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PLANK SPECTRUM IS INCORRECT: Energy is Not Quantized

(Plank Spectrum is Cavity Dependent and Charge Independent) (Lenard Experiment is Incomplete and Conclusions are Incorrect)

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Abstract–Energy quantum is an ad hoc assumption made by Plank in his derivation of blackbody spectrum. For the quantum energy assumption to hold, Plank spectrum must be correct. Plank spectrum and its derivation are incorrect. In fact, all the blackbody spectra, Plank, Rayleigh-Jeans, and Wein are incorrect. There is no theoretical foundation for energy quanta and hence there is no theoretical foundation for its off-shoot Quantum Mechanics.

Correct blackbody spectrum must be independent of a blackbody cavity. Plank spectrum depends on the geometry of a cavity. Correct blackbody spectrum must also be bounded for infinite span of frequencies and for infinite span of temperatures. But Plank spectrum is not bound in temperature. The generation of blackbody radiation has nothing to do with the speed of light and hence the correct blackbody spectrum must be independent of the speed of light. Plank spectrum depends on the speed of light. Plank spectrum is nearly zero since it is inversely proportional to the cubic speed of light. There is no radiation without a charge and there is no charge without a mass, and hence blackbody spectrum must be a function of both the charge and the mass of the charge. The area of the correct spectral density must increase with the charge and temperature while remaining finite and must be zero when temperature or mass is zero. Charge independent, temperature unbound, cavity dependent, and incorrectly derived Plank spectrum cannot be the blackbody spectrum.

Blackbody spectrum cannot be derived using the mode density of a cavity. Mode density of a harmonic n in a cavity cannot be obtained by counting all the integer nodes in a linearly laid spherical grid of radius n in the phase space. Every integer node in the phase space is not an allowed mode in a cavity. Allowed modes for a harmonic in a cavity are the solutions to the Pythagoras Integer Quadruples (PIQ) or extended 3D Fermont problem of second order. Even with the invalid approach of counting the mode density in a cavity, the number of allowed modes for harmonic n in a cavity is not proportional to the square n or square frequency f, and hence the derivations of all the blackbody spectra are flawed. Without this flawed mode density analysis, there would be no Plank, Rayleigh-Jeans, and Wein blackbody spectra.

The problem with the derivations of Plank, Rayleigh-Jeans, and Wein blackbody spectra is in their foundation, which is based on the maximum mode density of a cavity. The maximum number of modes, a cavity can hold, says nothing about what is present in the cavity; it says nothing about the actual blackbody spectrum. The capacities of the rooms in a hotel says nothing about the actual number of guests in the hotel. Wrong derivation can give the correct frequency function just like the Plank Spectrum and the rest of blackbody spectra did. If all that is needed is the correct frequency function that fits the observed spectrum, it can be obtained simply by using a least square fit. Correct frequency function itself does not say much about the underline process that generated the blackbody radiation, The true cavity independent blackbody spectrum must first be derived from a theoretical foundation, and then test for its validity with observed spectrum.

The agreement of frequency function with observed spectrum is necessary for a spectrum to be correct, but it is not sufficient for the derivation to be valid. The spectrum through a hole on a blackbody cavity is continuous even though the spectrum inside the cavity is discrete. Continuous blackbody spectrum observed through a hole cannot be obtained from the discrete spectrum inside a cavity. Spectrum inside a blackbody cavity can never be observed through a hole on the cavity; it is not possible.

All the energies are not equal and hence cannot be represented by a universal energy quantum e=hf. Kinetic energy and electromagnetic energy are not the same and hence cannot be from the same energy quantum e=hf. All energies do not have associated frequencies to represent them by e=hf. Potential energy has no associated frequency and hence e=hf is meaningless for potential energy. Kinetic energy of a mass moving at constant speed on a linear path has no associated frequency and hence cannot be represented by e=hf. This shows the invalidity of the Schrodinger equation. The e=hf is meaningless for electromagnetic waves. Light has no temperature or entropy. Electromagnetic waves have no kinetic energy, no temperature, no entropy. Electromagnetic energy is simply a measure of wave strength. Plank constant h is not a universal constant. The e=hf is not a universal energy quantum. The e=hf is solely the energy per cycle of an oscillating mass of frequency f, nothing else.

Light waves propagate. Propagation of light wave is governed by Maxwell equations. Light bursts move. The motion of light bursts is not governed by Maxwell

equations. What we see as light is the motion of light bursts, not the propagation of light waves. The speed of light we measure is the speed of motion of light bursts, not the speed of propagation of light. We cannot measure the speed of propagation of light. We calculate the speed of propagation of light as the product of frequency and the wavelength. Measured speed of light, which is the speed of light bursts, is greater than the calculated speed of light, which is the speed of propagation of light, since light bursts are relative; they are the same only relative to a stationary frame in the vacuum.

We cannot see the propagation of light waves. What we see is the moving light bursts. Even though the speed of propagation of light is a constant, the speed of motion of light bursts does not have to be a constant since the motion of light bursts is not governed by Maxwell equations. The path of light is fixed in the vacuum and can only be altered by a medium. Speed of any entity on a fixed path in the vacuum and in a medium is observer independent. Propagation of light is observer independent. It is the path of light that moves unaltered relative to an observer just as the motion of a mountain relative to a runner. It is the train track that moves unaltered relative to an observer, not the train. Speed of a train is independent of an observer. Speed of light is independent of observers. Propagation of light is observer independent while the motion of light bursts is observer dependent. No Special Relativity required.

Masses cannot propagate; they move. Propagation is not motion. Motion is not propagation. Newton laws do not apply for propagation. Newton laws only apply for masses in motion. Wave equations do not apply for masses in motion; they only apply for propagation of massless. LaGrange does not apply for light. Light has no momentum, no kinetic energy, no temperature, no heat, and no entropy. Thermodynamic laws do not apply for light since light has no temperature; they apply solely for masses. There is no temperature or entropy without mass. Although electromagnetic radiation itself has no heat or energy, electromagnetic radiation can generate heat or energy in the presence of charge particles. Light is useless without matter. There are no electromagnetic waves without matter.

Amplitude of light cannot be changed by varying the intensity of a light source. By varying the intensity, what we are varying is the rate of light bursts released from a source, not the amplitude of light. Only way to change the amplitude of light is using a semi-transparent reflector along the path of propagation to reflect off a part of light so that only a fraction of the amplitude is transmitted. Lenard's photoelectric experiment is incomplete, and conclusions are incorrect. Lenard only studied the effect of frequency and the burst rate on photoelectric effect. The effect of amplitude on photoelectricity cannot be known from the Lenard's experimental results. Einstein's photon cannot explain the result of a properly carried out photoelectric experiment. Einstein's photon derivation is invalid since light has no temperature and entropy.

Frequency has no existence without amplitude and hence photoelectric effect must depend on both amplitude and frequency of light. There must be a frequency cut-off as well as an amplitude cut-off for photoelectricity. Photoelectric current and speed of ejected electrons must depend on both amplitude and frequency of light. Lenard has not investigated the effect of varying amplitude on photoelectric effect and hence his conclusions are incorrect.

Plank, Rayleigh-Jeans, and Wein spectra do not apply for electromagnetic radiation itself; they only apply for the generation of electromagnetic radiation. Maxwell-Boltzmann distribution and Boltzmann entropy do not apply for light since light has no entropy; they have been derived for masses and do not apply for massless. Einstein's derivation of light quanta is invalid in its very foundation. Coherent light waves cannot consist of spatially random particles at any frequency. Einstein's claim that electromagnetic waves turn themselves into particles when they are above a threshold frequency is magic, not science. A hypothetical threshold frequency above which electromagnetic waves automatically turning themselves in to particles defies the logic and reality.

By reducing the intensity, we can reduce the rate of light bursts to a level where we can separate the individual light bursts. Each of these individual bursts must be further divided into reflected and transmitted waves at a semi-transparent reflector and hence these individual light bursts cannot be light quanta or photons. If these individual light bursts are light quanta, they would be in limbo at a semi-transparent boundary. No light burst can be undecisive at a boundary. The claim that these individual light bursts are light quanta or photons is incorrect. There are no photons or light particles. If it is massless, it cannot be a particle. If it has a mass, it cannot be a wave, Coherent light cannot consist of spatially random particles. Computing devices based on these individual light bursts are not quantum computers; they are optical processors. They are not Quantum Bits or Q-Bits, they are Optical Bits or O-Bits.

Light waves propagate on a fixed track in the vacuum and can only be altered by a medium. Motion or propagation of any entity on a fixed track in the vacuum and in a medium is observer independent. Propagation of light is observer independent, not relative. The speed of propagation of light is a constant in the vacuum and in a medium, and it is independent of the observer's frame of reference. What we see as light is the motion of light bursts, not the propagation of light waves. We cannot see the propagation of light waves. A burst of light moves unaltered relative to us just like the motion of a mountain relative to a runner. The speed of motion of a burst of light is relative and it depends on the speed of the observer's frame of reference. It is the fixed path of light in the vacuum and in a medium that moves unaltered relative to an observer, not the light itself. The fixed path of light moves unaltered relative to an observer just as the motion of a mountain relative to a runner. No physical change of any sort

can take place in Relativity. Relativity of light does not require a special treatment or Special Relativity.

Time, length, and mass are independent of the frame of reference. Since the propagation of light is not relative, Lorentz Transform and Special Relativity are invalid. Maxwell equations cannot be transformed on to inertial frames since light is not relative. Light does not propagate on a moving frame or in a medium. Light propagates in the vacuum. With reference to the vacuum, which is the absolute frame, the speed of motion of a light burst is the same as the speed of propagation of light wave. Relativity of light is no different from a relativity of a train, Bulldozer, or an armored vehicle except that light is massless; their speeds on their fixed tracks are independent of observers. It is always the track that moves unaltered relative to observers, not what is on the track.

Speed of motion of a light burst varies from observer to observer depending on the observer's motion even though the speed of propagation of light on its fixed track within the burst remains constant. The claim that nothing can travel faster than the speed of light is false. Anything can travel faster than light. There is no speed limit. The speed of propagation of light cannot be measured, it is calculated as the product of the frequency and the wavelength. What is measured the speed of light bursts as the distance travelled per unit time. The measured speed of light bursts is relative. Calculated speed of propagation of light is not relative. The problem with Special Relativity is the treatment of the speed of propagation of light and the speed of light bursts as the same; they are only the same relative to the vacuum, which is the absolute frame.

Blackbody spectrum must be obtained by analyzing the oscillating electrons in atoms on the blackbody itself, which is independent of a cavity. The derivations of Plank, Rayleigh-Jeans, Wein spectra are incorrect. Quantized energy is not required for the derivation of blackbody spectrum that agrees with the observations. Hypothetical universal energy quantum e=hf is not just wrong, it is simply meaningless. There never was a blackbody catastrophe. Einstein's derivation of photons or light quanta is invalid both mathematically and conceptually. Energy consisting of different flavors cannot come in universal quantum. Light cannot come in quanta or photons. Electromagnetic waves cannot come in quanta. Light is a wave at any frequency and comes in wave bursts.

Individual wave bursts in light are not light quanta since a burst must be further divided into reflected and transmitted parts at a semi-transparent boundary. When Plank spectrum is invalid, there are no energy quanta. Derivation of blackbody spectrum does not require a quantum energy assumption. Plank spectrum is incorrect. Energy is not quantized. There is no justification for Bohr atom, de Broglie waves, Heisenberg uncertainty, Schrodinger equation, and Plank constant. Quantum Mechanics cease to exist since energy is not quantized. Speed of light is just the speed of light, nothing more. Speed of light cannot limit the speed of other entities. Universe has no speed limit. Anything can travel faster than light.

