. The orbit of the earth does not vary relative to observer motion. It doesn't matter how fast an observer is moving in which direction, the time that is defined as the day and the year are independent of the observer motion. It is the orbit as a whole that shifts relative to an observer motion, not the planet itself. Time that is defined as the day or the year are not relative. Clocks do not determine the time, the day or the year. Clocks are designed for the whole purpose of breaking down the day or the year into smaller intervals.

The day or the year does not change with the clocks. The day is the day irrespective of what the clocks display. If clocks do not represent the day or the year correctly, it is the operation of the clocks that are at fault. Clocks are engineered devices. The display of a clock does not define how we age. We cannot engineer devices to slow down how we age. Engineered devices operate properly when the devices are used in an environment that agrees with the design specification.

Gravity does not alter time. Gravity exerts a force on the mechanism of a clock and hence gravity alters the display on a clock. The speed does not alter the time. The speed affects the mechanism of a clock and hence the display on the clock. The display on a clock represents time if the operation specifications are met. The time, which is a definition, is not relative. The propagation of light is not relative. The motion of an object has nothing to do with the speed of light unless the object is moving at the speed of light. There is nothing that prevents the motion of an object at the speed of light.

Lemma:

Nothing can move relative to light since light has no standstill existence. Light is not relative.

XXII. GRAVITATIONAL WAVES AND GRAVITONS CANNOT EXIST

If waves carry out the gravitational interaction between masses, these waves must have identifiers.

If gravitons or disturbances in a gravitational field exist and the gravitational interaction is a result of the exchange of gravitons, these gravitons must have identifiers. The gravitons of one mass must be identifiable from the gravitons of another mass to carry out a meaningful interaction. A mail that has no sender's identification cannot carry out an interaction. Gravitons without identifiers cannot carry out the interaction between masses.

A wave cannot carry out the interaction between masses since a wave has no identifier to distinguish the wave of one mass from the wave of another mass. There is no mechanism to distinguish the gravitational wave of one mass from the gravitational wave of another mass. There is no mechanism to distinguish gravitons of one mass from the gravitons of another mass. Any propagation wave cannot be anchored to a mass. A wave that is anchored to a mass cannot propagate.

Gravitational field is a single field that exists between two masses. Gravitational field is anchored to two masses. There is no gravitational field without anchorage. A single field cannot be a wave. A single field cannot propagate. Propagation requires a pair of conjugate fields. A single field cannot be disturbed and hence gravitons cannot exist.

Lemma:

There is not a single field that propagates. A single field cannot be a wave. A single field cannot be disturbed. The existence of a wave requires a conjugate pair of fields.

Corollary:

Gravitational field is single and hence gravity cannot be a wave. Gravitons or disturbance in a gravitational field cannot exist since the gravitational field cannot be disturbed.

A single mass has no gravity. Gravity is the interaction between masses. Interactions between masses cannot be carried out by waves since waves must be independent of any mass and cannot be anchored to a mass. Propagating wave is completely independent of the source or a target. Waves do not deliberately propagate towards specific targets. It is only that if and when a wave encounters a target on its path, they interact. As a result, waves cannot carry out a deliberate communication between masses. Similarly, photons cannot shake hands or carry out an interaction between charges since photons have no identifiers. Light cannot be particles. There are no light particles or photons. Light cannot exist if light comes in photons of energy $E=hf$. Shake hands cannot take place without identifiers. Gravity cannot exist, if gravity is a wave. You cannot create a disturbance in a gravitational field.

The gravitational interaction between masses must be instantaneous. Instantaneous interaction cannot take place through waves since waves are associated with a propagation delay. Gravitational field has no conjugate partner and hence gravity cannot be a wave. Gravity has nothing to do with light or the speed of light.

A single mass has no gravitational field. Gravitational field is anchored to two masses and hence cannot be a wave. A field with an anchorage cannot be a wave. A single field without a conjugate partner cannot be a wave. A single field cannot be disturbed and hence there cannot be gravitons or disturbances in a gravitational field between masses. Gravitons do not exist even hypothetically. Gravity cannot be a wave even hypothetically. There is no gravitational field without two or more masses. Particles within an object of mass have gravitational interactions that keep the object as a whole. There are no gravitational waves.

"There is not a single field that propagates. Propagation requires a pair of conjugate fields."

XXIII. THE LOST REALITY IN MODERN PHYSICS

Lemma:

What is relative are the measuring instruments, not what is being measured. What is gravity dependent are the measuring instruments, not what is being measured.

Lemma:

Energy has no existence without mass. Mass cannot be converted to energy. Mass is conserved.

With the introduction of Special Relativity, General Relativity, and Quantum Mechanics, physics has lost its touch with reality. When we hear the claims that time is speed and gravity dependent, age is speed dependent, the universe expands, a particle of mass can be in multiple places simultaneously, particles are waves, waves are particles, spin-states are two dimensional, the measure of spin of a particle here affects the spin at a distant particle, we know immediately that the Modern Physics has taken mysterious turn into the realm of voodoo physics, not to the advancement of the science of nature or the natural sciences.

There is no physical entity called time to be speed and gravity dependent. We define time based on the motion of masses. We design clocks to break down the time we have defined into smaller intervals, to measure our definition of time. Any entity with a mass is affected by gravity, clocks that are engineered to break down the time, a year, are no exception. The motion of masses depends on gravity. As a result, our definition of time based on the motion of masses depends on gravity. It is not the time itself that depends on speed and gravity, it is the devices that are designed to measure the time that depend on gravity. It is not the time that is relative, it is the devices that we design to measure the time that is relative.

It is not the mass of an object that depends on the speed, it is the devices that we design to measure the mass of an object that depends on the speed. It is the measuring devices that are relative, not what is being measured. Physics has misinterpreted the dependance of engineered measuring instruments on the speed and gravity as a dependence of what is being measured on gravity and the speed. Physics has been taking an unrealistic path for more than a century. It is important to look back and see how and why physics has lost touch with reality.

The loss of touch with reality in physics began with Special Relativity. It goes back to Einstein's thought experiments. Most of the fundamental mistakes are hidden in these thought experiments. In formulating Special Relativity, Einstein thought of a vertical light beam from the bottom of a cabin of a moving train at constant speed. He visualized a vertical light beam released from the bottom of a moving cabin hitting the ceiling and reflecting the light beam back to the source vertically relative to a passenger in the cabin while the light beam is taking an angular path relative to a person standing on a stationary platform at the train station. This thought experiment is based on a hidden premise that is wrong. In this thought experiment, light is assumed to be relative.

In Special Relativity, light is assumed to behave as golf balls. Light is not relative [4]. Light does not behave as golf balls. A light beam relative to a passenger in a moving cabin cannot take a vertical path since light has no momentum. Special Relativity started with the wrong assumption that light is relative and behaves as golf balls. You cannot force a momentum on light by assumption. Light has no momentum. Light has no kinetic energy. Light does not propagate relative to moving frames.

Special Relativity is based on the assumption that light is relative and the Maxwell equations for propagation of light can be transformed onto an inertial frame using the Lorentz Transform. Light cannot be transformed onto a moving frame. What is forgotten is the fact that it is the velocity of light that is constant in the Lorentz Transform and the Lorentz Transform is not unique. Lorentz Transform is hypothetical, it cannot exist.

Special Relativity disregards the fact that it is not just the speed of light that is constant, the direction of light is also constant. The velocity of light is constant. It is the velocity of light that is constant in the Maxwell equations for the propagation of light. It is the velocity of light that is constant in the Lorentz Transform. In Einstein thought experiments in Special Relativity and General Relativity, Einstein derailed light. Einstein derailed the light to force the speed of light to be a constant relative to inertial frames. Light travels at constant speed on a fixed path and hence light is naturally observer independent, no Special Relativity is required. Special Relativity is unnecessary. It is this blindness to the fact that it is not just the speed of light that must be observer independent, the direction of light must also be observer independent, that led to the need for a Special Relativity and many unrealistic invalid conclusions thereof [3]. Light is not relative. Maxwell equations cannot be uniquely transformed onto a moving frame [4].

To see what a folly Special Relativity is, you do not need anything other than the fact that the Lorentz Transform is not unique and the fact that observers cannot derail a train [3,4]. The path of light is observer independent just as the speed of light is observer independent. Einstein derailed the light in Special Relativity. Einstein arbitrarily chose one Lorentz transform out of infinitely many equally valid Lorentz transforms. Einstein dismissed the fact that the direction of light is a constant. Einstein disregarded the fact that it is the velocity of light that is observer independent in Maxwell equations for propagation of light as well as in the Lorentz Transform.

Einstein assumed light behaves as a baseball in a moving cabin. Massless light cannot behave as a baseball in a moving cabin. Vertical light beam from the floor of a moving cabin does not take a vertical path and return to the source relative to an observer in the cabin since light has no mass. Einstein's light beam in a moving cabin thought experiment is incorrect. That is how reality was lost in Special Relativity. That is where the reality was lost in Special Relativity. The reality was lost in the foundation of the Special Relativity. The reality was lost in the Special Relativity due to the mistake of assuming light behaves as baseballs in Einstein's thought experiments. The fact is that when the velocity of light cannot be relative, Einstein's light beam in a moving cabin thought experiment is invalid. Special Relativity and General Relativity cannot hold true. Light does not behave as golf balls. Light cannot be assumed to behave as golf balls. Light is not relative [4,3].

Where else did we lose the reality? We can start with time. Is there an entity called time? Do you see an entity called time? Special Relativity is based on the assumption that there is an entity called time out there we can measure, and time depends on the observer's frame of reference. There is no entity called time out there for us to measure. Clocks do not measure time. We define the time, a year, as one complete orbit of the earth. And then, we engineer clocks to break down our definition of time, a year, into smaller intervals.

A thermometer measures the temperature that exists. A scale measures the mass of an object that exists. A ruler measures the distance that exists. Unlike thermometers, rulers, and scales, clocks do not measure an entity that exists. Clocks break down the year we have defined into smaller intervals. Clocks do not determine a year. The speed of a clock does not determine the year. A slow clock does not make us live longer or grow older slower. A fast clock does not make us go older faster. How long we have lived is not determined by the clocks. We do not grow older by clocks.

Special Relativity is founded upon the average return time of a light beam, not based on one directional time we observe on clocks. Average return time says nothing about one-way time. One-way time does not apply to Special Relativity and General Relativity. Special Relativity and General Relativity are out of reality. There is no mechanism in nature to calculate the mean return time required for Special

Relativity and General Relativity to be of any use in nature. Average return time cannot be obtained online, in real time. Average return time is available offline. You cannot avoid the speed dependence of the one-way speed of light in a moving cabin relative to an observer in Special Relativity. Special Relativity is consistent only for average return time of a beam of light, not for one directional time we measure on clocks. Special Relativity and General Relativity can maintain the constant speed of light c only for the average return time, not for the one-way time. Special Relativity does not apply for the time we measure on clocks.

"The time in Special Relativity and General Relativity are defined as the average return time of a beam of light and hence the one-way time in ordinary clocks do not apply to Special Relativity and General Relativity. Nature does not come with an accountant to keep track of average return time."

In Special Relativity, the time, the mass, and the length along the direction of motion are relative. Special Relativity allowed both time, mass, and length along the direction of motion to be observer dependent. The time and the mass of an object cannot be observer dependent. The mass of an object cannot be observer dependent. The mass, the amount of matter an object has, cannot change with the speed relative to an observer. There is no such entity called time for us to pick up and measure until we define it. There is no such entity as time to observe until we engineer clocks with displays. Time is not ticking until we engineer a ticker and give it a meaning. Time is not ticking when the ticker stops.

The time on earth is defined as the spinning of the earth on its axis and the orbiting of the earth on its orbit, which are independent of observers. Observer motion cannot change orbits. It is the orbit of the earth that shifts as a whole relative to observer motion, not the earth itself. The motion of the earth on its fixed orbit is observer independent. The time, a year, is observer independent. Time is not defined by clocks. Clocks are engineered to display the time, a year, that is already defined as one complete orbit of the earth in the planetary system. If a clock displays 8:00 AM, irrespective of the speed of the observers, observers at the same distance from the clock see the display of the clock as it is displayed on the clock simultaneously. There is no slowing down of the time based on the speed of the observers. It does not matter how different the speeds of the observers are, if the observers are at the same distance from a clock, they all see the same value on the clock. Observer speed cannot have any influence on the display of a clock. Moving observer cannot change how a clock in a different frame ticks just as a runner cannot change a mountain. Speed of light has nothing to do with time unless a clock is designed based on a beam of light. Speed of light is just the speed of light, nothing more. Speed of light cannot limit the speed of other entities.

Mass of an object is the measure of its material content, which is observer independent. Special Relativity allows the mass of an object to be dependent on observers even though observers cannot change the mass of an object. The material content of an object is independent of the velocity of an object. If the mass of an object depends on the speed of an object, the mass will be directional since the speed is directional. If the time depends on the speed, the time will be directional since the speed is directional. Time and mass cannot be directional.

Special Relativity allowed the length along the direction of motion to contract while keeping the lateral dimension of a moving object constant. It is this constraint on the lateral dimension of a moving object that made the time and mass dilation a necessity in Special Relativity. If the Special Relativity had allowed the volume to contract instead of just the contraction of length along the direction of motion, it would have been possible to have a Relativity with absolute time and absolute mass, where time and mass remain unaltered relative to observer motion as it should be the case in reality. The mass of an object and time cannot be relative. Special Relativity and General Relativity that is based on the concepts of time dilation and mass dilation cannot be a valid theory of nature.

The consistency in speed of light does not require inconsistency in time and mass. If you allow the lateral dimensions of a moving object to contract in addition to the length contraction, then, the time and mass will be independent of observers. When the lateral dimensions are allowed to contract, the volume of a moving object will be contracted, and the volume will approach zero as the speed of the object approaches the speed of light, turning the object itself into a blackhole. In this case, it is the mass density of a moving object that changes with the speed, not the mass; $E \neq mc^2$. Mass and energy are not equivalent.

There is no energy without an association with a mass. Mass is not energy. Energy is not mass. Mass is conserved in a closed system. Energy is conserved in a closed system. Mass and energy are not equivalent. A moving object turning itself into a blackhole as the object reaches the speed of light is more realistic than the moving objects turning into pancakes in Special Relativity as the object approaches the speed of light.

In Special Relativity, time is relative, mass is relative, and the length is relative. However, if the lateral dimensions of a moving object are allowed to change, the only entity that is observer dependent is the volume of a moving object; the speed of light remains observer independent. Time dilation and mass dilation are not required to keep the speed of light independent of observers.

Nature can maintain the consistency of the speed of light without the help of Special Relativity and

General Relativity since light propagates on a constant track at a constant speed. The speed of any entity on a fixed path is observer independent. No Special Relativity and General Relativity are required [3]. Observers cannot derail a train. The speed of a train on its track is independent of observers.

Special Relativity is an extension of the Galileo-Newton Relativity and hence the problems associated with Galileo-Newton relativity have also been spilled into it. Galileo-Newton Relativity is incorrect since it derails a train by its blind vector addition approach to relativity. Special Relativity derailed a train just like the Galileo-Newton Relativity did. Observers cannot derail a train. No Special Relativity is required to keep the speed of propagation of light constant since light propagates at constant speed on a constant path.

Special Relativity claims that an object moves both in space and time. Special Relativity also claims that an object moving fast in space slows down in time. The problem is that there is no time axis. There is no flow of time. What we have is this moment, nothing beyond. Time is defined based on the motion of objects in space and as a result, time is not an orthogonal axis to space. Time lies in space itself as a definition. Time is not real. The motion of an object in space is real. There is no flow of time until we define a flow by designing a metronome. Objects do not move in time, it is the time that moves because we defined the flow of time. It is only that the motion of an object in space can also be represented as a motion in time as an alternative representation due to our definition of the flow of time based on a metronome.

Lemma:

In space, it is always the objects that run, never the space. In the case of time, it is always the time that runs, never the objects because we defined the flow of time.

An object cannot move both in space and in time, because time is a definition based on the motion of an object in space. The motion in space and the motion in time are alternative representations of the same motion, not separate motions. The motion of an object takes place in space. The motion of an object we can represent as it happens in space or as an alternative representation in time, which we have defined. The motion in space is not distinct from the motion in time; it is the same motion, different interpretations. Nature does not know if time exists. It is we who know time, because we define it using the distance that is real and the physical motion of an object in space that is real. What is primary is the (space, motion, mass) triplet. Electric charge is inclusive in the mass since there is no charge without mass and there is no mass without charge particles. Energy is inclusive in the mass since there is no energy without motion of masses. Energy is the kinetic energy of particles of mass. Potential energy is not energy until it is converted into energy in the presence of masses or charged masses. Mass is not energy. The motion of a mass is energy. There is no massless energy.

Waves propagate. Objects of mass move. Space can neither propagate nor can move. Experimental misinterpretations cannot make space move just as Einstein's proclamation cannot make time dilate. Space cannot expand or contract. Gravitationally bound galaxies cannot move with expanding space. Expanding space cannot change the wavelength of electromagnetic waves. Electromagnetic waves are not anchored to space. A wave with an anchorage cannot propagate. The redshift of a star in a galaxy cannot be attributed to the galaxy since not all the stars have the same redshift. The redshift of a star cannot be attributed to the Doppler effect [5].

The Doppler effect requires a homogeneous medium. Light from stars propagates in inhomogeneous media. The redshift of a star cannot be attributed to the Doppler effect. A galaxy does not have a redshift. Individual stars in a galaxy have different redshifts depending on the medium variations and the density gradients of the media the light from a star propagating on. The Doppler effect is an observer phenomenon. The Doppler effect is not a phenomenon of the wave. The Doppler effect cannot alter the wave. The Doppler effect is the eyes of the observer only. There is no approaching or receding siren without an observer. The galactic redshift cannot be attributed to expanding space [5]. Universe cannot expand or contract. It is only the matter that can expand or contract. Cosmology based on Special Relativity and General Relativity, and experimental misinterpretation of the expanding universe is invalid.

Every star is surrounded by a medium. Every planet is surrounded by a medium. A gravitational object is surrounded by a medium. A gravitational object creates a density gradient of the medium it surrounds. When light leaves a star, light propagates in the direction of a decreasing density gradient. An increasing density gradient redshifts the wavelength since the speed of light increases with the decreasing density gradient of the medium while the frequency remains unaltered. When light enters the earth, light propagates in the direction of an increasing density gradient. When light propagates in an increasing density gradient, speed of light decreases and as a result wavelength is blueshifted since frequency is unaltered. When the light from a star travels large distances, light also passes through different media in between on the way to earth.

The density gradient near a star is larger than the density gradient near the earth. If we disregard the in-between change of the medium, the net density gradient light passing through from the star to the earth is negative, and hence the light from a star has a red shifted wavelength; frequency is unaffected. If light happens to have passed through intermediate mediums that have strong positive density gradient, then on rare occasions, light might have a net positive density gradient on its path from the star to earth resulting in a blueshift of the wavelength. Stars in the same galaxy can have different redshifts and different blueshifts and hence a star redshift/blueshift cannot be attributed to the galaxy. There is no galactic redshift/blueshift.

Lemma:
The redshift of light from a star is due to the changes of the medium densities and the change of medium that light from a star has to pass through on its way to earth, not a Doppler effect. The redshift of a star in a galaxy cannot be attributed to the galaxy itself. There is no radial motion of galaxies. Universe is not expanding [5].

Special Relativity and General Relativity falsely assume that for the light to propagate at constant speed, light has to somehow zip up space and time. Light is not a zipper. No such zipping up is required for light to propagate at constant speed. The speed of light is just that, the speed of light, nothing more to it. For light to propagate at constant speed, light does not have to zip up space and time. Motion in time and motion is space are not two different processes. Nothing moves in time. Things move in space. We represent the same space motion as a motion in time. There is no orthogonal time axis. Time is not an axis. Time is defined in space using the motion of objects in space. Space and time are mutually independent.

There is no hem in space to zip up. There is no hem in time to zip up. There are no hems in space and time for a zip to cling on to. Time is not an axis. Nothing can move in time since time is not a dimension. We cannot move in time, it is always the time that runs, not us. What is fundamental is motion of objects. We use motion of objects to define time. We design metronomes to define a non-existing flow of time. Any entity can propagate at constant speed without bringing space and time into an unwanted union. Besides, there is no time to bring into a union with space. There is no unholy union of space and time in nature. Before talking about space and time, the question that begs an answer is: Can time be an axis?

We occupy space. We can travel in space in any direction; no direction is prohibited. And that should be the case for the space to be represented by 3D axes. For an entity to be an axis, that entity must be present and all the values of that entity must be accessible in both directions of an axis. We can measure the distance in space. We can only measure whatever that is there. We can measure the length using a standard length that we define. Length itself does not change with observer motion. However, the length of an object can change with its absolute motion, not with relative motion. The standard ruler that we use to measure the length can change with absolute motion, not with relative motion. Although the length is absolute motion dependent, the length is observer independent since the motion of an object on its track is observer independent. What is happening on the fixed track of a moving entity is independent of observers. The change of length of an object with absolute motion has nothing to do with speed of light. It is the length of the ruler, the length of an object, that can be dependent on the absolute speed of an object, not the length itself as an entity.

"It is the measuring instrument that is relative, not what is being measured."

Beside space, then, there are objects in space. An object can be quantified with its mass. Objects in space are not anchored to space. Propagating light bursts in space are not anchored to space. Expanding space cannot change the mutual distances between the gravitational bound objects and the wavelengths of waves. Space cannot expand. A mass of an object can be measured with a standard mass that we define. The quantity of matter does not change with the speed. The mass of an object is absolute. The mass must be observer independent. The mass of an object must be independent of its speed. If experimental evidence claims that mass varies with speed, then, it is the method used to measure the mass that is speed dependent, not the mass itself.

It is not possible to claim that the mass of an object is speed dependent by using a speed dependent method to measure a mass, The mass of an object must be speed independent. The claim in Special Relativity that a mass of an object is speed dependent cannot hold. The quantity of matter in an object cannot change with motion. You cannot create mass by dividing the energy by c^2. Energy has no existence in the absence of mass. Speed of light has nothing to do with the energy of a mass unless the mass is moving at the speed of light. A stationary mass cannot have speed c relative to light since light is not relative, and no mass can have a constant speed c from the start, and hence $E \neq mc^2$. Relative speed cannot exist relative to an entity that has no standstill existence. Light has no standstill existence and hence no mass can have relative speed c relative to light. A mass cannot be converted to energy since energy has no independent existence without the association of mass. Light has no energy. What light has is potential energy. Potential energy is not energy unless it is converted to energy by a mass or charged mass. Mass of an object is not relative. Mass is conserved.

It is the rearrangement of the constituents of atoms that generate energy, not a result of the loss of mass. There is no energy other than the kinetic energy of masses. What is there other than the kinetic energy is the potential energy. But, the potential energy is not energy until it is converted to kinetic energy of a mass. There is no massless energy. There is no independent entity called energy. Mass cannot be converted to energy and vice versa. Mass in a closed system is conserved, just as the energy in a closed system is conserved.

The speed of light is the speed of light, it has nothing to do with a mass or energy of a mass unless the mass is moving at the speed of light. A rest mass cannot have kinetic energy $E=mc^2$ since no mass can start at constant speed. No stationary mass can have a relative speed relative to light since light has no standstill existence. The mass is the measure of the quantity of matter of an object. The mass is the mass;

there is no inertial mass or acceleration mass. The mass of an object is observer independent.

Acceleration by definition is the rate of change of speed, $a=dv/dt$. Consider a mass m under the force F. Can we apply Newton's law of motion $F=ma$ for any mass m under force F? No, we cannot. The relationship $m=F/a$ is valid only for $a\neq0$, or in other words, when $dv/dt\neq0$ or $d^2x/dt^2\neq0$. The relationship $m=F/a$ does not apply for stationary objects. The acceleration cannot be non-zero unless the change of position is non-zero.

Lemma:

Newton's second law, $F=ma$, does not apply for stationary objects since there is no acceleration without the change of the position, where acceleration $a=d^2x/dt^2$.

Corollary:

Einstein's equivalence principle is false. Gravity and acceleration are not equivalent. An observer in a closed cabin can determine if the cabin is moving at constant speed, at an acceleration, or at standstill on a gravitational object using a beam of light since light is not relative.

The relationship $m=F/a$ applies only for moving objects, where $a\neq0$. If an object is stationary, there is no acceleration, $a=d^2x/dt^2=0$ and hence $m=F/a$ or $F=ma$ does not hold. There is no acceleration without the change of speed. There is no speed without the change of position. There is no acceleration without the change of position. For the application of $F=ma$, the change of position is necessary even though the change in position itself is not sufficient. For the application of $F=ma$, the change of speed of the object, or a non-zero acceleration is necessary and sufficient; a stationary object under gravity does not satisfy this condition.

Force is given by $F=ma$ only for a moving mass. For a stationary mass $F=ma$ does not apply since a stationary mass has no change of speed or an acceleration. Gravity is not an acceleration unless an object is moving under gravity. A stationary mass under gravity has a force, but it has no acceleration. Any entity with acceleration must have a change of position. An apple on a tree does not have an acceleration. It is only a falling apple that has an acceleration. If an object of mass m is at rest on earth, the gravitational force F on the object divided by the mass m of the object is not an acceleration since there is no acceleration without motion. The equation $F=ma$ or $m=F/a$ does not apply to a stationary mass on a gravitational object. Gravity and acceleration are not the same. Einstein's equivalence principle is incorrect. General Relativity is invalid.

Gravity has no effect on the massless. Gravity has no effect on light in a vacuum. The path of light relative to an observer in a stationary cabin on a gravitational object is not the same as the path of light relative to an observer inside a moving cabin under acceleration. A stationary cabin on a gravitational object can be distinguished from a moving cabin under acceleration using a beam of light. A horizontal light burst in a stationary cabin takes a straight horizontal path (or light burst shifts on a straight horizontal path) while a horizontal light burst shifts on a parabolic path in an accelerating cabin due to the accelerated motion of the cabin. If the cabin is moving at constant speed, a horizontal light burst shifts on an angular path, which is the same as the path of the light burst under acceleration when the acceleration is zero. The propagation direction of light within the save burst remains unchanged irrespective of whether the cabin is stationary, moving at constant speed, or accelerating. Light does not bend relative to observers. It is only that a burst of light as a whole shifts relative to observers [3]. Gravity is not acceleration; it is only that a gravitational force can accelerate mass that is free to move. For a stationary mass m on earth $F\neq ma$ or $m\neq F/a$.

Since gravity and acceleration are not the same, Einstein's equivalence principle does not hold. When the equivalence principle does not hold, General Relativity is invalid. General Relativity is also invalid since the spacetime function is not unique [4]. There cannot be a spacetime since time is an instant, a point, not an axis. There cannot be a warping of space in time since time is not an axis. Time is not a dimension. There is no fourth dimension.

What about time? Does time itself exist as an independent entity? No. Mass and space exist, but not the time. There is no independent entity called time. To measure an entity, it must be present. There is no entity called time that is present for us to measure. We cannot measure an entity that does not exist. If we are stuck in a basement, we have no idea what the time is. We cannot measure time. We cannot measure an entity that is not present. So, we have to first define time using a metronome. If we are stuck in a cave without a watch, we have no sense of time; that is because time does not exist as an observable entity in nature; in this situation, we only have the sense of passing time due to the ticking of the heart, a natural metronome. Mass exists as an observable entity; we can measure it. Charge exists as an observable entity. Space exists as an observable entity; we can travel in it. It is always we that travels, not the space. Time does not exist, and hence we cannot travel in time. It is always time that travels, not us. Because, time is a defined entity using the motion of objects in space.

What is there is just the present moment; a point, not an axis. For the time to be an axis, the past and the future must be accessible. The past and the future are not accessible. As a result, time cannot be an axis. Without time being an axis, there cannot be a so-called spacetime or a spacetime distortion. The concept of the distortion of space is meaningless. It is a material medium that can be distorted, not the space. It is a medium that is distorted by a gravitational object, not space. It is always another mass an object of mass can exert a force on, not the massless, not on space, not on light.

We design clocks to measure our definition of time.

The mechanism of a clock depends on the motion of the clock, both the speed and acceleration. Although the time itself is independent of speed and acceleration, the clocks we design to break down the time into smaller intervals depend on the environment the clock is in. Unless the clock is calibrated for the design specification, the display of a clock has no meaning. Any clock is working at the right speed when it is synchronized to the time, a year, one complete orbit of the earth. It does not matter at what speed a clock is moving or what gravity a clock is under, as long as the clock is synchronized to the time, a year, one complete orbit of the earth, clock is ticking at right speed.

The claim that the time itself depends on the frame of reference in Special Relativity has no meaning since there is no such entity called time in nature. Relative motion cannot make physical changes. It is only the absolute motion that makes physical changes. The motion of an object does not require an observer. The time it takes the earth to orbit the sun does not depend on observers. The length of the earth's orbit, the shape of the earth's orbit, and the earth's speed on its orbit does not change relative to observers. The time, a year, one complete orbit of the earth does not change relative to observers.

It is the orbit as a whole that shifts relative to a moving observer, not the motion of earth on its orbit. For a moving observer, what changes relative to the observer is the distance to the position of the moving object on its fixed path, not the speed and the direction of the object on its path or the path itself. It is always something fixed or unchanging associated with a moving object that changes relative to a moving observer just as a mountain moves relative to a runner.

The shift of the fixed path/orbit of a moving object relative to a moving observer does not change the path/orbit of the object. The path/orbit of a moving object remains unaltered by any shift of the path as a whole relative to an observer. It is the orbiting system that shifts relative to an observer. Observer motion cannot change the speed of an object on its path, the direction of the motion of the object on its path, the path that the object takes, the mass of the object, or time. Special Relativity and General Relativity are bad dreams, not science.

Einstein's celebrated mass energy relationship, $E=mc^2$, is meaningless since there is no energy as an independent entity. There is no energy without an association of a mass. If there is no mass, there will be no energy. There is no massless energy. Even though it appears that there is electromagnetic potential energy that has no association with a mass, the hidden fact is that there is no electromagnetic energy without mass. It is the mass that generates electromagnetic energy. There is no potential energy of any form without mass. There is no light without the objects of mass. Potential energy is not energy until it is converted to kinetic energy of a mass.

A mass cannot be converted to energy since energy has no existence without mass. Mass must be conserved. Object can release electromagnetic potential energy if the internal structure of an atom has changed. The change of the internal structure of an atom releases electromagnetic potential energy, but the release of electromagnetic potential energy has no effect on the mass. The mass of an object remains unaltered with the release of electromagnetic potential energy. A mass of an object can only change if a part of its mass has broken away.

The mass of the sun is changing not as a result of electromagnetic potential energy it is emitting, but because of the particles of mass it is losing. Similarly, the masses of planets are changing due to the particles of mass they are losing into space. Any particle of mass with sufficient kinetic energy can leave an object. With the change of the mass of the planets and the sun, their orbits readjust adaptively. Planetary orbits are adaptive. Planetary systems are adaptive systems. Planets do not have fixed orbits. Planets orbits change with the change of mass. The loss of mass of a planet results in an orbit contraction. The stability of a planetary system is not maintained by an invisible hand as suggested by Newton. Orbits are adaptive and self regulatory.

The galaxies themselves are orbiting systems. No object or collection of objects can have an independent existence in space without being a part of an orbiting system. Galaxies are gravitationally bound. Gravitationally bound galaxies cannot move with expanding space even if there is such a thing called expanding space. Space cannot expand. There is no energy without matter. There is no massless energy since energy is the kinetic energy. The redshift of a star in a galaxy cannot be attributed to the galaxy itself since each star has a different redshift. The redshift is a wavelength shift not a frequency shift. The redshift of a star is not a Doppler effect. The redshift is a result of the net negative density gradient of the medium from the star to earth. Universe cannot expand. Expansion of space cannot generate a redshift. Expansion of space cannot change the wavelength of a wave. Expansion of space cannot change the distance between gravitationally bound objects and clusters of objects such as galaxies. Universe is not expanding. Space cannot expand. Space is unaffected by objects and the energy of the objects.

Special Relativity and General Relativity are not the only reality-defying invalid theories. When it comes to reality-defying, Quantum Mechanics go even beyond Special Relativity and General Relativity. Quantum Mechanics is supported by misinterpretation of experiments. To observe the fallacy of Quantum Mechanics, all you have to do is look at its foundation.

Quantum Mechanics started with the claim that the energy is quantized and an energy quantum is given by $E=hf$. The problem is that if the energy is quantized and an energy quantum is given by $E=hf$, the energy of a continuous spectrum is infinite. The energy of a spectrum cannot be infinite. Quantum Mechanics null and void in its foundation. One has to be both mathematically and theoretically blind to consider

Quantum Mechanics science.

The concept of energy quanta E=hf is an assumption in the Planck Spectrum. For the energy quantum E=hf to hold, the Planck spectrum must be cavity independent. The Planck spectrum is cavity dependent [1]. The cavity dependent spectrum cannot be the spectrum of a blackbody. The assumption E=hf has no validity when the Planck spectrum is cavity dependent. Frequency has no energy. The relationship E=hf is simply meaningless.

Quantum Mechanics represents observables by operators based on the strange unexplainable ad hoc assumption that particles behave as waves. Particles cannot behave as waves. Particles are not waves. Waves are not particles. If observables are represented by operators, the operators must have unique eigenspaces for Quantum Mechanics to be a valid theory. Quantum Mechanics defines the position operator as the position itself and as a result the eigenspace of the position operator is not unique. In addition, the position operator is in contradiction with the momentum operator. The position operator, which is defined as position itself, cannot coexist with the momentum operator, which is defined as the derivative with respect to the position. When the position operator cannot be the position itself, Quantum Mechanics ceases to exist.

When Quantum Mechanics is fundamentally wrong in its foundation, we can ignore the rest of Quantum Mechanics as useless. Particles cannot be waves, waves cannot be particles, a mass cannot be multiple places simultaneously. Experiments have used every possible misinterpretation of experimental results to justify Quantum Mechanics. No real experiment can justify Quantum Mechanics without misinterpretation since it is a false theory in its foundation.

When the eigenspace of the position operator is not unique, the position and momentum are not a Fourier Transform pair and the Heisenberg Uncertainty principle is invalid. When the position operator is position itself, the eigenspace of the momentum operator is also an eigenspace of the position operator and hence position and momentum are simultaneously measurable.

Quantum Mechanics is an invalid theory born out of mathematical and theoretical blindness. The reason why Quantum Mechanics is still here is that physicists are paid to do Quantum Mechanics. Physicists are paid to show Quantum Mechanics is valid experimentally. There is no other reason. If your job is to do Quantum Mechanics, you will lose the job if you question it. That is how the system works. Nobody will pay you to find what is wrong with Quantum Mechanics. Otherwise, why in the world, would one go on claiming a particle of mass can be in multiple places simultaneously? People who claim a particle can be in multiple places simultaneously and the universe is expanding are people who are paid to make those claims. Nobody with any sanity would claim a particle can be in multiple places simultaneously unless he/she personally benefits from that claim. Nobody with any sanity would claim the universe is expanding unless he/she personally benefits from that claim. Nobody with any sanity would claim that the angular momentum is quantized unless he/she personally benefits from that claim. People are ready to make any outlandish claim irrespective of whether it is true or not if the person could benefit from that claim; that is exactly why/how lies perpetuate.