Keywords—*Plank; Quantum; Spectrum; Einstein; Photon; Light; Blackbody; Radiation;; Waves; Energy; Entropy; Photoelectricity; Electromagnetic; Bohr; Atom*

I. INTRODUCTION

In an around 1900 AD, much attention had been paid on deriving the blackbody spectrum that fits the observed spectrum of a blackbody cavity through a small hole on the cavity. They approached the problem based on the different frequencies a closed cavity could hold. Spectrum of a closed cavity is discrete. Only the primary frequency determined by the geometry of the cavity and its integer harmonics could keep propagating in a cavity. Any other frequency generated by the oscillating electrons on the inner surface of the cavity would dissipate on the inner surface.

It was wrongly assumed that all the possible frequencies, a closed cavity can provide a home for, are the same as what are observed through a small hole on the cavity and hence it is possible to determine the blackbody spectrum by analyzing the maximum modes that a closed cavity could contain. So, they went on counting. They started counting the number of modes or different waves that could be present in a closed cavity for each discrete harmonic that could be there in the cavity. However, unbeknown to them as well as unbeknown to their religiously loyal followers to date, there is a major problem with this approach. What a cavity could hold says nothing about what is present in the cavity.

In Plank spectrum, Plank made an arbitrary on-the-fly blunt assumption that the kinetic energy of an oscillating mass of frequency f comes in energy quanta e=hf. This assumption requires all energies to be associated with a frequency. You cannot use this assumption to make the general claim that energy is quantized since not all energies are associated with a frequency f. All the energies are not a result of an oscillation of frequency f. There are energies that have no association with frequency f. Plank's energy assumption only applies for an oscillating mass of frequency f, for nothing else. It is not possible to make a general claim that the energy is quantized when Plank's assumption only applies to energies of oscillating mass of frequency f. There is no oscillating mass in electromagnetic energy. What is applied for mechanical energy does not apply for electromagnetic energy. Electromagnetic energy and kinetic energy are distinct; they have nothing in common. It is only that one can be transformed into other and vice versa. There is an associated energy loss in any transformation, it is never a hundred percent.

The claim that the energy is quantized is incorrect since all the energies are not created equal. Potential energy has no associated frequency for it to come in quanta. The e=hf is meaningless for a gravitational potential energy of a mass. The e=hf is meaningless for electric potential energy of a charge. Gravitational potential of a mass cannot be represented by e=hf.

Electric potential of a charge cannot be represented by e=hf. Kinetic energy of a mass moving at constant speed has no associated frequency for it to come in quanta. Kinetic energy of a mass moving at constant speed on a linear path cannot be represented by e=hf. Kinetic energy of a mass orbiting on a circular path cannot be represented by e=hf.

You cannot substitute e=hf wherever or whenever you come across energy. Not all energies are equal. As we are going to see, there is no universal energy quantum. Plank assumption is invalid, e≠hf. Plank's derivation of blackbody spectrum is invalid. Even the energy of an oscillator of mass m of frequency f cannot come in energy quanta. All the energies are not created equal. If any entity comes in quanta, there must be a mechanism to assemble the quanta into a unique whole. There is no such mechanism in nature to assemble the quanta into a unique whole to maintain the distinctness of different energies. Energy cannot come in quanta.

"*One should not adhere unquestionably to what one was taught in schools and universities since there is a possibility that they can turn out to be wrong. Many things that were taught turned out to be wrong. Einstein's Relativity, photons, De Broglie waves, and Plank's energy quanta are few such grand mistakes. Nothing can be any more ridiculous than particle waves.*"

a) **Problem with Modes Counting**

Yes, a cavity can hold an infinite number of harmonics. There can be many modes for each harmonic in a cavity. However, what modes of a harmonic and what harmonics a cavity can provide a home for say nothing about what modes of a harmonic and what harmonics are present in a cavity. If a hotel has one hundred rooms, that does not mean there are guests in all the rooms filled to full capacities of the rooms. We cannot find the number of guests in a room by finding the capacity (modes) of the rooms (harmonics). If there are five guests in a hotel, neither can we distribute the five guests to all the rooms nor can we fill the rooms to full capacity.

A guitar string can vibrate at infinite number of harmonics does not mean it vibrates at infinite number of harmonics when we pluck a string on the guitar. In the case of a blackbody cavity, the modes present in a cavity for a discrete harmonic is determined by the oscillating electrons on the inner surface of the cavity. What cavity has is whatever that is thrown into it, not what it can hold. Trunk of a car can hold many things, but what trunk has is whatever you have put in it. If the trunk is locked, we have no idea what is inside.

We do not know what modes are present in a cavity. We cannot find what discrete modes are present in a cavity by drilling a hole on the cavity. What comes out of a hole is not discrete. What comes out of a hole on a cavity is continuous. This is an indication that what comes out of a hole is not what is present inside. If what comes out of a hole on a cavity is not what is present inside the cavity, it is not possible to model what comes out of a cavity by analyzing what could be present inside a cavity. There was never a blackbody catastrophe. Blackbody catastrophe is a result of using a wrong approach for determining the blackbody spectrum.

"*The maximum number of modes of frequency f a cavity is able to hold says nothing about the actual number of modes present in a cavity*."

"*What is present in a cavity is whatever that is put into the cavity within the confine of what is allowed in the cavity.*"

b) **Pythagoras Integer Quadruples and the Number of Modes**

The derivation of blackbody spectra started with finding the mode density (maximum) of a cavity for harmonic n. Mode density of a harmonic n had been obtained by using a linearly laid 3D grid of radius n in phase space. This approach incorrectly assumes that every integer nod in 3D phase space is a legitimate mode in a cavity. The problem with this approach is that not all the integer nodes in a sphere of radius n are allowed modes in a cavity. Only the nodes that satisfy the Pythagoras integer quadruples $n^2=n_x^2+n_y^2+n_z^2$ are legitimate modes for harmonic n, where n, n_x, n_y, n_z are all integers. The mode density for the harmonic n cannot be determined by counting the integer nodes in the volume of a sphere of radius n on phase space.

Finding the allowed modes for harmonic n in a cavity is equivalent to determining the solutions to the Pythagoras integer quadruples or solutions to the extended 3D Fermont problem of second order. The number of solutions to the Pythagoras integer quadruples is not proportional to the n^2 or harmonic frequency f^2, where f=nc/2(2r) for a spherical cavity of radius r, c is the speed of light, n is an integer. Plank Spectrum, Rayleigh-Jeans spectrum, and Wien spectrum are based on the fundamentally incorrect idea that the mode density can be obtained by laying out a linear 3D grid and counting all the integer nodes within a sphere of radius n in phase space, and it is proportional to n^2 or f^2. It is this incorrect approach to counting modes for a harmonic n in a cavity that led to an appearance of a blackbody catastrophe that was never existed.

What modes a cavity can contain say nothing about what modes are present in a cavity of a blackbody at temperature T. Blackbody spectrum cannot be derived by using maximum mode density. If the number of modes is proportional to n^2, then the number of modes for n=1 is proportional to 1 and the number of modes for n=2 is proportional to 4, when in fact the actual number of modes for n=1 is 6 and for n=2 it is 12. This itself shows the invalidity of the claim that the number of modes is proportional to n^2 or f^2 in Plank and Rayleigh-Jeans spectra. The number of Pythagoras integer quadruples for integer n is not known to be or not proven to be proportional to n^2. No

such relationship exists for Pythagoras integer quadruples or to the 3D Fermont problem.

"*The actual number of modes for any harmonic n in a cavity is determined by the Pythagoras integer quadruples of n or the extended 3D Fermont problem of second order*."

"*Blackbody spectrum cannot be derived by using mode density*."

"The c*orrect frequency function is necessary but not sufficient for a correct spectrum. The derivation must be correct since incorrect derivation can also give the correct frequency function*."

If all you want is a frequency function that matches the observed data, you can always obtain the correct frequency function simply by fitting a curve to the observed data using a guestimate together with least square estimation. Correct frequency function that fits the observed data obtained in such a manner says nothing about the underlying phenomenon that generated the radiation. It is only if we derive the blackbody radiation from fundamentals under a theoretical foundation that matches the observed data that we have a phenomenon that describe the blackbody radiation.

Why Plank had to use such an experimental data driven approach with an ad-hoc arbitrary and unrealistic assumption of quantized energy, which is invalid, for the estimation of blackbody spectrum is understandable since not much was known about the atomic structure at the time. Without the actual knowledge of the atomic structure, it is not possible to derive the blackbody spectrum from a coherent theoretical foundation.

A matching frequency function is necessary for a spectrum to be correct, but not sufficient. The derivation must be correct. Wrong derivation can have the correct frequency function. A spectrum with the correct frequency function can come from a wrong approach. For spectrum to be correct, the derivation must be correct; it is not just the frequency function that is to be correct. A correct spectrum demands certain characteristics to be satisfied. A spectrum with correct frequency function cannot be correct unless all the required characteristics of a blackbody spectrum are satisfied. None of the blackbody spectra satisfies the required characteristics demanded by the correct spectrum. We consider those characteristics later. Plank spectrum, Rayleigh-Jeans spectrum, and Wein spectrum are incorrect; they do not represent the blackbody spectrum.

c) **Blackbody Spectrum Through a Hole has Nothing to do with the Discrete Modes in a Closed Cavity**

Spectrum of a blackbody cavity is discrete if it is a closed blackbody cavity. As soon as we drill a hole on the cavity, it does not matter how small the hole is, the spectrum through a hole is not discrete. The waves that are coming out through a hole are not limited to the discrete frequencies that are present in a closed cavity. Whatever the frequencies generated by the oscillating electrons on the inner surface of the cavity can propagate through the hole. Spectrum through a hole on a cavity is continuous. The discrete spectrum in a closed cavity does not determine the spectrum of the waves through a hole on the cavity.

Counting the modes in a cavity is a useless exercise for determining the spectrum through a hole on a cavity. Modes counting cannot be used to determine the blackbody spectrum through a hole. Yet, all the blackbody spectra have been derived based on modes counting. That is the problem with all the available blackbody spectra. Any blackbody spectrum based on modes counting is fundamentally flawed. All the blackbody spectra are invalid even though they all have the correct frequency function within their respective frequency bands. What is important is that the correct blackbody spectrum cannot be determined by modes counting. As we are going to demonstrate, mode counting is not required for determining the blackbody spectrum.

"*What is observed through a hole on a cavity says nothing about what is inside the cavity. What is inside a cavity is a discrete spectrum. What is observed through a hole on a cavity is a continuous spectrum*. *Spectrum inside a cavity says nothing about the observed frequencies in between harmonics*."

"*Continuous spectrum observed through a hole on a cavity cannot be derived by analyzing the discrete spectrum of a cavity*. *That is one of the fundamental flaws of all the blackbody spectra including the Plank spectrum*."

d) **Equation** e=hf **is Meaningless as Energy Quanta**

In e=hf, f is the frequency. Frequency of what? This equation is simply meaningless. How long does one have to wait to get that energy? One cycle, hundred cycle, or forever? Frequency is not the sole determining factor of the energy of an entity associated with an oscillation of a frequency f. Besides, there is nothing call the energy of a wave or an oscillation of a mass if the oscillation is perpetual. There is the power of a wave or oscillation of a mass, which is the energy of a wave or oscillation of a mass per second or per unit time. The energy e of frequency f has no meaning; it is meaningless without additional qualifiers. You cannot get energy of a wave or an oscillation of a mass just by multiplying its frequency by a constant.

A wave can have different amplitudes. Oscillations of a mass can have different maximum displacements. The energy per certain length of time varies with the amplitude. A wave or an oscillation of a mass can go on for any amount of time up to infinity if it is perpetual. If it is a wave burst, the energy of the wave burst depends on its frequency, amplitude, and the time span of the wave burst. How long do we have to wait to get the energy e given by e=hf? A wave can

be one wavelength long, several wavelengths long, or perpetual. An oscillation of a mass can be one wavelength long, several wavelengths long, or perpetual. The energy of a wave of one wavelength is not the same as the energy of the same wave of several wavelengths. The energy of a wave or oscillation varies with the time it lasts.

Without specific time interval or specific number of wavelengths, you cannot describe the energy of a wave or an oscillation of a mass. The e=hf by itself says nothing about the energy. Energy of a wave or an oscillation of a mass for a certain length of time is not defined by the frequency itself. Yes, energy of a wave or an oscillation of a mass is a function of frequency, but it is not equal to a universal constant multiplied by the frequency. There are other factors that determine the energy of a wave or an oscillation of a mass besides the frequency. The magnitude of the oscillation is an another determining factor of energy of an oscillator beside frequency. Without the magnitude of an oscillation, frequency has no existence, an oscillator has no existence.

The energy of a wave for a specific time interval depends on the maximum amplitude of the wave. The energy of an oscillating mass for a specific time interval depends on the maximum displacement of the oscillation and the mass. Just because the relationship e=hf in Plank's blackbody spectrum gives a matching frequency function for the observed data through a hole on a blackbody cavity, it is meaningless to say energy of a wave of frequency f is equal to a universal constant h times the frequency f; it defies the reality. Frequency of a wave itself does not determine the energy of a wave.

If the energy comes in energy quanta e=hf, then, how do you define potential energy using energy quanta? The e=hf has no meaning for the gravitational potential energy since gravitational potential has no association with an oscillation frequency f. If the energy comes in energy quanta e=hf, how do you define the kinetic energy of a mass moving at constant speed? The kinetic energy of a mass moving at constant speed on a linear path cannot be represented by e=hf since the kinetic energy of a mass moving at constant speed on a linear path has no associated oscillation frequency f. There is something fundamentally wrong with the claim that energy comes in energy quanta e=hf. It certainly cannot represent the energy of a wave or an oscillation of a mass. The presume energy quantum e=hf cannot represent any type of energy with its universal constant h since all the energies are not created equal.

All the efforts in blackbody spectra in the late nineteenth and early twentieth century had been not to derive the blackbody spectrum theoretically, but to find a function that fits the observed spectrum through a hole on a blackbody cavity. Rayleigh-Jeans function did not have a match for all frequencies; it only approximately agrees for low frequencies. Wein function did not have a match for all frequencies; it only approximately agrees for high frequencies. On the other hand, high and low are arbitrary. There was no spectrum that agrees for in between low and high frequencies. There was no blackbody spectrum that agrees for all the frequencies. To fill this void, Max Plank in 1900 AD used the Rayleigh-Jeans function as the foundation and tried to find a function that matches the observed spectrum of a cavity through a hole for all frequencies.

Plank assumed that the energy at any frequency f comes in energy quanta e=hf, where h is Plank constant. Problem here is that e=hf itself is meaningless for an oscillator of mass m oscillating at frequency f, and for an electromagnetic wave of frequency f since energy of an oscillation has no meaning without a specific time interval. In addition, you cannot use the same energy packet e=hf for both the kinetic energy of an oscillating mass as well as for the electromagnetic energy of a wave since the kinetic energy and electromagnetic energy are not the same; they are distinct. Not all energies are created equal.

When we say energy, in general, we mean the kinetic energy that is associated with temperature and entropy. None of the other energies has temperature and entropy. The other energies can generate kinetic energy and hence temperature and entropy in the presence of masses. If the temperature is increased, then, there is an added energy. If temperature goes down, then there is a loss of energy. So, the kinetic energy and temperature is interlinked. Kinetic energy has no existence without particles of mass. Temperature has no existence without particles of mass. There is no entropy without temperature. There is no temperature without masses and hence there is no entropy without masses. Therefore, in a sense, it is possible to say that there is no energy without particles of mass since electromagnetic energy cannot generate heat without masses.

However, energy is not limited to kinetic energy. There are energies that have no existence without masses but have no association with temperature. Potential energy has no association with temperature. Potential energy is distinct from the kinetic energy; they are not the same. You cannot use the same energy quantum to define both kinetic energy and potential energy since they must maintain their distinctness. The only thing that is common for the potential energy and kinetic energy is that they both have no existence without an association with a mass.

Similarly, an electromagnetic wave has its own kind of energy, a different kind that has nothing to do with kinetic energy or temperature. Electromagnetic energy is a misnomer. Electromagnetic energy is simply a measure of electromagnetic wave strength; it does not represent any real energy that is associated with a temperature or entropy. Electromagnetic waves do not have kinetic energy or a momentum. Energy of an electromagnetic wave has no association of a mass. Energy of an electromagnetic wave has no association with temperature or entropy. Without kinetic energy of particles of mass, there is no entropy. Without a temperature, there is no entropy.

Electromagnetic waves or light cannot generate mechanical energy or heat without charge particles. Since there are no charges without masses, it is only in the presence of masses that electromagnetic waves can increase the temperature. Light itself has no use without masses. Then again, there will be no light without masses. The claim that electromagnetic waves generate mass has no truth to it. Mass has nothing to do with electromagnetic waves. Gravity has nothing to do with electromagnetic waves. Gravity is not a wave. Gravity does not propagate. A single field cannot propagate. The claim that there are gravitational waves, and they propagate at the speed of light is false. What is gravitational wave got to do with the speed of light? Nothing. If there are gravitational waves that propagate at constant speed independent of an observer, then, we are back to the Einstein's relativity with respect to gravitational waves, the same de ja vu; that is of course if you consider Einstein's Special Relativity and General Relativity are true.

Einstein's Special Relativity and General Relativity do not hold true [2]. Now, if there are gravitational waves and the speed of gravitational waves is a constant, gravitational waves must be observer independent in addition to light being observer independent. No two wave phenomena in nature can have constant speed if Special Relativity holds true. Since light is travelling at constant speed, gravitational waves travelling at constant speed cannot exist. Despite those arguments, there is a real reason why gravity cannot be a wave. Gravity is a single field. Single fields cannot propagate. One cannot tango. There cannot be a propagating disturbance in a single field. There are no propagating gravitational disturbances or gravitational fields. There are no propagating single fields. Single lonely field cannot propagate. Propagation requires a conjugate pair. Gravitational field does not have a conjugate pair. There are no gravitational waves.

Electromagnetic waves have no association with kinetic energy since electromagnetic waves have no mass. Without any association with kinetic energy, electromagnetic waves have no temperature. Electromagnetic waves have different type of energy from kinetic energy. Energy that electromagnetic waves have is not the energy we usually refer to as energy. It is the kinetic energy that we refer to as the energy, which keeps us warm. Electromagnetic energy is not energy without matter. It is the matter that transforms the electromagnetic energy into energy. We cannot put the electromagnetic energy in the same category as kinetic energy of a mass. We cannot use the same energy quantum to define both the kinetic energy and the electromagnetic energy since they are distinct; they have nothing in common. Electromagnetic energy has no association with a mass except in the generation stage since there is no existence of charges without masses. The same universal energy quantum e=hf cannot represent different types of energies since the energy quantum does not contain a header that carry the self-identification. You cannot clump together different types of energies under one universal energy quantum e=hf.

More importantly, potential energy of a mass has no associated frequency. Kinetic energy of a mass moving at constant speed has no associated frequency. Energy quantum e=hf is meaningless for any energy that is not a result of an oscillation. The e=hf has no meaning for the potential energy of a mass and for the kinetic energy of a mass moving on a linear path at constant speed.

If a wave of frequency f comes in quanta, there must be a mechanism to assemble the quanta into the energy of a unique coherent wave. If an oscillating mass of frequency f comes in quanta, there must be a mechanism to assemble the quanta into the energy of one unique oscillating mass. There is no mechanism in nature to assemble the energy quanta into one unique whole of an oscillating mass at frequency f or into a one unique whole of a coherent propagating wave of frequency f. If energy comes in quanta, there is no way of distinguishing kinetic energy from electromagnetic energy, which are two completely different entities. If they are the same, why do we have an electricity crisis? You cannot substitute kinetic energy in the place of electromagnetic energy and vice versa. If e=hf, then, there is no way to distinguish a kinetic energy quantum of an oscillating mass at frequency f from an electromagnetic energy quantum of a propagating electromagnetic wave of frequency f. Without such distinguishing capability, nature cannot function.

If an object of mass is oscillating at frequency f, then, the kinetic energy of the oscillation is given for a certain time interval. The same is true for waves. For an electromagnetic wave, the energy has no meaning without a specific time interval. Oscillating object can go on oscillating perpetually. A wave can go on continuously. The question is, how long do we have to wait for the energy quanta e=hf? Since the energy e=hf must be given for a specific time interval, the units of h must be Joule square second ($J.s^2$) or kg square meter ($kg.m^2$), not Joule second (J.s) that is cited everywhere.

Max Plank arbitrarily assumed that the kinetic energy of oscillators on a black body comes in indivisible energy quanta e=hf just for the purpose of obtaining a frequency function that matches the observed spectrum of a blackbody cavity observed through a hole. Plank did not have any evident to support the validity of his claim except that he could obtain a spectrum that matches the observed spectrum through a hole with that quantum energy e=hf assumption. The matching of a spectrum with observed data is not a guarantee that it is the correct spectrum.

In the case of spectrum, if the derived spectrum matches the observations, that does not confirm the validity of the derivation of the spectrum. It is true that in a spectrum, the scale factor is not important. If the spectrum matches the observed data except for a scale factor, then, the spectrum will pass as correct.

What is important in blackbody spectrum is frequency function. All the blackbody spectra got the frequency function correct within their respective frequency bands. Everybody concluded that the blackbody problem was solved. What more do you need when we have a spectrum for a blackbody that matches the observed spectrum through a hole on the blackbody cavity? At least that happens to be what everybody thought? However, knowing frequency function for the blackbody radiation is not going to be the end of the blackbody radiation story, not at all. Blackbody problem does not stop at that. The knowledge of the frequency function itself that matches the observed blackbody spectrum says nothing about the underline physics of the process that generated the spectrum. Knowledge of the frequency function that matches the observed spectrum may be sufficient for engineering, but not for physics.

In the case of blackbody spectrum, scale factor says a lot more about the correctness of the derivation of the spectrum. If the scale factor of a blackbody spectrum depends on the geometry of a blackbody cavity, it says that the derivation of the spectrum is incorrect. All the blackbody spectra, Plank, Rayleigh-Jeans, Wein are dependent on the cavity, and hence their derivations are incorrect.

Blackbody spectrum must be cavity independent. That is a must for the correct blackbody spectrum. There is no way around it. If all the blackbody spectra are cavity dependent, it is an indication that there is a very fundamental problem in the derivations of all the blackbody spectra. It is an indication that they are all based on a foundation that is fundamentally flawed. When the derivation of the Plank spectrum is fundamentally incorrect, any assumption that had been made cannot stand. Since the derivation of the Plank spectrum is incorrect, the quantized energy assumption cannot stand. There are no energy quanta, e≠hf. Energy is not quantized.

The developers of the blackbody spectrum totally disregarded the fact that the blackbody spectrum that matches the observed spectrum through a hole on a cavity is no different from the spectrum of the blackbody itself and it is not the same as the spectrum inside the cavity. Blackbody spectrum could be obtained by other means without using the quantized energy assumption e=hf.

As we are going to see, the blackbody spectrum can be obtained with the true meaning of e=hf for an oscillating mass m at frequency f with maximum displacement A_o. The relationship e=hf is only applicable to an oscillating mass of frequency f. The parameter h in e=hf is not a universal constant. The e=hf is not an energy quantum. In fact, the energy cannot come in quanta since it leads to an ambiguity. Plank constant is not a constant.

"*e=hf is not an energy quantum*. *The e=hf with universal constant h is simply meaningless*."

Plank made the mistake of using the incorrectly derived Rayleigh-Jean spectrum as the starting point and extending it using unnecessary and unrealistic assumptions to obtain a function that fits the observed spectrum through a hole on the blackbody cavity instead of deriving the spectrum of a blackbody by the first principle and testing it with the observed data. That is where the seed of what derailed the physics into a hopeless abyss of quantum weirdness lies. Plank's blackbody spectrum is incorrect and invalid. Energy is not quantized, e≠hf. It is also true that the Einstein's ubiquitous mass-energy relationship is also false, $e \neq mc^2$ [2].