Angular momentum is a vector. Vectors cannot be quantized. Quantum without a header is pure nonsense. Non-reality in Quantum Mechanics is plenty. There is no point discussing the non-reality one by one since Quantum Mechanics is a mathematical and theoretical blunder and a deliberate experimental fraud in its foundation. Quantum Mechanics, Special Relativity, and General Relativity are fundamentally wrong and must be thrown away, they are not fixer uppers.

In the Double-Slit experiment with a beam of electrons, all the electrons are stopped at the double-slit barrier. This stopping of the electrons at the double-slit barrier generates electromagnetic waves that pass through the two slits and interfere, generating an interference pattern on the screen. The interfering pattern on the screen of the Double-Slit experiment is not a result of electrons behaving as waves. No electron can pass through the double-slit barrier since the slits are at an offset to the direction of the beam. It is a misinterpretation of the Double-Slit experiment in physics that led to the bizarre concept of particle waves. There are no particle waves [1].

XXIV. **REFLECTIONS**

In Quantum Mechanics, the assumption of a particle behaving as a wave is unrealistic, meaningless, hypothetical, unexplainable, and beyond the imagination; the same goes for the assumption that the light is particles or photons. Einstein's photon derivation is based on false assumptions. Particles cannot propagate. Propagating waves cannot be particles. Light cannot come in quanta without each quantum having a proper mechanism to assemble themselves together to form one coherent whole; light quanta carries no such information. Electromagnetic wave bursts that are released as a result of electrons changing energy levels are not particles. Light bursts have no momentum. Potential energy of a light burst is given by the amplitude, not by frequency. E=hf has no meaning for a moving mass as well as for light. Vectors cannot come in quanta. Angular momentum cannot come in quanta. Orbits cannot be quantized. Neil Bohr's atomic model that requires for an electron to disappear from one orbit and reappear in another orbit in order to change the orbits or energy levels is magic, not science. Houdini-acts are not science. Nothing in the universe can come in quanta since there is no mechanism in nature to carry the belonging information. Quanta without belonging information to assemble into one unique whole is useless.

Under the unrealistic hypothetical assumption that a particle behaves as a wave, Quantum Mechanics properly defines the momentum operator as the partial derivative with respect to the position, $\mathbf{P}=-j\hbar\partial/\partial x$. If a moving particle of mass m is assumed to behave as a wave, the definition of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ in Quantum Mechanics is in agreement with the so-called particle wave obtained by substituting $f=E_p/h$ and $\lambda=h/p$ in the plane wave,

$\phi(x,p,E_p,t)=A\ \exp((j/\hbar)px)\exp((-j/\hbar)E_pt)$,

where E_p is the kinetic energy of the particle and p is the momentum of the particle.

However, the definition of the position operator $\mathbf{X}$ as the position itself, $\mathbf{X}=x\mathbf{I}$ is quite arbitrary and stands as a direct contradiction to the properly defined momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$. The definition of the position operator $\mathbf{X}$ as the position itself, $\mathbf{X}=x\mathbf{I}$ is also a direct contradiction to the principle assumption in Quantum Mechanics that a moving particle behaves as a wave $\phi(x,p,E_p,t)=A\ \exp((j/\hbar)px)\exp((-j/\hbar)E_pt)$.

It is strange to assume a particle behaves as a wave when there is no clue to what is waving in a particle. How can a propagating wave be anchored to a particle? A wave that is anchored to a particle is not a wave; it cannot propagate. Propagating wave cannot describe a probability since by definition probability distribution cannot propagate. If the position and momentum are probabilistic they cannot be continuous and cannot represent a wave and vice versa. If the position and the momentum of a particle behave as a wave, the position and the momentum cannot be probabilistic. If the position and momentum are probabilistic, a particle cannot behave as a wave. If the position and momentum of a moving particle behave as a wave, the position and the momentum must be deterministic.

Propagating wave is subjected to attenuation and distortion. Nature has no mechanism to normalize. Probability distribution only exists on our notebooks, not in nature. There is no probability in the absence of humans who invented it in the last few centuries. Probability was invented, not discovered. There is nothing probabilistic about the position and the momentum of a particle. There is nothing probabilistic in Quantum Mechanics. Quantum Mechanics is a deterministic theory. Probability has been artificially and blindly injected into it. Probability has been injected to Quantum Mechanics as an intentional misinterpretation in order to save it, not as a reality. There is nothing probabilistic about the position and momentum. There is nothing probabilistic in the eigenspace representation of operators. There is nothing probabilistic in the Stern-Gerlach experiment [2]. Nature does not make decisions by flipping coins or throwing dice.

Lemma:

If position x and momentum p of a particle are probabilistic, the particle cannot behave as a wave. For a particle to behave as a wave, the position x and the momentum p of the particle must be continuous and deterministic.

Lemma:

If the momentum operator is $\mathbf{P}=-j\hbar\partial/\partial x$ and the position operator is $\mathbf{X}=x\mathbf{I}$, then, a particle cannot behave as a wave. If a particle cannot behave as a wave, then the momentum operator cannot be given by $\mathbf{P}=-j\hbar\partial/\partial x$.

Corollary:

If the position x and the momentum p of a particle are probabilistic, the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is not defined. The position x must be continuous for the momentum operator to be $\mathbf{P}=-j\hbar\partial/\partial x$.

Quantum Mechanics incorrectly and improperly defines the position operator as the position itself, which is a necessary evil since there is no Quantum Mechanics without this invalid definition of the position operator as the position itself $\mathbf{X}=x\mathbf{I}$. If a moving particle is assumed to behave as a wave, the position operator cannot be the position itself, $\mathbf{X}\neq x\mathbf{I}$. If the momentum operator is defined as $\mathbf{P}=-j\hbar\partial/\partial x$, the position operator cannot be the position itself, $\mathbf{X}\neq x\mathbf{I}$. If the position is probabilistic, the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is not defined, momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ cannot exist.

The position operator must agree with the momentum operator as well as the core assumption that a particle behaves as a wave. The main problem with the position operator is that it does not agree with the momentum operator and the particle wave assumption. If the position and momentum behave as a wave, $\phi(x,p,E_p,t)=A\ \exp((j/\hbar)px)\exp((-j/\hbar)E_pt)$, position operator is determined by the momentum operator and the momentum operator is defined by the position operator; they must be mutually mirror-symmetric. If a particle is assumed to behave as a wave, both position operator $\mathbf{X}$ and the momentum operator $\mathbf{P}$ must stem from the plane wave equation,

$\phi(x,p,E_p,t)=A\ \exp((j/\hbar)px)\exp((-j/\hbar)E_pt)$ itself.

The position operator cannot be the position itself, $\mathbf{X}\neq x\mathbf{I}$. It is this invalid and illogical definition of the position operator as the position itself that made the position and momentum operators non-commutative. So, the non-commutativity of the operators in QM is a direct result of the invalid choice of position operator $\mathbf{X}$ as $\mathbf{X}=x\mathbf{I}$. Non-commutation of the operators in QM is not a result of a natural consequence. In QM, non-commutation of the operators has nothing to do with the actual behavior of microscopic particles. If a particle is assumed to behave as a wave, the legitimate operators commute.

The indeterministic probabilistic behavior of microscopic particles that has been much talked about in QM is not a fact of matter; it is a fake behavior that has been imposed upon on particles by the invalid choice of the position operator as the position itself in QM. There is neither the Quantum Mechanics nor the Heisenberg Uncertainty Principle without the invalid definition of the position operator as the position itself.

If the position and momentum of a particle is assumed to behave as a wave, the position operator $\mathbf{X}$ must be given by $\mathbf{X}=-j\hbar\partial/\partial p$ that agrees with the momentum operator **P**=-jħ∂/∂x. Although the position and momentum operators in QM do not commute due to the invalid choice of the position operator as the position itself **X**=x**I**, the legitimate position and momentum operators commute, [**XP**-**PX**]=**0**, with the proper choice of the position operator **X** as **X**=-jħ∂/∂p. When position and momentum operators commute, there is no Heisenberg Uncertainty Principle or Quantum Mechanics.

An unforeseen consequence of this invalid and contradictory definition of the position operator as the position itself, **X**=x**I**, is that the eigenspace of the position operator **X**=x**I** is not unique. For Quantum Mechanics to hold, each operator of the observables must have a unique eigenspace. When the eigenspace of any of the operators is not unique, the whole foundation of Quantum Mechanics collapses. The Heisenberg Uncertainty Principle requires the eigenspace of the position operator to be unique and given by the delta function. There cannot be a Heisenberg Uncertainty Principle unless the eigenspace of the position operator is unique and given by the delta function. Position and momentum are not a Fourier Transform pair since the eigenspace of the position operator is not unique.

When the position operator is position itself, the eigenspace of any Hermitian operator is also an eigenspace of the position operator. As a result, the eigenspace of the momentum operator is also an eigenspace of the position operator. Even though the position and the momentum operators do not commute when the position operator is the position itself, the position and momentum operators have a shared eigenspace. The eigenspace of any Hermitian non-trivial operator is also an eigenspace of the position operator **X**=x**I**. The eigenspace of the momentum operator is also an eigenspace of the position operator **X**=x**I**. The momentum eigenspace is the eigenspace shared by the both momentum operator **P**=-jħ∂/∂x and the position operator **X**=x**I**. When the position and momentum operators have a shared eigenspace, the position and momentum are simultaneously measurable.

Property:

When the position operator is position itself **X**=x**I**, the eigenspace of the momentum operator **P**=-jħ∂/∂x is also an eigenspace of the position operator. The position and momentum operators in QM have a shared eigenspace.

For the position and momentum to be a Fourier Transform pair, the eigenspace of the position operator must be unique and given by the delta function, in addition to the necessary requirement that the position and the momentum must be mutually independent. The eigenspace of the position operator is not unique, and the delta function is one of the many equally valid eigenspaces of the position operator. As a result, the position and momentum are not a Fourier Transform pair even under the false assumption that the position and momentum are mutually independent. When the position and momentum are not a Fourier Transform pair, there is no Heisenberg Uncertainty Principle. The position and momentum are simultaneously measurable to any achievable precision without any precision tradeoff.

Lemma:

Eigenspace of the position operator **X**=x**I** is not unique. The eigenspace of any Hermitian operator is also an eigenspace of the position operator **X**=x**I**.

Commutation of two operators is sufficient for the simultaneous measurability of the observables but not necessary if either one of the two operators is the observable itself. Even though the position and momentum operators are non-commutative, the position and the momentum are simultaneously measurable since the eigenspace of the momentum operator is also a valid eigenspace of the position operator since the position operator is defined as the position itself in Quantum Mechanics.

Wave function is the coordinates or the projections of the state of a particle given by the Hamiltonian onto the eigen-axes represented by the eigenvectors of the operator of an observable. As a result, the value of the observable is given by the Euclidean distance, which is the square root of the sum of square coordinates. The value of the observable is in fact the normalization factor of the wavefunction that is discarded in Quantum Mechanics as useless. There is no probability involved in eigenspace or eigen-axes representation of the state of a particle.

An eigenvalue of an operator is simply the value of an observable only if the state of a particle overlaps the corresponding eigenvector, nothing more. Eigenvalues of an observable say nothing about an observable if the state of a particle does not coincide with an eigenvector. Eigenvalues are not unique and are useless for estimating observables. Eigenvalues say nothing about the observable of a particle if the state of the particle does not coincide with any of the eigenvectors.

It is only the eigenspace of a non-trivial Hermitian operator that is unique, and hence can be used as a coordinate system for representing the state of a particle in the domain of the observable. However, the state of a particle cannot be represented in the domain of the position operator if the position operator is defined as position itself since the eigenspace of the position operator is not unique. In the case of the position operator, eigenvalues as well as eigenspace are not unique. An operator defined as the observable itself is a trivial operator, and a trivial operator has no unique eigenspace. Trivial operators cannot belong in QM where the position and the momentum are assumed to behave as a wave.

A wavefunction in the domain of an observable is the sequence of projections of the state of a particle (given by the Hamiltonian) on the orthonormal eigen-axes given by the eigenfunctions/eigenvectors of the operator of the observable arranged in some order, where the order of the arrangement of the projections or the coordinates is not important; that is exactly where the problem lies. We can reshuffle the coordinates or projections anyway we like without affecting the representation of the state of the particle. As a result, the shape of the wavefunction in Quantum Mechanics is not unique. A wavefunction that is not unique is not a wave, and it cannot propagate. A wavefunction that is not unique cannot represent a probability distribution.

If a particle is assumed to behave as a wave, the position and the momentum must have equal status in every aspect in the plane wave equation. The position and the momentum must be interchangeable without affecting the plane wave equation. Neither the position nor the momentum should be given special status. Both the position and the momentum operators must agree with the plane wave equation. Neither the position alone nor the momentum alone can be an independent operator in the wave equation. Both the position and the momentum must be mutually independent. As such, the position operator cannot be treated as an independent operator and define it to be the position itself.

If the position operator is defined as the position itself, it will be a direct contradiction to the momentum operator and also a direct contradiction to the assumption that a particle behaves as a wave. Partial derivative of the eigenfunction of the momentum operator with respect to momentum clearly demonstrates this contradiction. Partial derivative of the eigenfunction of the momentum operator clearly indicates that the position operator should be $\mathbf{X}=-j\hbar\partial/\partial p$, $\mathbf{X}\neq x\mathbf{I}$.

The position operator and momentum operator must be complementary to each other, not contrary. The position and momentum operators must be mirror complementary. If the momentum operator is properly defined as the partial derivative with respect to the position in agreement with the plane wave equation, the proper position operator must also be defined as the partial derivative with respect to the momentum that agrees with both the momentum operator as well as the assumption that a particle behaves as a wave. Properly defined position and momentum operators commute $[\mathbf{XP}-\mathbf{PX}]=\mathbf{0}$.

When the position operator is properly defined as the partial derivative with respect to the momentum $\mathbf{X}=-j\hbar\partial/\partial p$, and the momentum operator is properly defined as the partial derivative with respect to the position $\mathbf{P}=-j\hbar\partial/\partial x$, the position and the momentum operators are mirror complementary. Position and momentum operators will have a shared eigenspace. Position and momentum operators will commute. Position and momentum will be simultaneously measurable without any precision tradeoff.

When the position operator is properly defined as the partial derivative with respect to momentum $\mathbf{X}=-j\hbar\partial/\partial p$ in accordance with the assumption that a moving particle behaves as a wave, the position and momentum are not a Fourier Transform pair and hence there is no Hisenberg Uncertainty Principle; Quantum Mechanics itself ceases to exist. Even when the position operator is incorrectly defined as the position itself, the position and momentum cannot be a Fourier Transform pair since the eigenspace of the position operator given by the delta function is not unique. For the position and momentum pair to be a Fourier Transform pair eigenspace of the position operator must be unique and given by the delta function, and also position and momentum must be mutually independent; none of these holds true.

The eigenvalues are useless for estimating the observables since eigenvalues are not unique. It is only the eigenspace of a nontrivial Hermitian operator that is unique.

Once it is assumed that a particle behaves as a wave, all the operators of a particle, the position operator, the momentum operator, and the kinetic energy operator, are all fixed and predetermined by the plane wave equation for a particle. We have no freedom to pick and choose operators as we wish. We have no freedom to define operators. All the operators are predetermined by the plane wave equation for a particle. All the operators have a shared eigenspace, which is the plane wave equation for a particle, and are simultaneously measurable to any achievable precision without any precision tradeoff.

The eigenvalues of the Hermitian operator of an observable represent the observable does not mean that the observable can only take those eigenvalues; it only means that the state of an observable can be represented uniquely by the orthonormal eigen-axes given by the corresponding eigenvalues. Eigenvalues are only useful for obtaining eigenvectors/eigen-axes that represent a unique eigenspace in the domain of the observable, nothing more.

Eigenvalues are useless for determining the observables. Eigenvalues are not unique. It is only the eigenspace that is unique and hence it is only the eigenspace that is useful for the representation of the state of a particle and the estimation of the observables or parameters.

Orthonormal eigen-axes representation is simply an alternative representation to the orthonormal $\mathbf{x}$, $\mathbf{y}$, $\mathbf{z}$ axes in 3D representation. It is no different from orthonormal 3D representation. In 3D representation, a particle at any given position $\mathbf{r}=(x,y,z)$ with non-zero coordinate is not in any of the axes; not on $\mathbf{x}$ axis, not on $\mathbf{y}$ axis, not on $\mathbf{z}$ axis; not on $\mathbf{x}$, $\mathbf{y}$, and $\mathbf{z}$ axes simultaneously. Particle is at the position given by the coordinates $\mathbf{r}=(x,y,z)$. It is meaningless to claim that the particle is on all three axes $\mathbf{x}$, $\mathbf{y}$, and $\mathbf{z}$ simultaneously, and the probability of finding the particle on the $\mathbf{x}$ axis is x, the probability of finding the particle on the $\mathbf{y}$ axis is y, and the probability of finding the particle on the $\mathbf{z}$ axis is z. Probability has nothing to do with coordinates in an orthogonal representation. A particle is not on any of the axes unless the state lies on an axis.