"*There cannot be a universal energy quantum since all energies are not created equal,* e≠hf."

"*The relationship e=hf is meaningless since the energy of any oscillator of frequency f has no meaning without specific time interval*."

"*Potential energy of a mass and the kinetic energy of a mass moving at constant speed on a linear path have no associated frequency and hence cannot be represented by e=hf*."

e) **The Ambiguity Arises with Energy Quanta** e=hf

There is a problem if the oscillators of frequency f come in energy quanta e=hf. If an oscillator has energy E=n(hf), where n is an integer, then, n quanta of e=hf must be bound together for the oscillator to work or in other words n energy quanta must be entangled for an oscillator oscillating at frequency f to function. It is here the problem lies. If energy comes in quanta, E=n(hf) is mathematically the same as E=h(nf), but they are physically distinct. They both are the oscillators of the same energy but physically distinct. There is no way to discriminate which is which based on energy. If we have energy E, there is no way of determining if it is an oscillator of E=n(hf) or an oscillator of e=h(nf) because energy quanta do not carry a header indicating which is which. Any quantum must carry an identification header. A quantum cannot exist without a header that identifies the quantum. The problem is that there are no such identification quantum energy headers in the nature. If any entity with belonging comes in quanta, quantum must be accompanied with an identification header.

Any entity that has a belonging cannot come in quanta. Energy cannot have such an ambiguity. Energy cannot be quantized. Energy cannot come in quanta. The perception that only way to explain the blackbody spectrum obtained through a hole on a blackbody cavity is using the assumption that the energy comes in quanta of fixed energy e=hf is fundamentally wrong. There is no reason to use a cavity to derive the blackbody spectrum. Blackbody spectrum must be cavity independent. There are other ways to obtain the blackbody spectrum without analyzing a blackbody cavity. It is possible to test the derived blackbody spectrum using the observed data through a cavity without a problem since radiation of a blackbody is the same as what is observed through a hole on the cavity.

Counting modes in a closed cavity for determining a spectrum through a hole on a cavity is fundamentally wrong. Counting the modes using a linearly laid out 3D grid of radius n in phase space is fundamentally wrong. Even one opts for the correct method of finding the modes using the Pythagoras integer quadruples, it will take us nowhere since mode counting is not much use in finding the blackbody spectrum. The number of Pythagoras Integer Quadruples (PIQ) of a harmonic n is not proportional to n^2 and hence the spectrum obtained with mode counting will not match the observed spectrum. It is the incorrect mode counting that gave the correct frequency function. If the mode counting had been done correctly, it would not have given the correct frequency function. The correct frequency function alone of a blackbody spectrum is not a validation for the correctness of the derivation and the blackbody spectrum.

The maximum number of modes a cavity can contains says nothing about what modes cavity have. The arbitrary claim that the energy comes in quanta of e=hf just for the sake of matching a function to the observed spectrum through a hole is unrealistic. If kinetic energy comes in quanta, the velocity of an oscillating mass must also come in quanta, which is impossible. Velocity is a vector. Vectors cannot come in quanta. Vectors cannot be quantized. The energy quantum e=hf simply meaningless.

"*If any unique whole comes in quanta, quantum must have the information on how they can be combined to form a unique whole; that is what is missing in energy quanta. That is why energy quanta are not real, not possible.*"

"*There is no internet without data quanta with headers*. What would the internet be without headers in data quanta?"

"*A header is an essential part of any quantum. Nature has no mechanism to incorporate belonging information into a quantum. Neither energy nor anything non-material in nature can come in quanta*."

f) **If** e=hf **is Not an Energy Quanta, What Does** e=hf **Really Represent?**

Max Plank's arbitrary claim that e=hf represents an energy quantum of an oscillator of a mass oscillating at frequency f is incorrect. However, the relationship e=hf is not something without an actual physical meaning. As we are going to see, the equation e=hf has a real meaning with regards to the kinetic energy of an oscillating mass at frequency f. In fact, it is the kinetic energy per cycle of an oscillating mass at frequency f that is represented by e=hf. The energy e=hf is not an energy quantum. Not all Energies are created equal for them to come in one type of quanta. Electromagnetic energy and kinetic energies are different and cannot have a common quantum e=hf.

How can the potential energy be represented by e=hf since potential energy has no association with a frequency? How can the kinetic energy of a mass moving at constant speed on a linear path can be represented by e=hf when it has no association with a frequency? As we are going to see, even the kinetic energy of an oscillating mass of frequency f and electromagnetic energy of an electromagnetic wave frequency f cannot be represented by energy quanta e=hf even though they both have associated frequencies. Except the mass itself, nothing else can come in quanta. Waves cannot come in quanta. Light cannot come in quanta even hypothetically. The relationship e=hf is simply the kinetic energy of a mass oscillating at frequency f, and h is not a universal constant.

"*The e=hf only has a meaning as energy per cycle of an oscillator of mass m of frequency f, nothing else*. The h is not a constant."

"*e=hf is not an energy quantum. Energy is not quantized*"

g) **Einstein's Claim that the Light Come in Energy Quanta** e=hf **is Incorrect and Meaningless**

Einstein went even further blindly on the same incorrect path and claimed that the electromagnetic energy or light itself comes in energy quanta e=hf. The problem is that electromagnetic waves do not have actual energy that has any association with a temperature. Electromagnetic energy does not refer to real energy. Electromagnetic energy simply refers to the wave strength.

It is ironic that Einstein used Boltzmann's entropy relationship and Wein's entropy principle together with Wein's blackbody spectrum for high frequency range to demonstrate that electromagnetic energy also comes in corpuscles, light particles, or photons of energy quanta e=hf, because Boltzmann entropy, Wein's entropy principle, and Wein spectrum do not apply for massless. Boltzmann entropy, Wein's entropy principle, and Wein spectrum do not apply for light or electromagnetic waves. Light has no mass. Light has no momentum. Light has no thermal energy. Light has no temperature. Light has no entropy. Boltzmann's entropy does not apply to light.

If a cavity is a vacuum containing light only, cavity has no temperature. A vacuum cavity with light is still a vacuum. Space without matter is a vacuum. As a result, Wein's spectrum and Boltzmann entropy, Maxwell-Boltzmann distribution do not apply to a vacuum with light. Equations specifically derived for objects of mass are useless for massless waves. Newton's laws designed for objects of mass do not apply to light. Einstein's used whatever the available equations derived for particles of mass without any regard to their applicability for light and went on to make one unrealistic claim after another. He used whatever the available experimental results to justify his unrealistic claims paying no attention to their applicability.

Einstein's assumption that all the light can be in a sub-volume v in a cavity of volume V is simply

meaningless since coherent light cannot be spatially random. Further if light comes in energy quanta e=hf, we have the same problem for the energy E=n(hf) since n(hf) is mathematically the same as h(nf), yet physically they have different abilities. There is no way of distinguishing E=n(hf) from E=h(nf) if electromagnetic energy comes in quanta e=hf. There is no way of identifying kinetic energy of a mass oscillating at frequency f from electromagnetic energy of an electromagnetic wave of the same frequency f if they both come in energy quanta e=hf even though they are not the same characteristically. Kinetic energy cannot do what electromagnetic energy can do and vice versa.

Potential energy and the kinetic energy of a mass moving at constant speed cannot come in quanta since they have no associated frequency. This itself makes the Schrodinger equation invalid.

"*Einstein's light particles or photons derivation is invalid*. *Light has no entropy*."

"*Coherent light cannot come in spatially random photon or light quanta*."

"*Particles cannot propagate. Any entity with momentum cannot propagate. An entity with momentum moves. Massless or momentum-less waves propagate."*

h) **What is Wrong with Einstein's Explanation of Photoelectric Effect with Photon or Light Quanta** e=hf

Einstein derived the photons by using equations that do not apply to light and used the photon or light quanta e=hf to explain the photoelectric effect observed by Philip Lenard in his photoelectric experiments. As we are going to see later, photoelectric experiment of Lenard is incomplete and hence the conclusions are incorrect and incomplete. It is the incorrect and incomplete conclusions made by incomplete photoelectric experiment that required hypothetical unrealistic light quanta or photons for an explanation. If Lenard's photoelectric experiment had been complete, the results could not have been explained by Einstein's incorrectly derived hypothetical photons.

Einstein considered light quanta or photons as billiard balls to explain the interaction of light with matter. Compton used this mistaken identity of light as billiard balls to wrongfully justify his experimental results. Interaction of light with matter is not a momentum transfer. Light has no momentum to transfer. Massless has no momentum. You cannot bestow a momentum on light by proclamation. The reality is that the light interacts only with charge particles. Light has no effect on fundamental neutral particles. Light interacts with the electrons in an object of mass. The only reason that the light interacts with matter is that matter contains charge particles, especially electrons.

Einstein tried to explain the ejection of an electron from a metal by light as an outcome of a collision of a photon with an electron. To Einstein, interaction of light with matter is a momentum transfer according to Newton's laws. The problem with that assumption is that the light is massless. Massless has no momentum.

You cannot force a momentum on massless. If light can increase the speed of an object, then, the reverse must also be true. A moving object can also be able to increase the speed of light, which is indeed not true since the speed of light is constant. As a result, the claim that the interaction of light with matter is a result of a momentum transfer cannot be true. Light has no momentum to transfer. Transfer of electromagnetic energy on to a mass is not a result of a momentum transfer. It is simply the process of electromagnetic energy generating kinetic energy in the presence of charge particles or electrons.

In addition, if light comes in energy quanta e=hf, then, if we have energy E, it is not known if the energy E is due to n photons of frequency f, E=n(hf) or one photon of frequency nf, E=h(nf). The energy E is ambiguous if light comes in energy quanta or photons. Practical consequences of this are significant since h(nf) may eject an electron from an atom whereas n(hf) may not even though they both have the same energy.

If light is quantized or electromagnetic energy comes in photons of energy e=hf, then, the electric field must also be quantized since electromagnetic energy is half the square magnitude of the electric field. Electric field is a vector, and vectors cannot come in quanta. Light cannot consist of energy quanta or photons of e=hf. Electromagnetic waves cannot consist of photons of energy e=n(hf), n=1, 2, 3, … Einstein's derivation of light quanta or photons based on entropy is conceptually incorrect since light has no entropy.

As we are going to see $e_m=h_mf$ is simply the energy of an oscillating mass of frequency f per unit cycle, not an energy quantum or a particle. The h_m depends on the square magnitude of the maximum displacement of the oscillator and the mass of the oscillator. Equation e=hf has no meaning for light or electromagnetic waves. As we are going to see, in the case of electromagnetic waves, the energy per unit cycle is $e_e=h_e/f$. The h_e depends on the square magnitude of the peak electric field, $h_e \neq h_m$. The e=hf does not apply to electromagnetic energy. Electromagnetic energy is not quantized. Energy in general cannot come in quanta.

i) **Plank Constant is Not a Constant**

The average kinetic energy per unit cycle of an oscillating mass at frequency f is given by e=hf. The parameter h is not a constant. As we are going to see it depends on the square of the maximum displacement and the mass, the parameters of the oscillating mass. The maximum displacement of an oscillating electron varies with the temperature. The h

depends on the temperature and the mass of the oscillator. The h is not a universal constant.

j) **There are No Heat Waves**

The widely used phrase “Heat Radiation” is simply meaningless. Heat is not a wave. Waves do not have heat. There are no heat waves. There is no heat without matter. Heat does not radiate. Heat generates heatless electromagnetic waves that radiates. Electromagnetic waves propagate without an energy loss in a vacuum.

Nature uses electromagnetic waves as an intermediary agent to transfer heat from one object to another at a distance. Without electromagnetic waves heat cannot be transferred from one object to another separated by a vacuum. Without electromagnetic waves, heat transfer can only take place by collision of matter. In the heat transfer process, the transfer function of the intermediary agent, electromagnetic waves, is white or frequency independent. Electromagnetic waves transfer heat from one object of matter to another object of matter separated by a distance without altering the frequency and without energy loss in a vacuum in the form of electromagnetic wave energy.

k) **Blackbody Spectrum Must be Independent of the Cavity Geometry**

The number of modes and harmonics present in a blackbody cavity is unknown. A cavity can hold an infinite number of modes and harmonics does not mean a cavity has all the modes and harmonics it can hold. A cavity can only contain whatever the modes and harmonics that are put into the cavity by the oscillating electrons on the inner surface of the blackbody cavity. So, it is not possible to obtain the blackbody spectrum by analyzing what a cavity can hold.

Even though spectrum of a blackbody cavity is discrete, the spectrum of the waves through a hole on the cavity is continuous. Continuous blackbody spectrum through a hole cannot be obtained by analyzing discrete harmonics of a closed cavity. Analyzing the discrete spectrum of a cavity says nothing about the frequencies in between the discrete harmonics observed through a blackbody cavity. Analyzing a cavity is a wrong approach to deriving blackbody radiation.

Blackbody radiation cannot be obtained by analyzing a cavity. Plank managed to get the correct frequency function that matches observation by wrong method at the cost of unrealistic unnecessary assumptions. Getting the frequency function correct is not the whole process in spectrum derivation; it is half the process. The derived spectrum for blackbody must also be cavity independent. This where Plank’s spectrum fails. Plank spectrum is cavity dependent. Cavity dependent spectrum cannot be the spectrum of a blackbody. Plank spectrum is not the blackbody spectrum. Although all the textbooks claim that Plank’s spectrum is cavity independent, it is cavity dependent. What is in textbooks are not always correct. Textbooks are written by people. People make mistakes especially when they adhere to a false doctrine religiously. A religious belief blinds the reality.

Blackbody spectrum must be obtained by analyzing the spectrum of oscillating electrons on the blackbody itself. What is coming out of a hole on a blackbody cavity is the radiation of the blackbody itself, not the limited content in the cavity. The derivation of blackbody spectrum can be achieved without the assumption of quantized energy. Quantized energy assumption or energy quanta e=hf is unnecessary for the derivation of blackbody spectrum. Energy is not quantized.

Plank, Rayleigh-Jeans, and Wein spectra are dependent on the geometry of the blackbody cavity. Unlike the Plank, Rayleigh-Jeans, and Wein spectra, the correctly derived blackbody spectrum must be independent of the cavity geometry. Blackbody spectrum must be cavity independent. The cavity dependence of Plank, Rayleigh-Jeans, and Wein spectra is a good indication that the derivations of these spectra are incorrect.

l) **Philip Lenard’s Photoelectric experiment is Incomplete and Inconclusive**

The experiments that have been carried out for the study of photoelectric effect are incomplete. If an experiment demonstrates that the dislodging of an electron by light is not affected by the amplitude of the light and totally determined by the frequency of light alone, then, there must be something wrong the way that experiment had been carried out due to the undeniable fact that there cannot be a frequency without an amplitude. Although Lenard claims that he carried out his photoelectric experiment to observe the effect of amplitude of light, the methodology he used to change the amplitude does not have any effect on the amplitude at all. You cannot change the amplitude of light by changing the intensity of a light source.

Lenard changed the intensity or brightness of the light source and thought he was, in effect, changing the amplitude of light. You cannot change the amplitude of light by changing the intensity or the brightness of a light source. We have no access to the amplitude of light at the source. We only have the access to amplitude of light once the light is emitted by the source. We cannot change something we have no access to. Changing the intensity of a source is different from the changing intensity at a destination or along the path of propagation; they cannot be achieved by the same mean.

We only have access to the amplitude of light when the light has left a source and starts propagating. It is along the path of the propagation that we have access to the amplitude of light, and hence our ability to control the amplitude of light. Photoelectric experiments have not been carried out by changing the amplitude of light along the path of propagation after the light has left the source and before the light being entered the photoelectric experiment.

The magnitude of light cannot be controlled by dimming a light source or enhancing it by adding more light sources. By dimming a light source or adding more light sources, you are only changing the rate of light bursts emitted by a source. Dimming a light source or adding more light sources, you cannot change the amplitude of a light. It is only the rate of light bursts that are released by a source that you can change by meddling with a light source.

If you want to study the effect of amplitude of light on the photoelectric effect, you must use a semi-transparent reflector along the path of the propagation before light enters the photoelectric experiment so that a part of the light is reflected at the reflector while the rest is allowed to continue towards the photoelectric experiment. By changing the amount of light reflected by the semi-transparent reflector, you can control the amplitude of the light entering the photoelectric experiment. This was not done in Lenard photoelectric experiment and hence it is incomplete. Some of the Lenard's photoelectric conclusions are incorrect and some are partially correct.

m) **Photons or Light Quanta cannot Exist**

You can control the rate of light bursts emitted by a light source by controlling the intensity or the brightness of the source. If you dim the light source further and further, you can decrease the rate of burst further and further to a level you may be able to see the separate light bursts. Contrary to many claims in textbooks, these light bursts are not light quanta or photons. You cannot use these light bursts to claim the existence of photons. These light bursts are not photons. By dimming a light source what you get is not photons, they are light bursts at such a slower rate you can see them separately.

If you send these separated bursts through a semi-transparent reflector, a part of each burst will be reflected while the rest will be transmitted through indicating that these bursts are not light quanta or photons. If these bursts had been light quanta or photons, they could not be further divided into reflected and transmitted components at a semi-transparent reflector as the light must do at a semi-transparent reflector.

The claim that we can separate photons or light quanta by dimming a light source is false. What we get by dimming a light source is individual light bursts that are perfectly capable of further dividing into reflected and transmitted waves at a semi-transparent reflector, at a medium boundary. If light comes in light quanta or photon, photon will be in limbo at a semi-transparent reflector since a photon or light quantum cannot be further divided. Light burst cannot be undecisive at a medium boundary and hence there cannot exist light quanta or photons. It does not matter how small the energy of a light burst, it must be divided into reflected and transmitted parts at a boundary depending on the incident angle.

n) **Einstein's Photons Cannot Explain Well-Designed Complete Photoelectric Experiment that is done for varying frequency, varying rate of light bursts, as well as for varying amplitudes.**

Einstein's photon or light quanta only explains partially complete photoelectric experiments such as Lenard's photoelectric experiment that is done under constant amplitude of light, an experiment that is run by dimming or enhancing light source. Einstein's photons or light quanta cannot explain the result of a complete photoelectric experiments that include the varying amplitudes of light by using a partially reflective surface before the light enters the photoelectric experiment.

The ability of light to eject an electron from a metal must depend on both the frequency of light as well as the amplitude of light. The claim that the ability to eject an electron from a metal depends only on the frequency and independent of the amplitude of light is false since frequency has no existence without the amplitude.

The amplitude of an electromagnetic wave generated by an oscillating electron depends on the frequency of the oscillating electron. So, it is incorrect to claim that the number of electrons ejected, or the photoelectric current is independent of frequency and depends only on the amplitude of light. The number of electrons ejected, or the photoelectric current depends on both the amplitude and the frequency of light.

In Lenard's experiment, he thought he could change the amplitude of light by changing the intensity or the brightness of the light source. This is not possible. You cannot change the amplitude of light by changing the intensity or brightness of the source. By changing the intensity of the source, Lenard was changing the burst rate of the source. When the burst rate increases, the photoelectric current will increase. In Lenard's experiment the increase of the photo electric current is due to the increase of the burst rate. Lenard never changed the amplitude of light in his experiment. Lenard's attribution of the increase of photoelectric current with the intensity of the source to increasing amplitude of light is incorrect, a false misrepresentation.

The claim that the speed of ejected electrons is unaffected by the amplitude of light and affected only by the frequency of light is false. This false conclusion is a result of the incompleteness of the Lenard's photoelectric experiment. The speed of all the ejected electrons depends only on the frequency if and only if the amplitude of light remains a constant. In the Lenard's photoelectric experiment, the amplitude of light remains a constant. What is true is that all the ejected electrons have the same speed if both the amplitude and the frequency of light remain constants.

Although Philip Lenard thought that he was changing the amplitude when he changed the intensity of the light source, the fact is that he never changed the amplitude of light in his photoelectric experiments. Lenard did not carry out experiments to study the effect of amplitude of light on photoelectricity. Lenard only studied the effect of frequency and the burst rate on photoelectric effect.

The effect of amplitude on photoelectricity cannot be known from the Lenard's experimental results.

If you keep the frequency constant and vary the amplitude of light entering the photoelectric device by using a semi-transparent reflector, you will see the effect of amplitude of light on photoelectricity. The photoelectric current as well as the kinetic energy of the ejected electrons must vary with both the amplitude and the frequency of light. The ability to eject an electron from a metal depends on both the amplitude and the frequency of light. The claim that the ability to eject an electron depends only on frequency of the light is false since frequency has no existence without the amplitude.

o) **There are No Light Quanta**

It is important to note that by dimming or enhancing the intensity or brightness of a light source, you are only changing the rate of light burst from a source. If you reduce the brightness or the intensity of the source further and further, you will ultimately see the individual light bursts. These individual light bursts get further divided into a reflected part and a transmitted part at a semi-transparent reflector. The claim that these individual bursts is photons or light quanta of energy e=hf is false for the fact that if they are photons or energy quanta they cannot be further divided at a semitransparent reflector as light should. If light comes in quanta or photons, a light quantum will be in limbo at a semi-transparent reflector since a quantum cannot be further divided.

Individual light bursts we witness when the intensity or the rate of bursts of a source is decreased are not light quanta or photons. There are no light quanta or photons that cannot be further divided. If there is a light burst, it must be further divided at a semi-transparent reflector irrespective what amplitude it has or what energy light burst consists of. Nature does not leave a light burst in limbo at a semitransparent medium boundary.

p) **Litmus Tests for the Validity/Invalidity of a Blackbody Spectrum**

Blackbody spectrum must be a function of the electric charge. In fact, blackbody spectrum must be proportional to square charge. There is no blackbody radiation without an electric charge. It does not matter how well the frequency function of a blackbody spectrum matches the observation, if any blackbody spectrum is not a function of electric charge, then, it is an indication that its derivation is fundamentally incorrect.

Plank spectrum is independent of electric charge. Wein and Rayleigh-Jeans spectra are independent of electric charge. As a result, Plank, Rayleigh-Jeans, and Wein spectra are incorrect.

Blackbody spectrum must be independent of the shape of a blackbody cavity. Blackbody spectrum has nothing to do with a cavity. If any blackbody spectrum is dependent on the shape of a cavity, it does not matter how well the frequency function of the spectrum matches the observations, the derivation of the blackbody spectrum must be incorrect.

"*Plank, Rayleigh-Jeans, and Wein spectra are dependent of the shape of a cavity and hence they are all fundamentally incorrect*."

q) **Must Have for Blackbody Spectrum**

1. There is no radiation without temperature of an object of mass. Blackbody spectrum must be a function of the temperature of the object. Blackbody radiation is zero if temperature is absolute zero.
2. There is no radiation without oscillation of charge particles or electrons. Blackbody radiation must be a function of the electric charge. Blackbody radiation is zero if charge is zero.
3. Since an electric charge has no existence without a mass, blackbody spectrum must also be a function of the mass of an oscillating charge at frequency f. Blackbody radiation is zero if mass is zero.
4. Blackbody radiation frequency f is the same as the frequency f of the oscillating charge. If the oscillation frequency of the charge is zero, the blackbody radiation is zero.
5. Blackbody radiation has nothing to do with a cavity. Therefore, blackbody spectrum must be independent of a cavity. Blackbody radiation is present whether the blackbody has a cavity is not.