Similarly, in eigenspace or eigen-axes representation, a particle at any given state is not on the eigen-axes simultaneously. In fact, a particle is not on any of the axes unless the state of the particle overlaps with any of the eigen-axis. The representation of the state of a particle in the eigenspace of the domain of an observable is simply an alternative orthonormal coordinate system, nothing more. It has to be treated that way since it is the reality.

When a particle is in a 3D coordinate system, we don't say (and we cannot say) that the particle is on **x**, **y**, and **z** axes simultaneously; the particle is at the unique position denoted by the coordinates (x,y,z); particle is not on **x** axis, not on **y** axis, not on **z** axis, and not on **x**, **y**, and **z** axes simultaneously; and it is the same with eigenspace representation. The particle is at position **r**=(x,y,z). The position of a particle exists without our coordinate representation of it.

When a particle is at position (x,y,z), that does not mean that the particle is at x on **x** axis, y on y axis, z on z axis simultaneously. The claim that the particle is at positions x on **x** axis, position y on **y** axis, and position z on **z** axis simultaneously in an orthogonal axis representation voodoo-science, not science. Anybody who makes such a claim is tarnishing science and should not belong in a university or in a science lab. No mass can be at multiple places simultaneously. It is the misinterpretation of the double-slit experiment that has given such a false concept that a particle can be in many places simultaneously, a mysterious voodoo concept that has no place in science.

The eigenspace representation of the position and momentum of a particle is one of many orthonormal axis representations. The same particle can be represented in 3D. The behavior of a particle must be independent of its orthonormal representation of it. A particle cannot behave differently in one orthonormal representation from any other orthonormal representation. The behavior of a particle cannot change with its orthonormal representation. A particle cannot behave probabilistically in one orthonormal representation and deterministically in another orthonormal representation. Behavior of a particle must be independent of its orthonormal representations.

Property:

The existence of a particle in space does not depend on our orthogonal coordinate representation of it. Our eigenaxis representation of a particle in space cannot make a particle to simultaneously be present on all the eigen-axes.

Corollary:

The behavior of a particle is not determined by our orthonormal coordinate representation of it.

The spin of a particle is not an abstract concept. The spin is the direction of the magnetic field of a spinning charge. The state of a spin cannot be two dimensional since spin cannot exist in 2D. A particle can spin in a 2D plane only in 3D space. The Up or Down spin is not a state of the spin itself. Up and Down are observer perceptions. Up or Down only exist relative to an observer. Up and Down are not orthogonal. Up and Down are just the opposite of each other that exist relative to an observer. There is no Up without Down and vice versa. Spin itself has no Up or Down. Spin Up for one observer can be spin Down for another observer. Up and Down are not states of a particle.

Two-dimensional Pauli matrices have no existence; they are hypothetical and do not represent the state of a spin. The state of a spin must be 3D. The state of the spin of a free-moving particle is always the direction of the environmental magnetic field it is in since the spin always aligns with the external magnetic field. If there are two particles, their spins are magnetically coupled and hence their spins are in opposite directions; either one can be Up or Down.

There is no probability involved with the spin of a particle. Probability is a human invention. Nature does not use probability. It is the misinterpretation of Stern-Gerlach experiment that has led to the mysterious 2D orthogonal vector representation of the state of a spin based on the Pauli matrices. Three-dimensional spin cannot be represented by two-dimensional states, impossible. There are no two-dimensional spin states.

Lemma:

Up and Down are not an inherent property of a spin. Up and Down are observer perceptions. A particle observed as spin Up by one observer can be observed as spin Down by another observer.

Spin of a particle can neither be measured nor set by using an external magnetic field. The setting of a spin using an external magnetic field is volatile. Entanglement is simply the magnetic coupling. Two locally entangled particles separated by distance cannot communicate. It is the use of the same direction of the magnetic field in the Stern-Gerlach device as a spin measuring device at both locations of the particles that gives the false impression that they are communicating their coupling.

There is no spooky action at distance between magnetically coupled or entangled particles. When two magnetically coupled or entangled particles are separated, there is no communication between them. We get the false impression of communication between particles due to the use of the same direction of the magnetic field in the measuring device (Stern-Gerlach device). What particles are interacting is not with each other but the same direction of the magnetic field of the measuring device.

It is the same direction of the Stern-Gerlach magnetic field, the measuring device, that carries the information from one particle to the other distant particle, not some inherent mysterious voodoo communication between them that physicists claim.

Wave function of a particle is single, and a single wave cannot propagate. Propagation requires a conjugate pair. Wave function cannot carry information from one particle to another since wave function cannot propagate. A wave function of an entangled spin cannot communicate the spin information from one particle to another distant particle since no wave function can propagate. There is not a single wave that propagates. Wave Propagation requires conjugate partners. Wavefunction of a particle does not have a conjugate partner. It is the spin measuring device (the same direction of the magnetic field used in measuring the spins in both places) that carry the information from one entangled particle to another distant particle. There is no voodoo communication taking place between separated entangled particles.

The separated entangled particles have no means of communication with each other except through the permanent magnetic field of the spin measuring device (Stern-Gerlach). The same direction of the magnetic field of the Stern-Gerlach device is used to measure the spin of a particle at both locations. When two entangled particles are separated, both spins individually react to the same direction of the magnetic field of the spin measuring device in exactly the same manner as they did when they were close together or when they were made entangled. If one is Up the other will be Down when the same direction of the magnetic field of the stern-Gerlach device is used at both locations irrespective of the separating distance. There is no mystery here. There is no hidden communication here. There are no hidden variables here. There is no wave function propagation here. There is no information transfer here. It is the magnetic field of the spin measuring device that forces the particles to retain the coupling or entanglement, not some mysterious distant communication or a voodoo act.

The Planck spectrum is cavity dependent. The Planck spectrum is not a spectrum since it is cavity dependent. The Planck spectrum for a cubic cavity is not the same as the Planck spectrum for a spherical cavity; the only thing that is the same is the frequency function. Although the correct frequency function is necessary for a spectrum to be the correct spectrum, it is not sufficient, the multiplication factor must also be the same. The multiplication factor of the Planck spectrum for a cubic cavity is not the same as the multiplication factor for a spherical cavity.

When the Planck spectrum is incorrect, its assumption of quantized energy no longer holds, $E \neq hf$. Blackbody spectrum has nothing to do with a cavity and hence the blackbody spectrum must be cavity independent. The Quantum energy assumption is not necessary for the derivation of the blackbody spectrum. The derivation of the blackbody spectra is incorrect. The observed spectrum through a hole is continuous and hence the blackbody spectrum cannot be obtained by counting the discrete harmonic modes in a blackbody cavity. The derivation of the Planck spectrum is incorrect [1].

If an energy quantum is given by $E=hf$, where h is a universal constant, then the energy depends on just the frequency itself. This is meaningless since there is no frequency without an amplitude. However, there can be an amplitude without a frequency. Frequency has no energy. There can be energy without a frequency. Gravitational potential energy has no frequency. A moving mass at constant speed has kinetic energy, but it has no frequency. It is the amplitude that determines the electromagnetic potential energy of electromagnetic waves, not the frequency. There is no energy without amplitude.

There is no energy without a mass. Light has no temperature. Light has no energy. Light has energy potential. It is in the presence of electrons or charge particles that the potential energy of light can be converted to kinetic energy, the energy. Energy means the kinetic energy. Potential energy is not energy until it is converted into kinetic energy. There is no independent entity called energy. There is no massless energy.

Electromagnetic potential energy must depend on the amplitude. If the electromagnetic potential energy is quantized as $E=hf$, then the amplitude must be quantized. If the amplitude is quantized, amplitude variation cannot be continuous. If the amplitude variation cannot be continuous, there will be no waves; waves cannot exist. There are no waves without continuous amplitude variations. If the electromagnetic potential energy comes in quanta, electromagnetic waves cannot propagate; electromagnetic waves cannot exist. There cannot be waves without continuous amplitudes. Any entity with a belonging cannot come in quanta. If the amplitude is quantized, a field, which is a vector, has no existence since vectors cannot come in quanta. If a vector is quantized, the quantum must have a header to carry the belonging information. Nothing in nature can come in quanta since there is no mechanism in nature for a quantum to carry the belonging information. If any entity comes in quanta, each quantum must contain a mechanism to carry identity information without which quanta have no existence. Quanta in physics have no existence. Quanta in physics have no mechanism to carry the belonging information for assembling quanta into a coherent whole.

If light consists of photons or light quanta $E=hf$, the amplitude of light will be dependent on the frequency. Amplitude of light cannot be determined by frequency since frequency has no existence without amplitude. Light has no existence if light consists of photons or light quanta $E=hf$. Light cannot come in photons or light quanta $E=hf$. Waves are not particles. Particles are not waves. Wave-particle duality is meaningless. There is no wave-particle duality. Speed of light is the speed of light. Speed of light has no effect on other matters. The speed of light cannot limit the motion of other objects. The speed of light cannot govern the mass of an object. Mass of an object is not relative. Speed of light cannot govern the energy of an object of mass. Energy of a mass has nothing to do with the speed of light unless the mass is moving at speed of light. There is nothing that can prevent a mass moving at the speed of light. Einstein derailed the light relative to observers in Special Relativity. It is this derailing of light relative to observers in Special Relativity that drove physics into a mysterious abyss.

Observers cannot derail light. Observers cannot derail trains. Observers cannot deorbit planets.

The energy quantum $E=hf$ cannot hold true. Besides, if the energy quantum is $E=hf$, how long do we have to wait for to get that energy, one cycle, two cycles, or infinitely many cycles? The energy quantum $E=hf$ is meaningless; frequency has no energy. It is only that the electromagnetic potential energy can be converted to energy (kinetic energy), which is a function of frequency, in the presence of electrons or charge particles.

If electromagnetic potential energy comes in quanta, the energy of the spectrum of a wave with even a narrowest band will be infinite since the electromagnetic spectrum is continuous. When the spectrum is continuous, between any two frequencies, there are infinite frequencies. If the energy is quantized, the electromagnetic spectrum cannot be continuous and vice versa. If the energy is quantized as $E=hf$, the variation of the amplitude is not continuous and hence waves cannot exist. There is no wave if the amplitude is quantized.

When an electron moves from a higher energy level to a lower energy level, it releases an electromagnetic wave burst of potential energy E, which is the difference between the energy levels, at an associated frequency f. An electromagnetic wave burst has potential energy E at the source, and this potential energy E at an associated frequency f is source independent at the source. The amplitude of a wave burst emitted by a source is source independent. Light emitted by the sun and a supernova have the same amplitude at an associated frequency f since the light emitting mechanism is source independent. It is the rate of wave bursts that varies from source to source, not the amplitude. The intrinsic intensity or brightness of a source is the rate of light burst emitted by the source and it depends on the source. The rate of light bursts released by the sun (intrinsic brightness of the sun) is different from the rate of light bursts released by a supernova (the intrinsic brightness of a supernova) although they both have the same amplitude at a given frequency. Wavebursts released from a source are not anchored to a source and hence they can propagate.

The propagation of a wave burst is subjected to path energy loss. In the presence of charge particles, this propagating wave burst oscillates a charge particle at the frequency f of the wave burst generating kinetic energy. It is this generated kinetic energy of a charge particle by a wave burst of frequency f that is a function of frequency f. This kinetic energy is not just a function of the frequency f of the wave burst, it is also a function of the amplitude of the wave burst and the mass of the charge particle too. If there had not been any incurred path energy loss by the wave burst, the generated kinetic energy by the wave burst in the presence of a charged particle, on the charged particle, is the same as the energy E, which is the energy difference due to the change of electron energy level from a higher level to a lower level that caused the release of the wave burst. Light cannot propagate without energy loss. The attenuation of a wave burst along the path results in the loss of potential energy.

There is no independent autonomous entity called energy. Energy is the kinetic energy of particles of mass. Energy has no existence without mass. There is no temperature without mass, and hence there is no entropy without mass. The energy is not quantized. If the electromagnetic potential energy is quantized, electromagnetic radiation is not possible since the amplitude of a wave cannot be continuous. Propagating wave cannot have a discrete amplitude. The potential energy quantum $E=hf$ cannot exist without amplitude and hence energy cannot come in quanta determined by frequency alone.

Energy cannot be quantized since the potential energy comes in different varieties and not all the energies are associated with a frequency; potential energy has no associated frequency. The energy due to direct current (DC) has no associated frequency. In fact direct current has infinite discrete frequencies and hence the energy associated with it will be infinite if energy comes in energy quanta $E=hf$. If energy comes in energy quanta $E=hf$, there is no wave to distinguish energy due to n energy quanta $n(hf)$ from the energy of one energy quantum of frequency nf or $h(nf)$ although $n(hf)$ and $h(nf)$ are distinct.

Any entity with a belonging cannot come in quanta since nature has no mechanism to carry the belonging information in a quantum. Nothing in nature can come in quanta unless each quantum comes with a header providing the information on how to assemble the quanta into one whole entity. The amplitude of a field cannot come in quanta. A field cannot come in quanta. A vector cannot come in quanta.

Energy cannot come in quanta. There cannot be an energy quantum without a header to carry belonging information. If energy comes in quanta, there is no way to determine which quantum belongs to which. Quantum Mechanics with headerless quanta is simply meaningless. Vectors cannot come in quanta. Vectors cannot be quantized. Nothing can be quantized unless there is a mechanism to assemble the quanta into one unique whole; nature has no such mechanism. Data quanta on the internet can achieve that since each data quantum carries a header packed with belonging information.

Light has no momentum, no temperature, no kinetic energy. What light has is potential energy; potential energy is not energy until it is converted into kinetic energy of particles of mass. It is only that light can generate momentum on a charged particle. Light can generate energy and hence an entropy only in the presence of charged particles. Light is useless without matter. There is no light without matter.

Light does not propagate relative to moving frames. Newton laws apply only for masses in motion; they do not apply for the massless. Maxwell equations apply only for propagation of electromagnetic waves; they do not apply for the motion of masses or for the motion of wave-bursts. Newton laws and Maxwell equations cannot be unified. Maxwell equations do not apply for single fields or single waves. Maxwell equations apply only for a conjugate pair of waves, for electromagnetic waves.

Microwaves do not have a temperature. The Cosmic Microwave Background (CMB) Temperature is simply an oxymoron. If there is a temperature at any point in space, it is an indication that the space is not empty of matter. If microwaves are detected at any point in space that has a temperature, that microwave is a result of the oscillating charge particles at that point in space.

Cosmic Microwave Background is not some remnant from a hypothetical bigbang. CMB maps only indicate the concentration of particles of mass at any point in space at present. Cosmic Electromagnetic Background (CEB) frequency maps are not limited to microwave frequencies. You can produce Cosmic Electromagnetic Background (CEB) frequency maps for any frequency range. The frequency of electromagnetic waves generated by vibrating particles at any point is determined by the temperature at that point and vice versa. The Cosmic Electromagnetic Background (CEB) maps will be different for different frequency bands. Such maps say nothing about the origin of the universe. Such maps say nothing about the origin of the universe, and say nothing about a hypothetical big-bang. Those maps only indicate the present concentration of matter in space that we cannot directly observe. CMB is useful for understanding the dispersed matter in space that is invisible to us.

The snow on an off-tuned old television set is not some remnant from a bigbang. The shameless claim that the snow on an off-tuned television is remnant from the bigbang is simply preposterous. No wave can propagate without energy loss. Amplitude of light is subjected to attenuation that depends on the medium. Light cannot propagate without energy loss. Light has a range or a maximum distance that light can propagate without energy being dissipated to undetectable levels. Light cannot keep propagating forever in the presence of a medium without a loss of energy. The interaction of light with a medium leads not only to attenuation, but also to a frequency down-shift. The maximum distance light can propagate without being frequency down-shifted below the visible range is the visible universe. The visible universe is a moving horizon.

The Lorentz transform is hypothetical and not unique. Space-time function and relative time are not unique. Maxwell equations cannot be transformed onto a moving frame uniquely. Light does not have to propagate relative to inertial frames in order for the speed of the propagation of light to remain constant. The speed of light is naturally observer independent since light propagates at constant speed in a constant direction on a fixed track that is independent of observers.

The velocity of light is a constant determined by the medium. The speed of light is observer independent since the velocity of light is constant. There is no time. We define time. We design clocks to display the time we defined. Clocks do not determine time, a year, one complete orbit of the earth. Clocks are engineered to break down the time, a year, into smaller intervals. A fast or slow running clock cannot alter the time, a year. A clock has no meaning for a cave-man. There is space. We can travel in space. We occupy the space. We can measure it since it is there. There is motion. We can run. We can measure motion since it is there. We use the motion in space to define time. We cannot travel in time. Future does not exist. Past does not exist. Without motion, there would be no time. What we have is the universe at this instant, motion at this instant. We do not have a stack of ourselves or the universe for every instant. We do not have our past-selves or future-selves. What we have is our present-selves. Moment passed is passed, never to see it again.

Time is a human definition. Time is an instant, not a dimension. There is no fourth dimension. Just because we can draw an arrow on our notebooks and mark it as time does not bring time to existence in reality. The past does not exist. Past exists in human memory. We cannot travel to the past since it does not exist. Future does not exist. We cannot visit the future. Time exists because we define it using a metronorm of our choice. Since there is no access to the past time or the future time, time cannot be an axis. Equations are symmetric in time does not mean we can make time negative in an equation and go back in time. Time is a definition. Time does not exist and hence you can travel neither forward in time nor blackboard in time. You are stuck in the present. It is always the time that travels once it is defined.

Time cannot be a fourth dimension. Without time being an axis, spacetime cannot exist as four dimensional space (4D). Time does not qualify as a dimension since nothing in time except a single point, the present, is accessible. There cannot be a warping of space. The warping of space that is referred to in Relativity is simply the density variation of the medium in the presence of a compact gravitational object. Space does not depend on time and time does not depend on space. Space and time are mutually independent.

Gravity cannot change the time, a definition. It is only that gravity can have an effect on clocks, the devices that are engineered to break down the time, year. Any mass is affected by gravity. A clock as a chunk of mass is affected by gravity. The mechanism of a clock is affected by the gravitational force. The display of a clock is affected by gravity. The display of a clock is not time unless the clock is in an environment that the clock is designed to operate, or the clock has met design specifications. Gravity can only have an influence on a mass, nothing else. Gravity has no effect on light in a vacuum. Gravity has no effect on time itself. Gravity has no effect on massless entities. Time has nothing to do with the speed of light unless the mechanism of the clock is based on the travel time of a beam of light.

The claim in physics that a mass warps space and the amount of warping is determined by the mass alone of an object is incorrect. If the space is warped in the presence of an object of mass, the amount of warp by a mass m of an object with larger volume V cannot be the same as the amount of warp by the same mass m of an object with a smaller volume v. The claim that the warping of space is determined by the mass of an object is incorrect. The fact is that a mass cannot exert a force on massless. Space cannot be warped by an object of mass. A mass has no gravity, no force. Only the matter (mass) can be warped by another mass. A mass cannot make a dent on a plane in space. A mass cannot make a dent on a trampoline. If the space is warpable, it is the volume of an object that should determine the warp, not the mass since it is the volume that occupies the space, not the mass. The mass of an object can warp the medium that surrounds the object, generating a density gradient of the medium. Space is not warpable.

The claim in physics that a mass tells space how to warp and warped space tells the mass how to move is catchy, but meaningless and incorrect. If there is an entity that can be warped by an object of mass, then, the amount of warp is determined by the mass density of the object, not by the mass itself. It is a medium that is warped by the mass density of an object of mass, not the space itself. Space cannot be altered. Space does not move. Space does not expand or contract. Space cannot accelerate. (Space, Mass, Motion, Propagation) quadlet is the primary constituent of the universe. Time is secondary, a defined variable. You cannot FedEx space; Einstein's 1952 claim of moving space within the space is meaningless. A moving empty box does not move space; it moves within space.

Both the speed of propagation of light and the path of propagation are constants in the vacuum, and they are affected by a medium. Einstein derailed the light in order to force the speed of light relative to an observer unaltered in Special Relativity. Both the speed of light and the path of light are naturally observer independent since they are determined by the medium. It is the velocity of light that is a constant, not just the speed of light. Any entity that is determined by the properties of a medium is observer independent. The speed and direction of a train on its fixed track is observer independent. It is the track that moves relative to an observer, not the train itself. Observers cannot derail trains [3]. Galileo-Newton relativity is incorrect. In Galileo-Newton relativity, relative speed is obtained by vector addition. You cannot determine the relative velocity by vector addition unless the observer motion is parallel to the motion of the object. If you determine the relative velocity by the addition of velocities, then, the moving vehicles will end up in ditches and trains will derail. Moving vehicles do not end up in ditches relative to observers. Trains do not derail relative to observers.

Both the speed of light and the direction of light are observer independent. The speed of any entity on its fixed track is observer independent. It is the path that shifts relative to the observer motion while the speed of motion and the direction of motion on its track remain unaltered. It is the track and the moving object on the track as a single entity that is observer dependent. It is the motion of light bursts that depends on an observer, not the propagation of light. Motion of light is a vector; it is that vector that shifts relative to observer motion. The shift of the velocity of the light vector relative to an observer does not change the speed of light on its constant path. It is the track of light that moves relative to an observer, not the light itself [3].

The propagation of light on its fixed path at a fixed speed is independent of an observer just as the speed of a train on its track is independent of an observer. You cannot derail a train by running away from it. It is the track that shifts relative to observer motion, not the train. The speed of the train and the direction of the train remain unaltered relative to observer motion. No special relativity is required for maintaining the speed of light constant. Speed of light remains unaltered relative to moving observers. However, the speed of a wave burst is relative since the wave burst includes the path that shifts relative to an observer.

The speed of an object of mass has nothing to do with light, and is not limited by the speed of light. The energy of a mass has nothing to do with the speed of light unless the mass is traveling at the speed of light. A field cannot give the massless a mass. A single field cannot exist without a source. A single field cannot propagate. Massless cannot give a mass to massless. A field itself has no energy; What consists of a field is potential energy. A field can only generate energy in the presence of masses or charged masses.

A single wave or a single field cannot propagate. A distortion cannot be created in a single field. It is only in a conjugate pair of fields that a distortion can be generated. Propagation requires a pair of conjugate fields or a pair of conjugate waves. A single wave or a field cannot propagate. Wave function of a particle is single. A single wave function cannot propagate. The eigenfunction of the momentum operator is single, and hence cannot propagate. Eigenfunction of the Hamiltonian is single, and hence it cannot propagate. The falsely assumed particle wave is single and cannot propage.

A static field can neither be particles nor be able to propagate since it is anchored to a source. A wave that is anchored to a source cannot propagate. Gravitational field is single. Gravitational field has no conjugate partner. The Higgs field is single. The Higgs field has no conjugate partner. And hence the Higgs field and the gravitational field can neither be disturbed nor be able to propagate. Since gravitons and Higgs Bosons are defined as the disturbances in their respective single fields, both gravitons and Higgs bosons have no existence. A field that has no conjugate partner can neither be disturbed nor able to propagate. There are no single-field particles or single-field-a-tons such as gravitons or Higgs bosons. Fields are not particles.

A gravitational field is single and cannot be disturbed, and hence gravitons cannot exist. It is not just the Higgs bosons that cannot exist, the Higgs field itself cannot exist. A single field cannot exist without being anchored to a source. The Higgs field is single and sourceless. There is no Higgs source. The Higgs field itself cannot exist since the Higgs field is sourceless. A particle wave and a wave particle are oxymorons. There is no wave-particle duality. There is not a single field or a single wave that propagates. Propagation requires a conjugate pair of waves.

Special Relativity claims that there is no absolute frame of reference, yet in hindsight Special Relativity is based on an absolute frame. Einstein took light as the absolute frame and claimed that any stationary object of mass m has speed c relative to light. It is this choice of light as the absolute frame that gives a stationary mass a relative kinetic energy $E=mc^2$. It is this choice of light as the absolute frame that limits the maximum speed of an object to speed of light c. Einstein made the false assumption that light is relative in Special Relativity.

Light has no standstill existence and hence light cannot be considered as a reference frame. When light cannot be considered as a reference frame, stationary mass does not have speed c relative to light, and hence an object of mass m does not have a rest kinetic energy, $E\neq mc^2$. Further, no mass can move at constant speed from the start. Light is not relative. Maxwell equations for light cannot be transformed onto an inertial frame uniquely [4]. Light does not propagate relative to moving frames. Objects do not move relative to light.

The claim that an object has rest kinetic energy $E=mc^2$ is meaningless. Stationary mass does not have kinetic energy. The energy of a mass m is not determined by $E=mc^2$ unless the mass m is moving at speed c from the start, which is not possible, $E\neq mc^2$. The mass m of an object is not relative and hence $E\neq m'c^2$, $m'\neq\gamma m$. The mass of an object does not depend on its speed, $m'=m$. No mass can travel at constant speed from the start. Mass cannot be converted to energy since energy has no existence without a mass. Mass must be conserved.

Space cannot be quantized; there are no space quanta. Space is quantized, what holds the space quanta? Light is not particles. Electromagnetic field is a vector; vectors cannot come in quanta. If light comes in quanta of energy $E=hf$, then the energy of even a narrowest band of a spectrum will be infinite. Energy of a wave cannot be infinite and hence light cannot come in quanta $E=hf$. If light comes in energy quanta $E=hf$, the amplitude must be determined by the frequency, which is impossible since frequency has no existence without amplitude. Light has no existence if light comes in photons or light quanta $E=hf$.

Einstein's photon derivation is incorrect since light has no temperature. A mass is not a wave. A wave has no mass. A massless field cannot give a mass to massless; a field has no effect on mass-less. It is only that a field can give a momentum to a mass or a charged mass. A single field can neither be disturbed nor can propagate.

Relativity does not apply to waves that propagate at fixed speed on a fixed track that can only be altered by a medium. Relativity only applies to static fields that are anchored to a source. Relativity does not apply to light since light is not anchored to a source. Relativity does not apply to propagating waves, where the speed of propagation and the direction of propagation are determined by a medium. The Higgs field and the gravitational field are single fields. A single field has no existence without a source. A sourceless Higgs field cannot exist. Single fields such as the Higgs field and the gravitational field cannot be disturbed. The Higgs field and gravitational field cannot propagate. There are no gravitons or Higgs bosons. There are no gravitational waves. What the Laser Interferometer Gravitational-Wave Observatory (LIGO) is measuring is not gravitational waves. What the LIGO is measuring is something that pretends to be gravitational waves. The LIGO is pure deception.

Frequency has no existence without an amplitude. As a result, the energy cannot depend solely on frequency itself. Frequency of a wave has no energy. It is the vibration of a mass at a frequency that has energy. It is the shift of an electron from higher energy level to a lower energy level in an atom that releases an electromagnetic wave burst of frequency f. The energy must be a function of amplitude. Since frequency of a wave has no energy, the energy quantum $E=hf$ simply meaningless; such energy quanta have no existence even hypothetically.

Energy cannot be quantized. Any entity with a belonging cannot come in quanta. Energy always exists in association with a mass. Quantum mechanics is pseudoscience. Quantum Mechanics is an artificial human construct that has been unjustifiably justified solely by experimental misinterpretations. Modern Physics founded upon the misinterpretations of the Double-Slit experiment, Stern-Gerlach experiment, Anderson cloud chamber experiment, Compton experiment, and Lenard's photoelectric experiment is voodoo-physics, not real.

For an energy quantum to be given by $E=hf$, where h is a universal constant and f is the frequency, there must be a sole existence of frequency by itself. But, frequency has no existence without an amplitude, and hence the energy cannot be solely dependent on frequency f as given in the energy quantum $E=hf$. Energy must depend on the amplitude since frequency has no existence without amplitude.

Electromagnetic spectrum cannot be continuous if $E=hf$. If $E=hf$, the energy of the electromagnetic spectrum for even a narrowest band will be infinite. The photons or light particles of energy $E=hf$ are meaningless. Light cannot come in energy quanta $E=hf$. Particles cannot propagate. Light comes in wave bursts. The Planck spectrum is not a spectrum since it depends on the geometry of a blackbody cavity, and hence energy quantum $E=hf$ has no existence. Energy cannot come in quanta. If energy comes in quanta $E=hf$, the only place the energy can be finite is inside a cavity; this is the reason why they couldn't leave a cavity. If $E=hf$, the energy of a continuous spectrum is unbounded.

Light is not a zipper. An entity propagating at constant speed c means just that; it is traveling c distance units at a given time unit. There is nothing more to it. For light to travel at constant speed c, light does not have to zip up two hems, space hem and time hem, together. Light is not anchored to space. There is nothing in space or in time that light can hold onto and bring them together to make a single entity called spacetime. Neither the space nor the time has hems to zip up.

You can zip up material, not the non-material. Space is non-material. Time is a definition, non-material. Any entity can travel at constant speed c without disturbing neither space nor the time. Any entity can travel at constant speed c without disturbing neither space nor the time. Existence of space is independent of matter; the existence of matter sparsely as objects or lumps of masses of various sizes is a good indication of that. If space cannot exist without mass, the mass would not have come in lumps spreaded sparsely in space. Space can exist without mass, and the existence of a vacuum is a good indication of that. However, mass has no existence without space. Waves have no existence without space. Neither a mass nor a wave is anchored to space; that is why waves and objects of mass are free to move in space.

Lemma:

Light does not have to bring space and time into an unholy union called spacetime for light to travel at constant speed c. Union of space and time into a single entity, spacetime, is not possible since time does not exist. There is space. There is the motion and propagation. There is no entity called time until we define time using motion or propagation. There is no unified entity called spacetime. Space and time are independent.

Space is there, we can measure it, we can move in space, we can describe it by 3D coordinate system. Time is not an axis. There is nothing called time until we define it using a metronome. In a 3D coordinate system x, y, z axes are called axes for a reason; they satisfy certain conditions. For a line to be an axis, we have to be able to access all the points on the axis. In x, y, z axes, all the points on an axis exist. we have access to all the points.

Anybody can draw a line on paper, mark an arrow at the end of the line, and label it as the time axis, but that line is not an axis, because we have no access to all the points in that line in reality except just one point, the present moment. Time is not an axis. Neither the past nor the future is accessible. What is present is the space at present, not spacetime. What is primary are distance, mass, and motion. We use motion and distance to define time. But once we have defined the time, we use it as a primary variable and forget that no time exists until we define time, and that is the mistake in Special Relativity. Time is not relative. The time, a year, one complete orbit of the earth does not depend on the observers. Special Relativity and General Relativity are false.

When the general public refer to space-time they mean space and time as separate entities. There is the space we occupy. Then there is time on clocks. One revolution of earth on its axis is a day. One orbit of earth around the sun is a year. Time on a clock has to fit with the day and the year; if it does not, the clock is incorrect and hence we change the battery on the clock or buy a new clock. Nothing beyond it. However, when physicists refer to spacetime, they mean space time function in Lorentz Transform $t'=\gamma(t-xv/c^2)$, where $\gamma=1/\mathrm{sqrt}(1-v^2/c^2)$. They make the meaningless claim that time is relative. Time cannot be relative. If time is relative, time will be directional. For this spacetime to exist, the spacetime function must be unique. Spacetime function is not unique [4]. Spacetime as a single entity cannot exist. Observers cannot derail light and hence the Lorentz factor $\gamma=1/\mathrm{sqrt}(1-v^2/c^2)$ cannot exist. Einstein derailed the light relative to observers. Observers cannot derail light. Cars do not end up in ditches relative to observers. Trains do not go off the track relative to observers. Any entity on a fixed path is observer independent.

The concept of relative time and spacetime function, as well as the concept of spacetime stem from the Lorentz-Einstein transformation. For relative time to exist, for spacetime to exist, for the concept of spacetime to hold, the Lorentz-Einstein transformation must be unique. The Lorentz-Einstein transformation is not unique [4]. There are infinitely many equally valid relative times, spacetime functions for a given inertial frame. Spacetime is not unique. Spacetime cannot exist. Relative time is not unique. Relative time is directional. Relative time cannot exist. Time cannot be relative. There is no spacetime.

Special Relativity and General Relativity cannot hold true. Light cannot zip up space and time. You cannot zip up non-material. You cannot zip-up nothing; space is nothing and time is nothing. There is nothing to be mended or to be disturbed neither in space nor in the time, in the non-material. Matter bends; space does not bend. Time does not expand or contract. Time is not elastic. Space is not elastic. Only the matter can be elastic. Gravitationally bound objects such as galaxies cannot move with the expanding universe. Wavelength of a wave cannot increase with the expanding universe. Space does not expand. The redshift of a star in a galaxy cannot be attributed to the galaxy since not all the stars in the galaxy have the same redshift. Different stars in the same galaxy have different redshifts. The redshift of a star is not the Doppler effect. The Doppler effect requires a homogeneous medium; light from a star propagates in an inhomogeneous medium. The redshift of light from a star is a result of the medium density gradient [5].

Time is a definition; definition does not bend. There is no warping of space or time. If an object creates a warping, it must be a material medium that is being warped, not the space. In the presence of a medium, a gravitational object generates a density gradient in a material medium. It is this density gradient in a material medium that refracts light near a gravitational object.

Gravity cannot alter the path of light in a vacuum. The use of the refraction of light near a gravitational object in the presence of a medium to justify General Relativity is self serving, not scientific. If one wants to justify General Relativity, one has to show that a gravitational object bends light in a vacuum, in the absence of a medium; this cannot be done, it won't happen. Special Relativity and General Relativity are false in their foundation.

Light does not have to zip up space and time to propagate at constant speed. Speed of light has nothing to do with clocks and time unless we use light pulses to define time, to design clocks. Speed of light is just the speed of light, nothing more. For light to travel at constant speed, light does not have to make time relative, does not have to make space and time to join, does not have to make length to contract, does not have to make twins on different inertial frames to age differently. Light does not have to zip up space and time that have no hems to propagate at constant speed. There is no spacetime. Special Relativity and General Relativity are designed to run on a manufactured time, on the average return time, not on ordinary one-way time. There must be a time accountant to calculate the average return time for Special Relativity and General Relativity to work; nature has no such accountant. Relative time is directional. Time must be non-directional. As a result, time cannot be relative [4].

Special Relativity defines simultaneity how we see an event. If Simultaneity is defined based on our vision, it has no meaning for people with visual impairments. Scientific definitions must be free of discrimination towards the visually impaired. Einstein's definition simultaneity has no meaning for the visually impaired. Visually impaired would define the simultaneity by sound, which is equally acceptable. Scientific definition must be independent of human sensory experience.

Light has nothing to do with simultaneity. The definition of simultaneity must be the same irrespective of any disability of an observer. You do not need the vision to determine simultaneity. The simultaneity must be independent of any vision impairment of an observer. Simultaneity of events must be independent of observers. You do not need a beam of light to define simultaneity.

The time, a year, is independent of observers. The clocks that are designed to break the time down to smaller intervals must be independent of observers. If the clock is not synchronized with the time, a year, or a day, then the clock must be synchronized. If you want to know if two events are simultaneous, all you have to do is to record the time of each event. Anybody can compare times of occurrences of events to find out if they had been simultaneous and this is independent of physical impairment of an observer. Simultaneity is not limited for the people with eyesight, simultaneity is present for the visually impaired too. Light has nothing to do with simultaneity.