Correctly derived blackbody spectrum must be cavity independent. Correctly derived blackbody spectrum must be a function of frequency f, charge q, temperature T, and the mass m of an electron. The derivation of blackbody spectrum must begin with an oscillating charge particle of mass since it is the origin of electromagnetic radiation. That is exactly where we are going to start.

r) **What You Can Find Here**

We are going to see what exactly the e=hf represents physically in reality. Blackbody spectrum can be derived without the aid of energy quanta. Energy cannot be quantized. Energy cannot come in quanta. Complete properly designed photoelectric experiment will change the current misunderstanding of the photoelectric effect. Light cannot come in energy quanta. Light cannot be quantized. There are no light quanta or photons. Photons cannot exist. Einstein's photon derivation is incorrect. Plank's derivation of blackbody radiation is incorrect. In fact, all the blackbody spectra are incorrect.

All the available blackbody spectra are cavity dependent. The derivation of Blackbody spectrum does not require a cavity analysis. A cavity has nothing to do with blackbody spectrum. Spectrum observed through a hole on a cavity has nothing to do with what is inside a cavity. What comes out of a hole

on a cavity is not limited to what is inside the cavity. We can derive the blackbody spectrum without quantized energy assumption. Without Plank's invalid blackbody spectrum derivation, there will be no energy quanta. There will be no Quantum Mechanics when Plank's blackbody spectrum is invalid.

s) **Plank Spectrum does not Represent a Blackbody Spectrum**

The radiation of a blackbody spectrum increases with the temperature of the blackbody. The radiation energy of the blackbody is given by the area of the spectrum. So, if the blackbody spectrum is a correct spectrum, the area of the spectrum must increase with the temperature T but must be finite. The area of the Plank spectrum becomes unbounded at high temperature.

The probability of a particle of mass m in a population of temperature T having energy E=ne is given by the Maxwell-Boltzmann distribution,

$Prob(E,T)=\beta_o exp(-ne/kT)$

$\beta_o=(m/2\pi kT)^{3/2}$

where, k is the Boltzmann constant.

However, what is used in the Plank's derivation is not Maxwell-Boltzmann distribution as it is. Plank uses a modified version of it that has no connection to the energy distribution of a mass since it has no association with mass m. The probability distribution particle having energy E=ne in Plank's derivation is given by,

$Prob(E,T)=[exp(-ne/kT)]/\{\sum_1^\infty [exp(-ne/kT)]\}$.

This is a re-normalized version of Maxwell-Boltzmann distribution. Maxwell-Boltzmann distribution is already in the normalized form and hence there is no purpose for re-normalization. This re-normalized version is not a probability distribution of an oscillator of mass m having energy E=ne at temperature T. This is a manipulation done to achieve a desired result than anything based on fundamental principle.

The direct use of Maxwell-Boltzmann distribution in Plank's approach does not give a spectrum that agrees with the observation and hence it was modified to match the observation. Plank spectrum is a trial-and-error approach to obtain a function that matches the observation rather than a development based on any fundamental principle. In the process of modification what is sacrificed is the bounded property of the spectrum.

Even though the Maxwell-Boltzmann distribution is finite for all temperatures, the modified distribution used in Plank derivation is unbounded at high temperatures. Area of the blackbody spectrum represents the radiation energy per cycle and hence the spectrum must be bounded for it to be correct. Plank blackbody spectrum is not bounded at high temperatures and hence Plank spectrum is incorrect. Plank spectrum does not represent the spectrum of a blackbody.

For a blackbody spectrum to be the true spectrum, the area of the spectrum must be finite for all the temperatures. In other words, the area of the correct spectrum must be bounded for all the temperatures irrespective of frequency. Plank spectrum is not finite for all temperatures. The area of the Plank spectrum is unbounded for high temperatures. At low frequencies, Plank spectrum goes on increasing linearly with temperature without a bound, which is unnatural. Nothing in nature can go on increasing without a bound.

Plank spectrum is unbounded in temperature since the factor $\beta_o=(m/2\pi kT)^{3/2}$ present in the Maxwell-Boltzmann distribution is lacking in the modified distribution of the oscillator energy distribution used in the Plank's derivation. Maxwell-Boltzmann distribution is already normalized and hence re-normalization as done in the energy distribution used in Plank's derivation is not required.

The direct use of the Maxwell-Boltzmann distribution in Plank's strategy does not lead to a spectrum that matches the observation. As a result, Plank suitably modified the Maxwell-Boltzmann distribution for the whole purpose of obtaining a spectrum that matches the observation. Plank cannot obtain a spectrum that matches the observed data without using a renormalized distribution.

Plank's approach to the blackbody spectrum estimation is incorrect, invalid and without logic, meaningless. Plank's only goal in the derivation of his blackbody spectrum had been in obtaining a spectrum that matches the observation with least amount of work without any concern for the validity of the assumptions.

The correct spectrum must be bounded for all frequencies and all temperatures up to infinity. The correct spectrum must also be a function of charge and the mass of the charge, which are constants. The area of the correct spectrum must be finite for all frequencies. The area must increase with temperature. Plank spectrum or any other blackbody spectrum do not satisfy any of these required necessary conditions to be a true blackbody spectrum. For a spectrum to be the true blackbody spectrum, it must satisfy the conditions:

1. Must be bounded for all temperatures and frequencies.
2. The area of the spectrum must be finite for all temperatures.
3. The area of the spectrum must increase with the temperature.
4. Must be cavity independent. Should not depend on the geometry of a cavity.
5. Must depend on charge since there is no radiation without the oscillation of a charge.
6. Should not be inversely proportional to speed of light c since it makes the spectrum approximately zero and frequency insensitive.
7. Should not be a function of the speed of light c since speed of light has nothing to do with the generation of radiation by a blackbody.
8. Blackbody spectrum must depend on the mass of charge particles since the energy distribution of a charge particle in a population depends on

the mass.

"*Plank spectrum and all the other blackbody spectra do not represent correct blackbody spectrum*."

II. ENERGY OF OSCILLATING PARTICLES AND ENERGY OF ELECTROMAGNETIC WAVES

Not all the energies are created equal. An oscillating particle of mass has mechanical energy or kinetic energy. Oscillating particles of mass generate thermal energy. Oscillating particles of mass have thermal energy. Oscillating particles of mass have a temperature and hence an entropy. Oscillating particles of mass have momentum that varies with time. Although the average momentum of an oscillating particle of mass is zero, the average energy is not. An oscillating particle of mass has average non-zero kinetic energy. Maxwell-Boltzmann distribution and Boltzmann entropy relationship based on number of complexions apply to oscillating particles of mass.

a) Electromagnetic Waves Have No Real Energy

In the case of electromagnetic waves, there is the propagation of electromagnetic energy in the direction of propagation. Energy of an electromagnetic wave is not real energy since it has no association with kinetic energy, momentum, temperature, or entropy. The real energy is associated with the temperature and entropy. Electromagnetic energy simply describes the strength of a wave. Electromagnetic energy is not kinetic energy or mechanical energy. As a result, light has no momentum. There is no massless momentum. You cannot force a momentum on massless. Light has no kinetic energy. Dividing electromagnetic energy e by the speed of light c, what you get is not the momentum, p≠e/c. In fact, the act of dividing electromagnetic energy by the speed of light is meaningless. There is no massless mechanical energy.

You cannot force feed a momentum on massless by dividing electromagnetic energy e by the speed of light c. Newton's laws do not apply to light. There is no LaGrange for light. Motion mechanics do not apply for massless, the light. Massless cannot be relative. Light is not relative. Light does not propagate relative to moving frames. Time has nothing to do with light. Gravity has no effect on light in the absence of a medium and vice versa.

If a vacuum space is shined with light, it does not matter how much light is present in a vacuum, vacuum has no temperature. There is no temperature without particles of mass. Vacuum cavity full of light has no temperature. Light has no temperature. Light has no entropy. Maxwell-Boltzmann distribution and Boltzmann entropy relationship based on number of complexions do not apply to light.

Claim that an oscillating object of mass has energy e is meaningless since it is a continuous process. Similarly, claim that an electromagnetic wave has energy e is also meaningless unless it is a wave burst of finite duration that is propagating. So, in the case of energy of an oscillating mass, we must consider the energy for a limited time duration. Similarly, for a continuous wave, we must also consider the energy for a limited duration of a wave. Most common is the energy per second or power of an oscillating mass or power of an electromagnetic wave.

As we will see, due to the widely used relationship energy e=hf, it is more appropriate to consider the energy per cycle for an oscillating mass of frequency f, where h is a constant only for that oscillating mass.

Claim that e=hf has no meaning unless we specify specific time interval. How long do we have to wait to get that energy e? Without specified time interval, the energy of an oscillating mass is meaningless. Without specified time interval, the energy of an electromagnetic wave is meaningless. As we are going to see, when we write e=hf, it means the average kinetic energy e per cycle of an oscillating mass at frequency f. The parameter h is dependent of the mass of the oscillating object and the square of the maximum displacement of the oscillator. In e=hf, h is not a universal constant.

"*The equation e=hf applies only for the kinetic energy per cycle of a mass oscillating at frequency f.*"

Property:

Electromagnetic waves have no real energy that is associated with temperature and entropy. Electromagnetic energy is simply an indication of wave strength.

b) Energy of an Oscillating Mass

The dynamics of an oscillating mass at angular frequency ω, where ω=2πf, is given by,

$$d^2y/dt^2=-\omega^2y \quad (2.1)$$

where, $\omega^2=k_H/m$, m is the mass of the oscillating particle, k_H is the oscillator coefficient or Hooks coefficient, y is the displacement.

If the maximum displacement is A_o, the displacement y(t) at time t that satisfies the eqn. (2.1) is given by,

$$y(t)=A_o\sin(\omega t) \quad (2.2)$$

The speed v(t)=dy(t)/dt at time t is given by,

$$v(t)=\omega A_o\cos(\omega t) \quad (2.3)$$

The acceleration a(t)=dv(t)/dt is given by,

$$a(t)=-\omega^2A_o\sin(\omega t) \quad (2.4)$$

The kinetic energy e_s of an oscillating electron or a source per unit cycle is given by,

$$e_s=(1/2)m\int_0^\tau v^2(t)dt \quad (2.5)$$

where, τ is the period, subscript s denotes a source since an oscillating charge of mass m generates electromagnetic waves.

For frequency f, we have,

$$\tau=1/f \quad (2.6)$$

Substituting for v(t), we have,

$$e_s=(1/2)m(\omega A_o)^2\int_0^\tau[\cos(\omega t)]^2dt \quad (2.7)$$

$$e_s=m(\omega A_o/2)^2\tau \quad (2.8)$$

Substituting for ω and τ, we have,

$$e_s=m(\pi fA_o)^2/f \quad (2.9)$$

$$e_s=m(\pi A_o)^2f \quad (2.10)$$

$$e_s=h_sf \quad (2.11)$$

where,

$$h_s=m(\pi A_o)^2 \quad (2.12)$$

The h_s is not a constant and depends on the mass m of the oscillating object and the square of the maximum displacement, A_o^2. The h_s has the units Kg m^2 or Joule second^2. The maximum speed of the oscillator does not have to be limited by the speed of light c [6].

Lemma**:**

For a mass m oscillating at frequency f with the maximum displacement A_o, the kinetic energy e_s per cycle is given by,

$e_s=h_sf$

where, $h_s=m(\pi A_o)^2$.

The maximum displacement A_o of an oscillating electron depends on the temperature T of the object. As a result, the parameter h_s depends on the temperature T. In fact, A_o increases with the temperature T of the object and hence h_s increases with the temperature T. We will see the importance of the increase of h_s with temperature when we come to blackbody spectrum.

"*If the blackbody spectrum is correct, the area of the blackbody spectrum, which is the radiation energy per cycle, must increase with the temperature T while the area of the spectrum, the total energy per cycle, remains finite. None of the blackbody spectra satisfy this condition."*

"Plank spectrum managed to keep the area of the spectrum, the total energy per cycle, finite for a band of temperatures, but it failed to have an increasing area with the temperature. Plank spectrum is also failed to remain bounded at high temperature."