Scientific definition is not just for the people with vision, scientific definition must also be meaningful for the visually impaired. The definition should not be based on how we see or hear. Scientific definitions must be independent of the sensory perceptions of an observer. Simultaneity of events should not depend on observers. Simultaneity is determined by the time of occurrence of the events. The definition of simultaneity in Special Relativity has no meaning for a visually impaired observer.

The claim in physics that the age of a person depends on the speed the person is traveling is simply ridiculous and false. We do not grow old by the clock. If we grow old by the clock, our age will be determined by the engineers who designed the clocks. The speed of clocks cannot determine how fast or slow we age. Clocks do not determine time. A ruler does not determine the space. A ruler breaks down the space into smaller divisions. A measuring instrument does not determine what is being measured. Clocks are engineered to break down the time, a day or a year, into smaller intervals. Clocks do not determine the day or the year. The day or the year determines the speed of clocks. We cannot alter the day or the year by running or taking a space flight. A person taking a space flight ages at the same rate as his twin sister on earth. There is no twin paradox. Time, the day or year, is not relative. If your clock does not represent the day or the year in the environment you are in, then, you have to readjust the clock to represent the day or the year. The time, the day or the year, does not vary with the observer speed. Time is not relative. The speed of light has nothing to do withs time unless the mechanism of the clock is based on the propagation of light. Propagation of light is not relative [4].

You cannot change the speed and the direction of a train on its track by running. The speed and the direction (the velocity) of a train is independent of the observer motion. It is the train track that moves relative to moving observers, not the train on its track. It is the path of light that moves relative to observers, not the speed of light and the direction of light. The velocity of light is independent of moving observers [3,4,5]. Light is not relative. Galileo-Newton relativity is incorrect. Simple vector addition cannot be used to obtain the relative speed. If the simple vector addition is used to determine the relative velocities, the cars will end up in ditches relative to observers. Cars do not go off the road relative to observers. Trains do not derail relative to observers. Observers cannot bend light. It is the path that is relative, not what is moving on the path [3,5].

XXV. WHAT WENT WRONG WITH THE QUANTUM MECHANICS, EINSTEIN'S RELATIVITY, AND THE MODERN PHYSICS IN GENERAL

"Modern Physics is pseudoscience falsely justified by pseudo experiments. Physicists have failed to realize that for the same reason why the emperor failed to realize he/she has no clothes."

1. Propagation of light is not relative. The motion of a light burst or a light beam is relative. What we see is the motion of light bursts or light beams, not the propagation of waves. A burst of light or a beam of light as a whole shifts relative to the motion of an observer while the direction of light and the speed of light on its fixed path remains unaltered [3]. The speed and the direction of the propagation light within the beam (on the fixed path or the track) is unaffected relative to the observer motion. It is the track as a whole that moves relative to observer motion, not what is moving or propagating on the track [3].
2. Motion of a mass has nothing to do with the speed of light.
3. Speed of light is the speed of light. Nothing more to it. Speed of light does not dictate the motion of objects of mass.
4. Speed of light does not determine the time. Speed of light does not determine simultaneity. Simultaneity has nothing to do with light, and it is not determined by the propagation of light.
5. The display of a clock depends on the speed of light if and only if the mechanism of the clock is based on the travel time of a light beam. Otherwise, clocks have nothing to do with the speed of light.
6. None of the clock designs is based on the travel time of a beam of light and hence clocks do not depend on the speed of light.
7. The time, a day or a year is independent of clocks and the speed of light.
8. Energy of a mass has nothing to do with the speed of light unless the mass is moving at the speed of light.
9. A mass is not relative. Time is not relative.
10. Clocks do not determine the time, a year, or a day. The time, a year, or a day is independent of observer motion.
11. A single wave cannot propagate. A wavefunction is single. A wave function cannot propagate.
12. The wave that a particle is assumed to behave as is single. These assumed particle waves cannot propagate. De Broglie waves cannot propagate. Propagation requires a conjugate pair. A de Broglie wave does not have a conjugate partner.
13. A particle cannot move from one position to another without passing through all the positions in between. A particle cannot disappear from one place and appear in another place. The Bohr model of the atom is magic, not science.
14. The Bohr model of the atom is based on Houdinification.
15. The eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is not unique.
16. The position operator $\mathbf{X}=x\mathbf{I}$ and the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ are contradictory. They cannot coexist.
17. If the wavefunction is defined as the projection of the state of a particle on the eigenspace of the operator of an observable, the wavefunction is not unique since the reshuffled projections also represent a valid wavefunction.
18. The wavefunction in the position domain is also not unique since the eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$ is not unique.
19. When the eigenspace of the position operator is not unique, the observable position is not unique. An observable must be unique and hence the position operator cannot be the position itself.
20. QM has no existence when the position operator cannot be the position itself.
21. Eigenspace of the momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ is also an eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$.
22. An eigenvalue represents the observable if and only if the state of the particle overlaps on the corresponding eigenvector.
23. When the state of a particle does not overlap with any of the eigenvectors of the observable, eigenvalues are useless and do not represent the observable.
24. The observable is given by the Euclidean norm of the coordinates or the projections of the state of the particle on the eigenspace of the observable, not by the eigenvalues.
25. A particle is not on any of the eigenvectors of an observable. A particle is at the position given by the projections or the coordinates in the eigenspace of the observable. Eigenspace representation is no different from the 3D representation.
26. Position operator $\mathbf{X}=x\mathbf{I}$ and momentum operator $\mathbf{P}=-j\hbar\partial/\partial x$ have a shared eigenspace and hence position and momentum are simultaneously measurable.
27. When the eigenspace of the position operator is not unique, the delta function is not the only eigenspace of the position operator, and hence the position and momentum cannot be a Fourier Transform pair. When the position and momentum cannot be a Fourier Transform pair, there is no Heisenberg Uncertainty.
28. Heisenberg Uncertainty cannot hold unless the eigenspace of the position operator is unique and given by the delta function $\delta(x)$.
29. Without the delta function being the unique eigenspace of the position operator $\mathbf{X}=x\mathbf{I}$, there would be no Heisenberg Uncertainty.
30. The Heisenberg Uncertainty Principle is utter nonsense, not science.
31. There is no precision tradeoff between the measurement of the position and momentum. Position and momentum can be measured simultaneously to any achievable precision.
32. If the momentum operator is $\mathbf{P}=-j\hbar\partial/\partial x$, then, the position operator cannot be the position itself, $\mathbf{X}\neq x\mathbf{I}$.
33. If a particle is assumed to behave as a wave, the position operator cannot be the position itself, $\mathbf{X}\neq x\mathbf{I}$.
34. Commutation of the position and momentum

operators is sufficient for position and momentum operators to have a shared eigenspace, but not necessary.

35. When the position operator is position itself **X**=x**I**, position and momentum have a shared eigenspace even though they do not commute.
36. If a particle is assumed to behave as a wave, the position operator must be given by **X**=-jħ∂/∂p while the momentum operator is given by **P**=-jħ∂/∂x. These are the operators that directly come from the particle wave assumption.
37. Proper position and momentum operators **X**=-jħ∂/∂p and **P**=-jħ∂/∂x commute.
38. If the position and momentum are probabilistic, a particle cannot be assumed to behave as a wave.
39. If a particle is assumed to behave as a wave, the position and momentum cannot be probabilistic.
40. Frequency has no energy, $E \neq hf$.
41. Frequency has no existence without amplitude and hence the energy cannot be given by frequency, $E \neq hf$.
42. Light cannot come in quanta.
43. If light comes in quanta given by $E=hf$, the energy of even a narrow band spectrum will be infinite.
44. Light has no energy.
45. What light has is electromagnetic potential energy. Potential energy is not energy until it is converted to energy by charge particles.
46. There is no independent entity called energy. Energy has no independent existence. There is no energy without mass.
47. Mass is not energy. Mass cannot be converted to energy, $E \neq mc^2$. Mass is conserved.
48. Energy of a mass has nothing to do with the speed of light unless the mass is moving at the speed of light, in which case the energy of the mass m is $E=(1/2)mc^2$.
49. The term energy is referred to the kinetic energy of a mass. Energy has no existence without a mass. There is no massless energy. If there are no particles of mass in the universe, there will be no temperature.
50. It does not matter how much light is projected to a vacuum, there will be no temperature in the vacuum.
51. Observed temperature of a few degrees Kelvin in space is not a result of the Cosmic Microwave Background (CMB) since electromagnetic waves have no temperature. This temperature is a result of the motion of the charge particles sparsely present in space. The CMB is the radiation due to the motion of the charge particles, not a remnant of a bigbang nonsense.
52. CMB maps provide the concentration of the charge particles in space, nothing more. The claim that the CMB is the remnant from the bigbang is simply preposterous. The people who make that claim must be stripped of the license to practice.
53. The Doppler effect is not applicable to CMB.
54. The Doppler effect is not a physical phenomenon. The Doppler effect is just an observer phenomenon available for the observer's eyes and ears only.
55. The frequency and the wavelength measured in the Doppler effect is not the actual frequency and wavelength of the wave. The motion of a source cannot change the frequency and the wavelength of the wave. The motion of an observer cannot change the frequency and wavelength of the wave. The Doppler effect requires the speed of light to be unaltered and hence the medium to be homogeneous.
56. The Doppler effect is not applicable to the light from the stars since light from the stars propagates in an inhomogeneous medium. The redshift or blueshift of a star in a galaxy cannot be attributed to the Doppler effect. The redshift of a star in a galaxy cannot be attributed to the galaxy itself.
57. The Doppler effect is only applicable for short distances where the medium can be assumed to be homogeneous.
58. Light is not relative. Light does not propagate relative to inertial frames. Light propagates in space.
59. A mass has no speed c relative to light, $E \neq mc^2$. No mass can have speed c relative to light.
60. Light is not relative. Light has no standstill existence and hence a stationary mass cannot have speed c relative to light.
61. For an entity to be relative that entity must be stoppable. Light cannot be stopped since light has no existence without propagating.
62. The massless cannot be relative. The massless has no momentum. Light has no mass. Light has no momentum, $p \neq E/c$.
63. $E \neq mc^2$, $E \neq hf$, $p \neq E/c$, $\lambda \neq h/p$.
64. The mass of an object is not relative. The time, a day, a year, is not relative.
65. Clocks do not determine the time, a day, a year.
66. No one gets old by the clock.
67. It is not just the speed of light that is observer independent, the direction of light is also observer independent.
68. It is the velocity of light that is observer independent.
69. Any entity moving on a fixed path is observer independent. Observers cannot derail light. Einstein derailed the light in Special Relativity.
70. The time, a year, is not relative. Clocks do not determine the time. Clocks are engineered to break down the time, a day, into smaller intervals, hours, minutes, and seconds. The day is not determined by clocks. The day or the year is independent of the speed of the clocks.
71. We do not age by the clocks we have designed. Age of a person is not determined by the clocks we engineer. Age of a person does not depend on the speed he/she is traveling.
72. Special Relativity, General Relativity, Quantum Mechanics, Particle waves, Photons, Energy

quanta, Warped spacetime, Bigbang cosmology, Heisenberg Uncertainty, and Modern Physics in general are hilarious jokes, an insult to human intelligence and to science.

73. Speed of light is naturally observer independent since light travels at constant speed on a fixed path that can only be altered by the change of the medium. No Special Relativity or General Relativity is required. Special Relativity and General Relativity are invalid.
74. Since light is not relative, the de Broglie wavelength $\lambda=h/p$ is meaningless. Particles are not waves. Waves are not particles. Particles cannot behave as waves. A wave that is anchored to a particle cannot propagate.
75. The claim that a mass bends space is meaningless. A mass cannot bend space. Space is not bendable or warpable.
76. If the space is warpable, it is the volume of an object that warps the space, not the mass. It is the volume of an object that occupies the space, not the mass of an object. The claim in Special Relativity that the mass warps space is meaningless.
77. Space cannot be warped. Space cannot expand or contract. It is the medium that expands or contracts. It is the medium surrounding an object that is warped by the mass of an object.
78. Gravity has no effect on the massless. Gravity cannot bend light. It is the density gradient of the medium surrounding a gravitational object that bends light. Gravity has no direct effect on light, the massless.
79. A mass has no gravity. Gravity exists between masses. Gravity is an interaction between masses.
80. Gravity is not acceleration. There is no acceleration without motion.
81. The redshift of light from a distant star in a galaxy cannot be attributed to the galaxy since the different stars in the same galaxy have different redshifts.
82. Stars in the same galaxy can have different redshifts as well as different blueshifts [5].
83. The redshift of a star cannot be attributed to a doppler shift. Dopplershift is only for the eyes of an observer. The motion of an observer or/and the source cannot change the actual wavelength and the frequency of light.
84. The redshift of light from a star is a wavelength redshift. The frequency is unaltered.
85. The redshift is the wavelength redshift, and it is a result of the density gradient of the medium on its path from the star to the observer on earth; frequency is unaffected.
86. The Doppler effect requires a homogeneous medium and hence does not apply for light from the stars. The Doppler shift is for the observer's eyes and ears only. The Doppler shift is not real. There is no approaching or receding source without an observer [5].
87. Galaxies do not have a radial velocity. Expanding space cannot change the mutual distance between the gravitationally bound galaxies.
88. Universe is not expanding.
89. Objects are not anchored to space and hence expanding space cannot change the distances between the objects.
90. Propagating waves are not anchored to space. Expanding space cannot change the wavelength.
91. Space cannot expand. It is a medium that expands or contracts, not the space.
92. Vacuum has no energy. There is no vacuum energy.
93. Quantum Mechanics cannot even be a hypothetical theory since the eigenspace of the position operator is not unique.
94. Quantum Mechanics is a theory of scientifically, mathematically, and logically blind. Mockery of QM is clearly visible by the claim that a particle can be in multiple places at the same time.
95. Quantum Mechanics is pseudoscience.
96. Special Relativity is pseudoscience.
97. General Relativity is pseudoscience.
98. Observers cannot derail a train. Observers cannot deorbit a planet. Observers cannot derail (bend or refract) light. Einstein derailed the light.
99. You cannot force a momentum on light by proclamation. Light has no momentum. The massless has no momentum. Light has no energy. Light has no temperature. Light has no entropy.
100. Einstein forced a momentum on light by proclamation. It is silly to force a momentum on light by proclamation. The massless has no momentum.
101. Simultaneity is not determined by observers; it is not an observer's perception.
102. The mass of an object does not depend on its speed. Time does not depend on speed.
103. Visible universe is the maximum distance light can travel without redshifting the light out of the visible region. It is the wavelength and the speed of light that are affected by the change of the medium. Frequency of light is unchanged by the change of the medium or the density gradient of the medium.
104. Cosmic Microwave Background (CMB) is not a remnant of a bigbang. Bigbang theory is false. Space cannot expand and contract. Snow on an off-tuned old-television is thermal noise, not some remnant from a bigbang.
105. Cosmic Microwave Background (CMB) temperature is an oxymoron. Microwaves have no temperature. Electromagnetic waves have no temperature. Light has no temperature.
106. If the Cosmic Microwave Background (CMB) has a temperature, it is an indication that space is not empty and there are charge particles in space. It is the motion of the charge particles that generate a temperature and CMB radiation. CMB maps provide the distribution of these charge particles in space, nothing else [5].
107. Space is not a vacuum. There are sparsely

distributed charge particles in space. The motion of these charge particles are the origin of the CMB, not a bigbang. The motion of these charge particles is the reason for the measured temperature of a few degrees Kelvin in space.

108. Galileo-Newton relativity is incorrect. Relative velocity is not a simple velocity addition. Relative speed is a path constrained velocity. The fixed path moves against the motion of the observer while the motion of an entity on the path remains unaltered relative to the observer [3].
109. Einstein's Special Relativity and General Relativity are false. Einstein derailed the light.
110. Quantum Mechanics is not a valid theory. How can Quantum Mechanics be a valid theory when the eigenspace of the position operator is not unique?
111. If the position and the momentum of a moving particle are probabilistic, the particle cannot be assumed to behave as a wave.
112. If a moving particle is assumed to behave as a wave, the position and the momentum of the particle cannot be probabilistic.
113. If the position and the momentum of a moving particle are probabilistic, the derivative operators are not defined and hence the momentum operator has no existence. When the momentum operator as the derivative operator has no existence, QM has no existence.
114. A moving particle with probabilistic position and momentum cannot behave as a wave.
115. The claim that the position and momentum of a moving particle are probabilistic contradicts the foundational assumption in QM that a particle behaves as a wave. Mutually contradictory assumptions cannot coexist.
116. Energy is the kinetic energy. The rest of the energies are potential energies. Potential energy is not energy unless they are converted to kinetic energy of particles of mass. Energy has no independent existence without the association of the particles of mass, and hence mass cannot be converted to energy. Mass must be conserved.
117. Light has no existence if light consists of photons or quanta of energy $E=hf$.
118. The energy of even the narrowest band wave would be infinite if light comes in quanta $E=hf$ since there are infinitely many frequencies between any two distinct frequencies of a continuous spectrum. The energy cannot come in quanta $E=hf$.
119. If energy is quantized as $E=hf$, the amplitude has to be determined by the frequency, which is impossible since there is no frequency without amplitude. There are no eggs without chickens. The existence of chicken cannot be determined by eggs. The amplitude cannot be determined by frequency. Energy cannot be quantized, $E\neq hf$.
120. Quantum Mechanics cannot exist. $E\neq hf$. Energy cannot come in quanta $E=hf$. Heisenberg Uncertainty cannot exist. Photons cannot exist.
121. The redshift of light from a star from a galaxy cannot be attributed to the galaxy itself as a galactic redshift since all the stars in the galaxy do not have the same redshift. Star redshift/blueshift is not a result of the Doppler effect. Star redshift cannot be used to make the false claim that the universe is expanding. Star redshift/blueshift is due to the density gradient of the medium.
122. Increasing star redshift is due to the increasing medium density with time due to the ejection of material from the stars into their surroundings. Universe is not expanding. The claim that the universe is expanding is blind physics [5].
123. Universe is not expanding. Universe is not accelerating. Space cannot expand or contract. Only the matter expands or contracts. There was never a Bigbang. Mathematical singularities are not real. There is no time until we define it.
124. There is no hole in a black-hole. black-holes are objects of very high mass densities.
125. The invisible gravitationally attractive point at the center of every galaxy is the center of mass of the galaxy; it is not a black-hole [5].