"Plank spectrum suffers from insensitivity at low temperatures as well as at high temperatures. "

The parameter h_s is not the Plank constant even though it appears like the Plank constant in the equation. Unlike the Plank constant, for an oscillating mass m at frequency f, the h_s is determined by the mass m of the oscillator and the maximum displacement of the oscillator A_o. The h_s is not a constant. Even for an oscillating electron, h_s is not a constant since the maximum displacement of an oscillator may vary depending on the temperature. Plank constant for an oscillating proton will be different from the Plank constant for an oscillating electron. The energy e=hf applies only for kinetic energy of an oscillating mass. As we are going to see, electromagnetic energy per unit cycle is not given by the equation e=hf. If a particle of mass m is oscillating at frequency nf, where n is an integer, then, the kinetic energy per cycle is given by e=h(nf).

"*If a particle of mass m is oscillating at frequency f, then, the kinetic energy per cycle is given by e=hf. The h is not a universal constant and depends on the mass of the oscillating particle and the maximum displacement of the oscillator*."

"In Plank's equation, t*he kinetic energy e=hf is not an energy quantum. It is the energy per unit period of an oscillating mass m of frequency f. Plank constant h is not a universal constant. The equation e=hf applies only for the kinetic energy of a mass m oscillating at frequency f.*"

III. **ELECTROMAGNETIC RADIATION DUE TO THE OSCILLATION OF AN ELECTRON OF CHARGE** q

For an electron of mass m oscillating at frequency f, the motion dynamics is given by,

$$d^2y/dt^2=-\omega^2y \quad (3.1)$$

where, $\omega=2\pi f$.

The displacement y(t) at any time t is given by,

$$y(t)=A_o\sin(\omega t) \quad (3.2)$$

where A_o is the maximum displacement.

The speed v(t) and the acceleration a(t) at any time t are given by,

$$v(t)=\omega A_o\cos(\omega t) \quad (3.3)$$

$$a(t)=-\omega^2A_o\sin(\omega t) \quad (3.4)$$

We have an electron of mass m and charge q oscillating at acceleration a(t) at time t. An oscillating charge at frequency f generates electromagnetic radiation that is proportional to charge and the acceleration of the charge. Electromagnetic waves of frequency f generated will be orthogonal to the direction of the oscillation of the charge q. Since the electron in eqn. (3.1) oscillates along the y-axis, the radiation will be on the xz plane.

The electromagnetic radiation generated by an oscillating charge in y direction is given by,

$$E(t)=\gamma qa(t) \quad (3.5)$$

$$E(x,t)=E_o\sin(kx-\omega t) \quad (3.6)$$

where, γ is a constant and the maximum amplitude E_o is given by,

$$E_o=\gamma q\omega^2A_o \quad (3.7)$$

Electromagnetic energy per cycle e_{es} generated by an oscillating electron or a source is given by,

$$e_{es}=E_o^2\int_0^{\tau}[\sin(kx-\omega t)]^2dt \quad (3.8)$$

$$e_{es}=(1/2)E_o^2\tau \quad (3.9)$$

Substituting for E_o, we have,

$$e_{es}=(1/2)(\gamma q\omega^2A_o)^2\tau \quad (3.10)$$

Since $\omega=2\pi f$, and $\tau=1/f$, we have,

$$e_{es}=(1/2)[\gamma q(2\pi)^2f^2A_o]^2/f \quad (3.11)$$

$$e_{es}=8(\gamma q\pi^2f^2A_o)^2/f \quad (3.12)$$

$$e_{es}=8(\gamma q\pi^2A_o)^2f^3 \quad (3.13)$$

$$e_{es}=h_{es}f^3 \quad (3.14)$$

where,

$$h_{es}=8(\gamma q\pi^2A_o)^2 \quad (3.15)$$

From eqn. (2.12), we also have,

$$(\pi A_o)^2=h_s/m \quad (3.16)$$

Substituting in eqn. (3.15), we have,

$$h_{es}=[8(\gamma\pi q)^2/m]h_s \quad (3.17)$$

The h_{es} is directly proportional to h_s.

The frequency f is determined by the oscillating electron and is a function of mass of the electron and the Hook's parameter of the oscillating electron.

As we can see, Plank energy quanta e=hf does not apply to electromagnetic radiation. Electromagnetic

energy e_{es} due the source of an oscillating electron of frequency f is given by $e_{es}=h_{es}f^3$. For the conversion of kinetic energy of an oscillating electron to electromagnetic radiation energy $e \neq hf$.

For an electromagnetic source or an oscillating electron, the kinetic energy e_s per cycle is given by,

$$e_s=h_sf \quad (3.18)$$

The electromagnetic energy e_{es} generated by the source or the oscillating electron is given by,

$$e_{es}=h_{es}f^3 \quad (3.19)$$

From eqn. (3.17), parameters h_s and h_{es} are related by,

$$h_{es}=[8(\gamma\pi q)^2/m]h_s \quad (3.20)$$

Substituting for f from eqn. (3.18) in eqn. (3.19), we have the kinetic energy to electromagnetic energy conversion by an oscillating electron source,

$$e_{es}=(h_{es}/h_s^3)\, e_s^3 \quad (3.21)$$

Lemma**:**

Electromagnetic energy per cycle generated by a charge q of mass m oscillating at frequency f with maximum displacement A_o is given by,

$$e_{es}=h_{es}f^3$$

where, $h_{es}=8(\gamma q\pi^2A_o)^2$.

The h_{es} is mass independent. However, the frequency of oscillation, f is mass dependent since for and oscillator of mass m under oscillation parameter or Hooks coefficient k_H, the frequency of oscillation f is given by $f=(1/2\pi)(k_H/m)^{1/2}$. As a result, the electromagnetic energy generated by a charge is inversely affected by the mass of the oscillator. The minimum mass a charge can consists of is the mass of an electron and hence the oscillation of electrons generates the maximum electromagnetic radiation.

IV. **HOT BODY RADIATION**

All the particles of mass that constitute an object oscillate when heated. However, it is only the oscillation of charge particles, especially the electrons, that contribute to the electromagnetic radiation generated by the hot body. As we have seen from equation (3.20), electromagnetic energy generated by an oscillating charge particle is inversely related to the mass of the oscillating charge particle. Since the electrically positive nucleus is much heavier than the constituting electrons in an atom, the electromagnetic radiation generated by a hot body is predominantly a result of oscillating electrons of a hot body. The overall average energy of an oscillating electron over all the atoms at temperature T is given by,

$$\bar{e}_s=kT \quad (4.1)$$

where, subscript s denotes a source or an oscillating electron at temperature T, k is the Boltzmann constant.

Now consider a source-electron oscillating at frequency f. Electron oscillating at frequency f is not a wave; it is not a propagating particle wave. It is simply a harmonic oscillation of an electron in an atom. Electrons on circular orbits do not radiate. However, when the orbiting electrons on circular orbits oscillate, they generate radiation. It is only that the oscillating orbiting electrons that generate electromagnetic waves given by equation (3.6).

When orbiting electron oscillates at frequency f, electron takes a path of a wavy orbit instead of a circular orbit. The wavelength of the wavy path for an electron orbiting at speed v is given by $v=f\lambda$. This is not a propagating wave. This is the path electron takes about the circular orbit. If the electron is not oscillating, it takes a circular orbit. If an orbiting electron at speed v oscillates at frequency f, it takes a wavy orbit of wavelength $\lambda=v/f$ about the circular orbit. This is not a particle wave. Particle wave is a misnomer. There are no particle waves. This wavelength $\lambda=v/f$ is not a wavelength of a propagating wave. This wavelength $\lambda=v/f$ is not a probability distribution. When an electron oscillates, it generates electromagnetic radiation. It is these generated electromagnetic radiation waves, which is given in equation (3.6), that propagate.

Blackbody:

A blackbody is no different from any other hot object except that a blackbody does not reflect the visible light. All the visible light are absorbed by a blackbody. As a result, temperature of a blackbody can increase at a faster rate. Other than that, black body radiates just as any other object at any temperature would. The mechanism of radiation of a black body at temperature T is no different from any other object of temperature T.

a) **Electrons in an Atom Oscillating at frequency** f **in a Hot Object at Temperature** T

We have already seen that the kinetic energy e_s of an oscillating electron of frequency f is given by,

$$e_s=h_sf \quad (4.1.1)$$

$$h_s=m(\pi A_o)^2 \quad (4.1.2)$$

A_o is the maximum displacement of the oscillator; m is the mass of the oscillating electron. Any oscillating mass m of frequency f has the energy $e_s=h_sf$ per cycle. Since we are considering hot body radiation, we are only interested in the oscillating charge particles in the hot body, especially the electrons. Electrons in a hot body are bound to atoms. Electrons in a hot body are not isolated.

Although an isolated electron of mass m oscillating at frequency f has energy e_s per cycle, the energy of an electron in an atom oscillating at frequency f is not the same as an energy of an isolated electron oscillating at frequency f since an electron in an atom can be any of many energy levels in an atom and still can oscillate at frequency f with energy $e_s=hf$ per cycle. The probabilities of an electron being in different energy levels are different.

The energy $e_s=h_sf$ is the kinetic energy per cycle of any mass oscillating at frequency f if we know for sure that the mass is oscillating at frequency f. In the case of a hot body, we do not know the individual behavior of electrons. We only know the collective behavior of electrons, the group dynamics. The group dynamics of an electron is given by the Maxwell-Boltzmann distribution. Maxwell-Boltzmann distribution gives us

the probability $P(e_s,T)$ of an electron having energy e_s at temperature T,

$$P(e_s,T)=\beta_o exp(-e_s/kT) \quad (4.1.3)$$

$$\beta_o=(m/2\pi kT)^{3/2} \quad (4.1.4)$$

m is the mass of the electron, k is the Boltzmann constant, T is the temperature.

For an electron of orbiting speed v with orbiting radius r, the orbiting frequency of the electron f_o is given by $f_o=v/(2\pi r)$.

If the frequency f of thermal oscillation is in resonation with the orbiting frequency f_o, then the orbit will change to the resonating frequency. The oscillation frequency $f=nf_o$ is in resonation with the orbiting frequency f_o. If the orbiting frequency is f_o, the thermal oscillation of frequency $f=nf_o$ will shift the orbit to the energy level with orbiting frequency nf_o.