XXVI. **THE BOTTOM LINE**

If the momentum operator is $\mathbf{P}=-j\hbar\partial/\partial x$, then, the position operator cannot be position itself, $\mathbf{X}\neq x\mathbf{I}$. If the position operator is position itself $\mathbf{X}=x\mathbf{I}$, then, the momentum operator $\mathbf{P}\neq-j\hbar\partial/\partial x$. If the momentum operator is $\mathbf{P}=-j\hbar\partial/\partial x$, then, the position operator must be given by $\mathbf{X}=-j\hbar\partial/\partial p$. If a moving particle is assumed to behave as a wave, then, the position and momentum operators must be given by $\mathbf{P}=-j\hbar\partial/\partial x$ and $\mathbf{X}=-j\hbar\partial/\partial p$. If the momentum operator is $\mathbf{P}=-j\hbar\partial/\partial x$ and the position operator is position itself $\mathbf{X}=x\mathbf{I}$, then the particle cannot be assumed to behave as a wave. If the position x and momentum p are probabilistic, then, the position and momentum operators are undefined since the derivatives $\partial/\partial x$ and $\partial/\partial p$ are undefined.

"If energy is quantized $E=hf$, the amplitude of a wave will depend on frequency. But, frequency has no existence without the amplitude, and hence, waves have no existence if the energy is quantized as $E=hf$."

There will be no light if $E=hf$. For energy to be quantized and determined purely by the frequency as $E=hf$, the frequency must have an independent existence. But, frequency has no existence without amplitude, and as a result, the energy cannot be quantized and determined by the frequency alone, $E\neq hf$. Energy must depend on the amplitude. If light comes in quanta $E=hf$, we are in a chicken and egg dilemma. Which came first? Chicken or eggs? Amplitude or frequency? Frequency has no existence without amplitude. The existence of chicken cannot be determined by eggs. The amplitude of a wave cannot be determined by its frequency. The energy must depend on the amplitude. The energy of a wave cannot solely depend on its frequency, $E\neq hf$.

Light has no energy. Light has no temperature. Light has potential energy. Potential energy of light can be converted to energy by charge particles. There is no light without mass. Energy has no independent existence without particles of mass, and hence mass cannot be converted to energy, $E \neq mc^2$. Energy of a mass has nothing to do with the speed of light unless the mass is moving at the speed of light. Light is not relative and hence a stationary mass has no speed c relative to light. As a result, the relationship $E=mc^2$ is meaningless, $E \neq mc^2$.

Time is not relative. Mass is not relative. It is not the mass of an object that varies with speed, it is the scale used to measure the mass of an object that varies with speed. People do not get old by the clock. A clock is an engineered device to break down the day or the year. The day or the year is not determined by the clocks. It is not the time that depends on the speed, it is the clocks that are designed to break down the time, the day or the year, into smaller intervals that depend on the speed. Time, the day or the year is not determined by clocks. Gravity has no effect on time, the day or the year. It is the clock as a chunk of mass that is affected by gravity, not the time.

Energy is not the mass. Mass is not energy. Energy has no existence without mass. Mass cannot be converted to energy. Gravity is not acceleration. There is no acceleration without motion. Einstein's equivalence principle is invalid. A mass cannot warp the space. It is not the mass that occupies the space, it is the volume of a mass that occupies the space. If the space is warpable and an object of mass warps the space, it must be the volume of the object that must warp the space, not the mass. A mass of an object warps or generates a density gradient of the medium surrounding the object. Space is not warpable. A mass cannot warp the space.

Observers cannot bend light. Observers cannot derail trains. Cars do not end up in ditches relative to observers. Einstein's Special Relativity and General Relativity are incorrect. Neither the observers nor gravity can bend light. Light is not relative. Time is independent of speed. Mass is independent of speed.

Light is not relative. It is the path of light that shifts relative to observers while the propagation of light on its fixed path remains unaltered. The direction and the speed of light on its fixed path remain unaltered relative to observers. It is the train track that shifts relative to observers. The speed and the direction of a train on its track remains unaltered relative to observers.

Galileo Relativity is incorrect. Galileo Relativity only appears to be right for situations where observer motion is parallel to the motion of the object. If Galileo Relativity is correct, the cars will end up in ditches relative to observers if the observer motion is at an angle to the road. We do not see any vehicle ending up in ditches irrespective of the direction and the speed we are moving. Observers cannot derail a train. Gravity cannot derail a train of light. Einstein derailed the train. Galileo and Newton derailed the train. It is the path that shifts against the observer motion. The velocity (the speed and direction) of a moving entity on its fixed path is unaltered relative to observers.

The bottom line is that Quantum Mechanics and Heisenberg Uncertainty cannot exist; they are false. There is no wave particle duality. Special Relativity and General Relativity are invalid. Modern Physics is pseudoscience.

XXVII. **CONCLUSIONS**

In Quantum Mechanics, the position operator is defined as the position itself and hence the eigenspace of the position operator is not unique. The eigenspace of the position operator is not limited to the delta function that is required for the position and the momentum to be a Fourier Transform pair. Without the delta function being the unique eigenspace of the position operator, there is no Fourier Transform pair. Without Fourier Transform pair, there is no Heisenberg Uncertainty Principle. Since the eigenspace of the position operator given by the delta function is not unique, the Heisenberg Uncertainty principle does not exist; it is invalid. Heisenberg Uncertainty shenanigan is a flimflam.

Since the position operator in Quantum Mechanics has been defined as the position itself, the eigenspace of any non-trivial Hermitian operator is also a valid eigenspace of the position operator. The eigenspace of the momentum operator is also an eigenspace of the position operator. As a result, the momentum and position operators have a shared eigenspace. Despite the fact that the position and momentum operators are non-commutative when the position operator is position itself, they still have a shared eigenspace. The position and the momentum operators have a shared eigenspace, and hence the position and momentum are simultaneously measurable to any achievable precision without any tradeoff between precisions of the position and momentum.

The commutation of the operators is sufficient but not necessary for the simultaneous measurability of observables. If one of the two operators is the observable itself, the commutation of the operators is not necessary for the simultaneous measurability. The commutation of operators is not necessary for the simultaneous measurability of observables to any achievable precision if one of the two operators is the observable itself.

The non-commutation of the position and the momentum operators is immaterial in Quantum Mechanics since they have a shared eigenspace due to the fact that the eigenspace of the momentum operator is also a valid eigenspace of the position operator. The delta function is just one of the several eigenspaces of the position operator. Since the eigenspace of the position operator is not limited to the delta function, the position and momentum are not a Fourier Transform pair, and the Heisenberg uncertainty Principle is invalid. There is no inherent uncertainty in position and momentum. There is no tradeoff between the achievable precision of the position and the momentum. The precision of the position is not affected by the precision of the momentum. The precision of the momentum is not affected by the precision of the position.

For a wave function to be real and to be a wave, the wave function must be unique. When the eigenspace of the position operator is not unique, the wave function of the position operator is also not unique. When the position operator is position itself, the eigenspace of the position operator is not unique. Since there are multitudes of eigenspaces for the position operator, there are multitude of wave functions for the position operator. A particle cannot behave as a wave unless its wave function is unique. In fact, no particle can behave as a wave.

In addition, for a wave function to be a wave, it is not just enough for the wave function to be unique, it must also be continuous. If the wave function is the projection of the state of a particle onto the eigenspace of an observable, the order in which the projections are arranged determines the wavefunction. There is no special reason for the arrangement of the projections in the increasing order of the observable. The reshuffling of the projection does not alter the representation of the state of a particle, but it leads to different wave functions. As a result, the shape of the wave function is arbitrary, and wavefunction is neither continuous nor unique.

The shape of a wave function depends on the order in which the projections are arranged, and this arrangement is arbitrary, and any arrangement is equally valid. The arrangement of the projections in the increasing order of the observable may give a continuous wave function, but there is no reason for this arrangement to be special over other reshuffled arrangements.

The projections of the state of a particle onto the eigenspace of an observable cannot be a wave function since the order of the arrangement of the projections determines the wave function, and the order of the arrangement is not unique; there is no specific order or sequence for the arrangement of the projections. The shape of the wave function depends on the order of the arrangement of the projections. There is no unique arrangement. A wave function does not have a unique shape, and it cannot propagate.

In Quantum Mechanics, since the momentum operator is the partial differential with respect to position, the partial derivative must exist for the momentum operator to exist. This requires the position to be continuous. If the position of the particle is probabilistic, the position of the particle cannot be continuous, and hence the partial derivative with respect to the position is not defined. The claim in Quantum Mechanics that the position and the momentum of a particle is probabilistic contradicts its very assumption that a particle behaves as a wave and the definition of the momentum operator as the partial differential with respect to the position. Partial differential with respect to position is not defined if the position is probabilistic.

If the position of a particle is probabilistic, the wave function cannot be continuous, and the particle itself cannot be real since no mass can move from one position to another without passing all the positions in between on any path. A particle cannot disappear from one position and reappear in another position as Quantum Mechanics suggests. The Neil Bohr atomic model is unrealistic and hypothetical since electrons cannot disappear from one orbit and reappear in another orbit when they have to change their orbits or energy levels. Such disappearing and reappearing acts prevent the momentum operator being the derivative with respect to the position; it also prevents assuming a particle to behave as a wave since a particle wave requires the position and the momentum to be continuous.

In addition, the position and the momentum of a charged particle cannot be probabilistic since it comes at a cost of radiation loss. The position of a mass cannot be probabilistic since a mass cannot move from one position to another without passing all the positions in between, and so is the case with momentum. The momentum cannot be changed from one momentum to another without crossing all the in between momentums. Momentum cannot be discrete. Momentum cannot come in quanta. Position cannot come in quanta. Angular momentum cannot come in quanta.

Vectors cannot come in quanta. Space cannot come in quanta. Energy cannot come in quanta. Any entity with a belonging cannot come in quanta since nature has no mechanism to carry belonging information in a quantum. A quantum without the belonging information has no meaning. Before you start quantizing, you must consider how you can put the quanta together into a one coherent whole; nature has no such mechanism. If a data quantum on the internet does not have a header to carry belonging information, what does the Internet would be? A quantum without a header is incomprehensible.

The position, the linear momentum as well as the angular momentum, and energy of a particle to be probabilistic, not only they must be discrete but also be able to go from one value to another without having to pass in between values, which is impossible. The position, the linear momentum as well as the angular momentum, and energy of a particle cannot be discrete, cannot be probabilistic. When you assume that a particle behaves as a wave, you are also assuming that both the position and the momentum of a mass are continuous and hence position and momentum cannot be probabilistic. If the position of a mass is probabilistic, the partial differential with respect to position no longer exists, and hence the momentum operator can no longer be defined as the partial differential with respect to position.

A wave cannot exist unless the wave is continuous and hence the change of the amplitude must be continuous. A particle cannot be assumed to behave as a wave when the position and momentum are probabilistic since a wave cannot exist unless the change of the amplitude of a wave is continuous. If the position and momentum are probabilistic, the change of the amplitude of the wave is not continuous, and hence particle waves have no existence, and as a result, the assumption that a particle behaves as a wave is contradictory to the assumption that the position and momentum of a particle are probabilistic.

An observable is not limited to the eigenvalues of the operator of an observable. The claim that the values an observable can take is limited to the eigenvalues of the operator is false. The eigenvalues of a non-trivial operator (an operator that is not the observable itself) of an observable says nothing about the values the observable can take at any general state. An eigenvalue only provides the value of the observable if the state of the particle is on the corresponding eigenvector. Eigenvalues say nothing about an observable if the state of the particle is not on any of the eigenvectors. An eigenvalue of an operator only says that the observable is equal to the eigenvalue if the state of the particle overlaps the corresponding eigenvector. Even then, eigenvalues are useless in determining the observables since eigenvalues are not unique.

Eigenvalues of an operator are not unique and hence cannot be used to estimate the parameters of a system. However, the eigenvectors of a non-trivial operator are unique, and hence eigenvectors provide a complete orthonormal basis in the domain of the operator that can be used to represent any state of a particle. The eigenvalues are only useful for determining the eigenvectors of an operator, nothing else. Eigenvalues are simply useless. Eigenvalues are not unique. Eigenvectors are unique.

The eigenspace or eigen-axis representation is no different from 3D representation; it is simply an alternative orthonormal representation. In both cases, the state of a particle is represented as the coordinates on orthogonal axes. The arrangement of the coordinates or the sequence of the coordinates is called the wavefunction. Since we can arrange the coordinates in any order without affecting the state, the wavefunction is not unique. By shuffling and reshuffling the coordinates (the projections), we can have many different equally valid wave functions in the same domain of the observable. Wavefunction is not unique by definition of it.

Once we know the coordinates on the eigens-axes in the domain of the observable, which is a wave function, we can calculate the observable in the same manner we calculate the distance r in 3D with x, y, and z coordinates. The actual value of the observable is given by the Pythagoras theorem. Even though the wave function is not unique, the value of the observable is the same for all the different wave functions of the same observable since the value is unaffected by the order in which the coordinates are arranged.

The measured value of an observable at any state is the square root of the sum of the squares of the wavefunction since the wavefunction is the projection of the state on the orthonormal eigenspace of the operator of an observable. The actual value of an observable at any state is in fact the normalization factor of a wavefunction that is considered as useless in Quantum Mechanics.

The parameters of a system cannot be estimated using eigenvalues of an operator since eigenvalues are not unique. Eigenvalues are only useful in obtaining the eigenvectors. Eigenvectors of an operator are unique, and provide an orthonormal basis. Eigenvalues of an operator are simply useless for estimating the parameters of a system except that the eigenvalues are useful in determining the eigenvectors that are unique for an operator.

There are certain applications where the eigenvalues play a role in Engineering. The eigenvalues can be used for the separation of signal subspace from the noise subspace. Even though the real eigenvalues are not unique, the phase of a complex eigenvalue is unique. If the parameters of interest are in the phase of the eigenvalues, the eigenvalues play a role in the estimation of parameters as in the case of the Direction Of Arrival (DOA) in array processing.

The value of an observable is not limited to the eigenvalues of the operator of an observable. The measured value of an observable has nothing to do with the eigenvalues unless an eigenvector corresponding to an eigenvalue overlaps with the state of the particle, in which case the observable is the eigenvalue theoretically, but in practice it could be any scalar multiplication of the eigenvalue and hence it is useless for estimating an observable.

Eigen-representation is simply an alternative orthonormal representation just like 3D axes representation. If the eigenvalues of an operator are discrete, we cannot claim that the observable represented by that operator is discrete. The values an observable can take is not limited to eigenvalues in general. It only means that any state of a particle can be represented by a discrete set of orthonormal vectors given by the eigenvectors in the domain of the observable in general.

Nothing that is non-material in the universe can be discrete. A vector field cannot be discrete. An amplitude of a wave cannot be discrete. The energy of a wave cannot be discrete since the wave has no existence if the energy is discrete. Neither momentum nor the energy of a particle can be quantized. There is no independent entity called energy. If there is energy, there must be a temperature and vice versa. Energy without temperature is not possible. There cannot be temperature-free energy. There is no temperature without particles of mass. Energy is simply the kinetic energy of masses. There is no temperature without the motion of masses. There is no light or electromagnetic waves without mass. Light has no energy. What light has is electromagnetic potential energy. Potential energy is not energy unless it is coveted to the kinetic energy of charge particles. There is no energy without mass. There is no entropy without mass.

Potential energy is not energy until potential energy is converted into kinetic energy associated with masses or charged masses. Potential energy has no temperature, no entropy. Light has electromagnetic potential energy. Light has no energy, no temperature, no entropy. If electromagnetic potential energy comes in quanta, the amplitude of a wave will be quantized. A wave cannot exist without the continuous variation of the amplitude. Light has no existence if the electromagnetic potential energy comes in quanta.

If energy comes in quanta, the velocity of a mass must be quantized and hence the position of a mass must also be quantized. If the position of a mass is quantized, a particle cannot have a motion since no particle can move from one position to another without passing all the positions in between. The position of a mass cannot be discrete if a particle is assumed to behave as a wave. A particle cannot change the position probabilistically. A particle cannot behave as a wave if the position and momentum are probabilistic and vice versa. The position is a vector and vectors cannot come in quanta. Momentum is a vector and momentum cannot come in quanta. Any entity that has a belonging cannot come in quanta.

If the kinetic energy of a particle comes in quanta, the momentum will be discrete. Momentum cannot be discrete if a particle is assumed to behave as a wave. Momentum is a vector and cannot come in quanta. Momentum cannot change in discrete steps. Momentum cannot change from one value to another without passing all the values in between. Energy cannot be discrete. Space cannot be discrete. Light cannot come in discrete particles or photons of $E=hf$. Energy cannot come in discrete particles or quanta. The energy quantum $E=hf$ simply meaningless. Frequency has no energy.

Physicists make the false claim that you can see the light particles or photons by decreasing the amplitude of light. You cannot slow down light by reducing amplitude. You cannot change the amplitude of a light source since the amplitude of light is determined by the internal structure of an atom. You are not changing the amplitude of light by dimming a source of light. Dimming a source of light has nothing to do with the amplitude. All the photoelectric experiments have been done under the false impression that we can change the amplitude of light by dimming a light source. That is a mistake made in all the photoelectric experiments. Photoelectric experiments had never been done for variable amplitudes of light. The conclusions of photoelectric experiments are incorrect. The conclusions of Lenard's photoelectric experiment are incorrect [1].

By dimming a source, all you are doing is reducing the rate of light bursts released by a source. The intensity of a source is determined by the rate of light bursts released from the source. You do not have access to the amplitude of light at a source. When you dim a source of light further and further, you are slowing the rate of light bursts released from a source, and hence you can see the separate light bursts. These separate light bursts are not light particles or photons. Light comes in wave bursts. Light is never a particle. There are no light particles or photons. Einstein's derivation of photons is incorrect since light has no entropy.

Consider a supernova, a star, the sun, a nuclear explosion, forest fire, 1000 Watts bulb, 10 Watts bulb, a candle light, Kerosene lamp! What do they have in common? They all have the same amplitude of light. How do they differ? They differ by the rate of light burst they release. The rate of light burst determines the intrinsic intensity of a light source. The intrinsic intensity is the rate of light bursts of the source. The apparent intensity is the rate of light bursts per unit area at a distance. Apparent intensity decreases due to dispersion, which is proportional to inverse square distance. Apparent intensity also decreases due to the attenuation, which is proportional to inverse distance.

If a particle is assumed to behave as a wave, the proper position and the momentum operators are predetermined by the plane wave equation itself. There are no independent and dependent variables in a wave. You cannot consider the position alone to be an independent variable. In a wave, all the variables are independent variables. Both position and momentum are interdependent in a wave. If both the position and momentum of a particle cannot be independent, the position and momentum of a particle cannot be a wave.

Neither the position nor the momentum in the so-called particle wave can have special treatment; both are on equal footing. Interchanging the position and momentum in a particle wave should not change the particle wave. If a particle behaves as a wave, the position operator and the momentum operator of the particle must be mirror symmetric. The position operator cannot be the position itself while the momentum operator is given by the derivative with respect to the position, which is not defined if the position is probabilistic. If the position and momentum are probabilistic, a particle cannot be assumed to behave as a wave.

If we make the meaningless assumption that a particle behaves as a wave as it is done in Quantum Mechanics, the position and the momentum must have equal status in the plane wave equation; neither one is special. We have no freedom to choose the position as an independent observable and define the position operator as position itself since position and momentum have equal status in the wave equation. In the wave equation, neither position nor momentum standout as special from the other. If the position has special status compared to the momentum, then the position and the momentum cannot, even falsely, be assumed to behave as a wave.

If the position and momentum of a particle behave as a wave, the position operator must be able to be obtained from the momentum operator simply by exchanging the position and momentum (x for p and p for x) and vice versa. This is not possible if the position operator is chosen to be the position itself. The choice of position as the position itself contradicts the momentum operator and the assumption that a particle behaves as a wave, which is the very foundation of modern physics.

The definition of the position operator is in contradiction with the momentum operator and the assumption that a particle behaves as a wave in quantum mechanics. If a particle is assumed to behave as a wave, the position and the momentum operators must be mirror symmetric. The position and the momentum have equal status in the wave equation. The proper position and the momentum operators must mirror each other if they are to behave as a wave. If the momentum operator is the partial derivative with respect to position as it should be if the particle is assumed to behave as a wave, the proper position operator must be the partial derivative with respect to the momentum in order for the position and the momentum of a particle to behave as a wave.

If the position operator is forced to be the position itself, the assumption that a particle behaves as a wave cannot be made, and the position and the momentum do not represent a wave. The definition of the position operator as the position itself not only contradicts the momentum operator but also contradicts the primary assumption in Quantum Mechanics that particles behave as waves. It is this invalid definition of the position operator as the position itself that led to non-commuting operators in Quantum Mechanics. It is the improper definition of the position operator that makes position and momentum non-commutative. Correct position and momentum operators commute making Quantum Mechanics disappear as a theory.

If the position operator is properly defined, it should be the partial derivative with respect to the momentum, which complements the definition of the momentum operator as the partial derivative with respect to the position. The proper position and the momentum operators commute and have a unique shared eigenspace, which is the particle wave. There is never a problem of simultaneous measurability of position and momentum to any achievable precision since they have a shared eigenspace. There is no precision tradeoff between the position and the momentum of a particle. If a particle is assumed to behave as a wave, the plane wave for a particle is the shared eigenspace.

Even when the position operator is defined as the position itself, the position and momentum are simultaneously measurable without any precision trade off since the eigenspace of the momentum operator is also a valid eigenspace of the position operator. When the position operator is the position itself, the eigenspace of the position operator is not unique.

“An eigenvalue of an operator of an observable is the observable if and only if the state of the particle overlaps the eigenvector corresponding to that eigenvalue.”

Not every wave can propagate. Not every field can propagate. Any field that is anchored to a source cannot propagate. Any anchored field cannot propagate. The electric field of a charge particle does not exist without being anchored to the charge particle and hence cannot propagate. The gravitational field of a mass has no existence without being anchored to the mass and hence cannot propagate. Not every field can be disturbed. A single field cannot be disturbed. Gravitational field cannot be disturbed since it is single. There are no gravitational disturbances or gravitational waves. The Higgs field cannot be disturbed since the Higgs field is single. There are no Higgs field disturbance or Higgs waves.

A field must have an unanchored independent existence for it to propagate. A single field has no existence without being anchored to a source. A single field cannot propagate. A single field such as the Higgs field that has no source cannot exist. There cannot be a static field without a source. No disturbance can be generated in a single field. There are no gravitons. There are no Higgs bosons. There are no Higgs waves. There are no gravitational waves.

Wave propagation requires conjugate partners. Wave propagation is a result of a give and take dance between a conjugate pair. A single field cannot propagate. A single wave cannot propagate. Wave function of a particle is single and has no conjugate partner. Wave function in Quantum Mechanics cannot propagate. Even though particles are assumed to behave as waves in Quantum Mechanics, those so-called particle waves cannot propagate since they have no conjugate partners.

A gravitational field has no existence without being anchored to a source, and hence a gravitational field cannot propagate. A disturbance in a gravitational field cannot be created since the gravitational field has no conjugate partner. There are no propagating gravitational field disturbances. There are no gravitational waves as such. A single field has no existence without being anchored to a source. There are no sourceless single fields. The Higgs field has no source, and hence without having a source, the Higgs field cannot exist. The Higgs field and gravitational field are single, and hence they cannot propagate. The Higgs field is single, and hence cannot propagate. For a non-propagating field to exist, it must be anchored to a source. But the Higgs field has no source, and hence the Higgs field cannot exist.

For a field to propagate, it has to have an independent existence without being anchored to a source. It is only a conjugate pair of fields, such as a conjugate pair of electromagnetic fields, that can have an independent existence without being anchored to a source. A conjugate pair of fields cannot be anchored to a source. A conjugate pair of fields has no existence without propagating. A single field has no independent existence without being anchored to a source. Not only does the Higgs field cannot propagate, the Higgs field cannot exist.

Although a disturbance in a Higgs field is called a Higgs particle, and a disturbance in a gravitational field is called a graviton, no disturbance can be generated in a single field, and hence there are no Higgs particles or gravitons. There are no massless particles or massless momenta. Waves are not particles. Particles are not waves. The momentum, whether it is a linear momentum or angular momentum, and energy cannot be quantized. Kinetic energy cannot be quantized. Potential energy cannot be quantized. Electromagnetic potential energy cannot be quantized. Light cannot be quantized. There are no photons or light particles. What is there are light bursts, which are waves of finite length.

There is no energy without momentum. There is no momentum without a mass. There is no energy without mass. There is no independent entity called energy. Energy always exists in association with the motion of masses, which is the temperature. Light has no momentum. Light has no temperature. Light has no entropy. The absence of entropy in light makes Einstein's derivation of photons invalid. Light cannot consist of particles. Coherent directional light cannot consist of spatially random particles. Hypothetical photons have no existence. There are no light particles. It is only that there are light bursts. The light bursts are not particles. The light bursts are waves that propagate.

If the electromagnetic potential energy comes in quanta $E=hf$ as hypothesized by Einstein, the amplitude of an electromagnetic wave will be discrete and hence there must be a mechanism to assemble the discrete amplitudes to one whole. Yet no such mechanism exists since energy quanta do not contain the belonging information. If the potential energy of a wave comes in quanta $E=hf$, the amplitude will be frequency dependent. The energy cannot come in quanta $E=hf$ since frequency has no independent existence. Energy must depend on the amplitude. Electromagnetic waves have no existence if the change of amplitude is not continuous, yet there is no mechanism to assemble the discrete amplitudes to a single whole. If energy comes in quanta $E=hf$, wave propagation is not possible. If energy comes in quanta $E=hf$, waves cannot exist. There will be no light if $E=hf$.

Frequency of light has no energy. $E=hf$ is meaningless. Light has no energy. Light only has electromagnetic potential energy that can be transferred to energy in the presence of charge particles. It is only that the light, in the presence of charged particles, generates energy (kinetic energy) that is proportional to the frequency [1]. Proportionality constant is not a universal parameter; it is a function of the amplitude to the electromagnetic field and the mass of the oscillating particle that generated the electromagnetic wave. Light has no momentum. It is only that light can generate momentum in the presence of charged particles.

If light consists of photons or energy quanta $E=hf$, then, the amplitude of the wave must be determined by the frequency, which is impossible since there is no frequency without amplitude. There must be an amplitude to have frequency. There must be chickens to have eggs. The existence of chickens cannot be determined by eggs. The amplitude of a wave cannot be determined by the frequency of the wave. Light cannot consist of photons or energy quanta $E=hf$. Energy cannot be quantized, $E\neq hf$. Light has no existence if light consists of photons or light quanta $E=hf$. Light does not consist of photons of light quanta. Light is always a wave at any frequency, not particles.

Discrete eigenvalues of the operator of an observable do not indicate that the observable is quantized; it only says that the state can be represented in the domain of an observable by a finite coordinate system described by the eigenvectors. Eigenvalues are not unique, and eigenvalues are useless for estimating the parameters of a system. The eigenvalues have no other meaning than that an eigenvalue of an observable is the observable if the state of the particle coincides with the corresponding eigenvector. The only use of the eigenvalues of an operator is for the determination of the eigenvectors of an operator, nothing more.

When a state of a particle is represented by the coordinates of the eigens-axes, the meaning is no different than the 3D coordinate system. A particle at a given state represented by the eigenspace is not on any of the eigens-axes. The state of a particle that has a coordinate on an eigenvector or on an eigen-axis does not mean the particle is on that axis. The state of a particle that has coordinates on all the eigenvectors does not mean the particle is in all the eigenvectors simultaneously; the particle is in none of the eigenvectors just as the position $\mathbf{r}=(x,y,z)$ of a particle is none of the $\mathbf{x}$, $\mathbf{y}$, or $\mathbf{z}$ axes in 3D space. Observable has nothing to do with eigenvalues unless the state of the particle overlaps with an eigenvector. If the state of a particle does not overlap with any of the eigenvectors, observable has nothing to do with the eigenvalues of the operator of the particle.

Quantum Mechanics claims that the position and momentum of a particle are probabilistic. At the same time, the momentum operator is defined as the partial differential with respect to the position. If the position is probabilistic, the partial differential with respect to position is not defined. And also a particle cannot behave as a wave if the position and momentum are probabilistic since the wave is defined by the position and the momentum of the particle that must be continuous. If the position and momentum of a particle are probabilistic, it is not possible to assume that a particle behaves as a wave. If the position and momentum are probabilistic, the wave function cannot be a wave. Quantum Mechanics is self-contradictory in its foundation. In any case, since the eigenspace of the position operator is not unique, Quantum Mechanics ceases to exist.

Blackbody spectrum must be cavity independent. The Planck spectrum for a cubic cavity is not the same as the Planck spectrum for a spherical cavity. The Planck spectrum is cavity dependent. The derivation of the Planck spectrum based on the modes of a cavity is incorrect. The Planck spectrum does not represent the true blackbody spectrum, although it has the correct frequency function. When the Planck spectrum is incorrect, its premier assumption that the energy quantum is $E=hf$ no longer holds; energy is not quantized. Quantum mechanics is a mythical mental construct that is mathematically incorrect and physically unrealistic, which is only supported by experimental misinterpretations. The Modern Physics founded upon such mystical and comical misinterpretations is voodoo-science, not science.

Frequency has no energy. Light has no energy, no temperature, no entropy. It does not matter how much light is there in a vacuum, there is no temperature in a vacuum. There is no energy in a vacuum. Vacuum energy is an oxymoron. Light has potential energy determined by the amplitude. Potential energy is not energy unless it is converted to kinetic energy of charge particles. There is no massless energy, no massless temperature, no temperature-less energy. Energy has no existence without mass and hence mass cannot be converted to energy. Mass must be conserved. Energy is the kinetic energy and has no existence without mass. If the energy comes in quanta, the mass must be associated with each quantum, which is not possible. Energy cannot come in quanta since a mass cannot be associated with each quantum of energy. If energy quantum is given by $E=hf$, the kinetic energy E of a mass will be limited to a single frequency since h is a constant. The energy cannot be limited to a single frequency as suggested by $E=hf$, since the energy can be converted to any frequency we want by appropriate means; $E=hf$ is meaningless.

If energy comes in quanta $E=hf$, the energy quantum is ambiguous since $E=hf$ is also equivalent to $E=nh(f/n)$, where n is any integer or any real number. Energy has a belonging. Kinetic energy of a mass belongs to a particular mass. If the energy comes in quanta, the quantum must have a mechanism to carry the belonging information. There cannot be energy quanta without belonging. There cannot be angular momentum quanta without belonging. There cannot be momentum quanta without belonging. Momentum and angular momentum are vectors. Vectors cannot come in quanta. Vectors cannot be quantized. Any entity with belonging cannot come in quanta without a mechanism to carry belonging information. Quanta in Modern Physics do not have a mechanism to carry belonging information. Quanta in Modern Physics cannot exist.

"Nothing can be quantized or come in quanta unless there is a mechanism for the quantum to carry the belonging information."

The Doppler effect is not real. It is not a phenomenon of the wave itself. The motion of a source and/or observer does not change the actual speed, frequency, and wavelength of the wave. The Doppler shift is an observer phenomenon. The Doppler shift is for the observer's eyes and ears only. The Doppler shift applies only for a homogeneous medium. The Doppler shift does not apply for light from stars to earth where propagation takes place in an inhomogeneous medium especially near the star and near the earth and also in between depending on the path. The redshift of light from a star in a galaxy cannot be attributed to the redshift of a galaxy since all the stars in the galaxy do not have the same redshift. The stars in a galaxy have different redshifts, and some of the stars in the galaxy can also have different blueshifts since whether a star has redshift or blueshift is determined by the net overall density gradient of the medium from the star to earth. The overall density gradient of the medium depends on the path it takes from the star to earth.

"Light does not propagate relative to moving frames. Light propagates in empty space. When light propagates in the presence of a medium, if the medium is pulled out, light does not move with the medium is an indication that the light propagates in space. Maxwell equations are valid only for a stationary frame in space. Light is not relative. [4,3,8]."

"If $E=hf$, the amplitude of a wave is determined by frequency. However, frequency has no existence without amplitude. A chicken and egg situation; which came first first, chicken or egg? $E \neq hf$."

"Frequency has no existence without amplitude and hence energy cannot come in quanta $E=hf$."

"Energy must depend on the amplitude, $E \neq hf$"

"Electromagnetic waves or light have no existence if $E=hf$. Waves in general have no existence if energy is quantized as $E=hf$. Energy cannot come in quanta, $E \neq hf$. The Planck spectrum is cavity dependent."

"If $\mathbf{X}=x\mathbf{I}$, eigenspace is not unique. QM has no existence when the eigenspace of the position operator is not unique."

"If $\mathbf{X}=x\mathbf{I}$, a particle cannot be assumed to behave as a wave. If $\mathbf{X}=x\mathbf{I}$, the momentum operator cannot be given by $\mathbf{P}=-j\hbar\partial/\partial x$. The position operator cannot be the position itself if a particle is assumed to behave as a wave, $\mathbf{X} \neq x\mathbf{I}$."

"The position and momentum of a particle are unique. They cannot be a Fourier Transform pair. The Heisenberg uncertainty principle cannot exist."

"The Doppler shift is for the observer's eyes and ears only, it is not real. It is an observer phenomenon, not a phenomenon of a wave. The Doppler shift does not exist in the wave itself. There is no approaching or receding source without observers. The Doppler effect is not real."

"Quantum Mechanics, Heisenberg Uncertainty, Einstein's Special Relativity and General Relativity, and Modern Physics in general are Pseudoscience."

"$E \neq mc^2$, $E \neq pc$, $E \neq hf$, $\lambda \neq h/p$, time and mass are not relative. The speed of light is just the speed of light and has nothing to do with the motion of objects of mass. There is nothing that can prevent an object of mass traveling faster than the speed of light. Mass and energy are not equivalent."

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