If an electron in an atom is orbiting at the stable energy level e_s per cycle, then, thermal oscillation of the electron with energy ne_s per cycle will move the electron to the orbit with energy ne_s per cycle, where n=1,2,3, …

For an electron with orbiting energy e_s per cycle, the shift to a new stable orbit can take place when the electron is undergoing a thermal oscillation of frequency f with energy e_s per cycle. The probability of an electron having orbiting energy e_s at temperature T is given by,

$$Prob(e,T)=\beta_o exp(-e_s/kT) \quad (4.1.5)$$

It is not just an electron with orbiting energy e_s that can move to a new stable orbit in an atom when it undergoes a thermal oscillation with energy e_s per cycle. An electron with orbiting energy $2e_s$ per cycle in an atom can also move to a new stable orbit when it undergoes a thermal oscillation at frequency f with energy e_s per cycle. The probability of an electron having orbiting energy $2e_s$ is given by,

$$Prob(2e_s,T)=\beta_o exp(-2e_s/kT) \quad (4.1.6)$$

An electron with orbiting energy $3e_s$ per cycle in an atom can also move to a new stable orbit when it undergoes a thermal oscillation at frequency f with energy e_s per cycle. The probability of an electron having orbiting energy $3e_s$ is given by,

$$Prob(3e_s,T)=\beta_o exp(-3e_s/kT) \quad (4.1.7)$$

Similarly, in general, an electron with orbiting energy ne_s per cycle in an atom can also move to a new stable orbit when it undergoes a thermal oscillation of frequency f with energy e_s per cycle, where n is a positive integer. The probability of an electron having orbiting energy ne_s is given by,

$$Prob(ne_s,T)=\beta_o exp(-ne_s/kT) \quad (4.1.8)$$

The orbiting electron having thermal oscillating energy e_s at any of the orbits with energy levels ne_s, n=1,2,3, … can move to a new energy level since the oscillation is resonance with all the energy levels ne_s, n=1,2,3, … The shift of orbit due to the thermal oscillation of an electron at frequency f with energy e_s can take place when electron is having any of the orbiting energies e_s, $2e_s$, $3e_s$, ….ne_s, … with probabilities determined by respective energies. So, the average energy $\tilde{e}_s$ of an electron oscillating at frequency f in an atom at temperature T is given by,

$$\tilde{e}_s=e_s\beta_o\sum_1^\infty\{exp(-ne_s/kT)\} \quad (4.1.9)$$

$$\tilde{e}_s=e_s\beta_o exp(-e_s/kT)\sum_1^\infty\{exp[-(n-1)e_s/kT]\} \quad (4.1.10)$$

$$\tilde{e}_s=e_s\beta_o exp(-e_s/kT)/[1-exp(-e_s/kT)] \quad (4.1.11)$$

$$\tilde{e}_s=e_s\beta_o/[exp(e_s/kT)-1] \quad (4.1.12)$$

$$\tilde{e}_s/e_s=\beta_o/[exp(e_s/kT)-1] \quad (4.1.13)$$

$$\tilde{e}_s/e_s=\beta_o/[exp(h_sf/kT)-1] \quad (4.1.14)$$

The average $\tilde{e}_s$ over all the atoms of an object at temperature T is $\bar{e}=kT$.

One deterministic oscillation of an isolated electron at frequency f with energy e_s is equivalent to the fraction N oscillating at frequency f in an atom at temperature T, where N is given by,

$$N=\tilde{e}_s/e_s \quad (4.1.15)$$

$$N=\beta_o/[exp(e_s/kT)-1] \quad (4.1.16)$$

Since $e_s=h_sf$ per cycle, substituting for e_s, we have,

$$N=\beta_o/[exp(h_sf/kT)-1] \quad (4.1.17)$$

Lemma:

The average kinetic energy per cycle $\bar{e}_s$ of an electron oscillating at frequency f in an atom at temperature T is given by,

$$\tilde{e}_s=e_s\beta_o/[exp(e_s/kT)-1]$$

where, k is the Boltzmann constant, e_s is the kinetic energy per cycle of an isolated electron of mass m oscillating at frequency f and $e_s=h_sf$ per cycle.

Corollary:

An isolated electron oscillating at frequency f is equivalent to the fraction N in an atom oscillating at the same frequency f at temperature T and it is given by,

$$N=\beta_o/[exp(h_sf/kT)-1].$$

where, k is the Boltzmann constant and T is the temperature.

An atom does not have discrete fixed energy levels. What circular orbit an electron in atom take is determined by the energy of the electron. An electron orbiting at frequency f_o undergoes thermal oscillation of frequency f depending on the temperature T. If the thermal oscillation of frequency f happens to be in resonation with the orbiting frequency f_o, in other words, if $f=nf_o$, then, the electron will move to a new orbit with orbiting frequency nf_o.

There are no discrete energy levels in a planetary orbiting system. A planetary orbit in a planetary orbiting system is determined by the kinetic energy of a planet. Just as the orbit of a planet in a planetary system is determined by the kinetic energy of the planet, the orbit of an electron in an atom is also determined by the kinetic energy of an electron.

There is no thermal oscillation of the planet in a planetary system. However, orbiting electrons in an atom undergoes thermal oscillations. If an electron gains oscillation energy that is equal to the orbiting energy of the electron at orbiting frequency f, then the electrons new orbit will be the one with twice the orbiting energy of the previous orbit and the new orbiting frequency will be 2f. An electron in an orbit with energy e and orbiting frequency f can be at orbit of kinetic energy ne with orbiting frequency nf, n=1,2,3, … depending on the temperature of the atom.

There are no forbidden regions for an electron. There are no forbidden radii for an electron in an atom. For an electron to move to a new energy level, an electron does not have to disappear from one energy level and miraculously appear in a new energy level as Bohr claimed. An electron can be at any radius on circular orbits while undergoing thermal vibrations. If thermal vibration is in tune with the orbiting frequency, then only orbit change take place. If the orbiting frequency is f_o, thermal vibration can move it to orbiting frequencies nf_o, n=1,2,3, …

Electrons orbiting on circular orbits do not generate radiation since there is no change in the speed along the path of the motion. Only the acceleration along the path of a charge generates radiation. The acceleration on an electron on a circular orbit at constant speed is always perpendicular to the direction of motion. As a result, orbiting electrons on circular orbits in an atom do not radiate electromagnetic energy and hence planetary model of an atom on circular orbits is stable.

b) **Electromagnetic Radiation Due to an Electron Oscillating at Frequency** f **in an Atom of an Object at Temperature** T

We have already seen that one deterministic oscillation of an electron at frequency f has the kinetic energy per cycle given by,

$$e_s=h_sf \quad (4.2.1)$$

$$h_s=m(\pi A_o)^2 \quad (4.2.2)$$

We have also seen that a single electron oscillating at frequency f with kinetic energy per cycle e_s generates electromagnetic radiation energy per cycle e_{es} of the same frequency f and they are related by eqn. (3.21),

$$e_{es}=(h_{es}/h_s^3)e_s^3 \quad (4.2.3)$$

As in equations (3.14) and (3.15), this is the same as,

$$e_{es}=h_{es}f^3 \quad (4.2.4)$$

$$h_{es}=8(\gamma q\pi^2A_o)^2 \quad (4.2.5)$$

One electron oscillating at frequency f with energy per cycle $e_s=h_sf$ is equivalent to fraction N oscillating at the same frequency f in an atom in a hot body at temperature T, where,

$$N=\beta_o/[\exp(h_sf/kT)-1] \quad (4.2.6)$$

Therefore, electromagnetic energy e_{es} generated by a hot body at temperature T is given by,

$$e_{es}=e_{es}N \quad (4.2.7)$$

Substituting for e_s from equation (4.2.4),

$$e_{es}=h_{es}f^3N \quad (4.2.8)$$

$$e_{es}=(h_{es}f^3)\{\beta_o/[\exp(h_sf/kT)-1]\} \quad (4.2.9)$$

$$e_{es}=\beta f^3/[\exp(h_sf/kT)-1] \quad (4.2.10)$$

$$\beta=\beta_o h_{es} \quad (4.2.11)$$

$$h_{es}=8(\gamma q\pi^2A_o)^2 \quad (4.2.12)$$

$$\beta_o=(m/2\pi kT)^{3/2} \quad (4.2.13)$$

The coefficient β is dependent of the mass m of the electron, the charge q of the electron, and the temperature T of the object. The h_s depends on the mass m and the maximum displacement A_o of an oscillating electron and hence it is not a constant. Eqn. (4.2.10) represents the blackbody spectrum.

It is important to note that the blackbody spectrum in eqn. (4.2.10) is proportional to the square charge q^2 as the correct blackbody spectrum should. Correct blackbody radiation must be a function of electric charge q since there is no radiation without an electric charge q. Plank, Rayleigh-Jeans, Wein blackbody spectra are independent of an electric charge q, and it is a clear indication that they are incorrect.

Lemma:

Electromagnetic radiation spectrum of an object at temperature T is given by,

$$e_{es}=\beta f^3/[\exp(h_sf/kT)-1].$$

where, $\beta=\beta_o h_{es}$, $h_{es}=8(\gamma q\pi^2A_o)^2$, $\beta_o=(m/2\pi kT)^{3/2}$, and m is the mass of an electron.

The radiation spectrum e_{es} is frequency bound. For any finite temperature T, as $f\rightarrow\infty$, $e_{es}\rightarrow 0$. It is also temperature bound. For any finite frequency f, as $T\rightarrow\infty$, $e_{es}\rightarrow 0$. Further, when mass m=0, $e_{es}=0$. The radiation increases with the charge q as it should. Radiation increases with the maximum displacement A_o of the oscillator as it should. The radiation spectrum $e_{es}=\beta f^3/[\exp(h_sf/kT)-1]$, where $\beta=\beta_o h_{es}$, $h_{es}=8(\gamma q\pi^2A_o)^2$, and $\beta_o=(m/2\pi kT)^{3/2}$, m is the mass of an electron, represents the true radiation spectrum of a hot body.

Since $\beta_o=(m/2\pi kT)^{3/2}$ the area of the spectrum or the total energy is finite and $E=\int \boldsymbol{e}_{es}df<\infty$ as $T\rightarrow\infty$. In addition, the maximum displacement A_o of an oscillating electron increases with the temperature T and hence the magnitude of the spectrum or the energy e_{es} at any frequency f increases with the temperature T while the area of the spectrum or the energy remains finite.

Litmus Test-1 for Correctness:

Correct blackbody spectrum must be a function of electric charge q since there is no blackbody radiation without an electric charge.

Litmus Test-2 for Correctness:

Correct blackbody spectrum must also be independent of a blackbody cavity since a blackbody radiation has nothing to do with a blackbody cavity.

Litmus Test-3 for Correctness:

Correct blackbody spectrum must have an area that increases with the temperature T.

Litmus Test-4 for Correctness:

The area of the correct blackbody spectrum must be finite.

Litmus Test-5 for Correctness:

Correct blackbody spectrum must not be frequency insensitive, or in other words, the multiplication factor should not be proportional to h/c^3, which is approximately zero, as it is in the case of Plank and Rayleigh-Jeans spectra.

Litmus Test-6 for Correctness:

Correct blackbody spectrum must be temperature bound.

Litmus Test-7 for Correctness:

Correct blackbody spectrum must be zero when the mass m=0.

Litmus Test-8 for Correctness:

Correct blackbody spectrum must be frequency bound.

Electromagnetic radiation spectrum of an object at temperature T given in eqn. (4.2.10) satisfies all these litmus tests.

Plank spectrum and all the other blackbody spectra fail all the Litmus Tests. Plank spectrum failed Litmus Test-1 since it does not depend on the electric charge. Plank spectrum failed Litmus Test-2 since it depends on the shape of a cavity by its derivation. Plank spectrum failed Litmus Test-3 since the area of the spectrum does not increase with the temperature. Plank spectrum failed the Litmus Test-4 since the area of the spectrum is unbounded at high temperatures. Plank Spectrum failed Litmus test-5 since it is directly proportional to h/c^3, which is approximately zero, and hence insensitive to frequency. Plank spectrum failed Litmus Test-6 since it is unbound in temperature for any finite frequency. Since the Plank spectrum is not a function of the mass m of an oscillating electron, it also failed the Litmus Test-7. Plank spectrum is frequency bound for finite temperature T and hence it passes the Litmus Test-8. Rayleigh-Jeans spectrum does not satisfy any of the Litmus Tests.

Corollary:

The derivation of black body radiation does not require energy quantization.

The electromagnetic radiation energy e_{es} is a result of an electron oscillating at frequency f. An electron oscillating at frequency f has the kinetic energy per cycle $e_s=h_sf$. This kinetic energy e_s generates electromagnetic energy per cycle,

$$e_{es}=\beta f^3/[\exp(h_sf/kT)-1],$$

which appears to be the same as the Plank spectrum except that there is no energy quantization here and h_s is not a constant.

Here, $e_s=h_sf$ is not an energy quantum. $e_s=h_sf$ is simply the kinetic energy per cycle of an electron oscillating at frequency f. Energy cannot come in quanta since n(hf) is not the same as h(nf) physically although they are mathematically the same.

For low frequencies, $h_sf<<kT$,

$$\exp(h_sf/kT)-1\simeq h_sf/kT \qquad (4.2.14)$$

Substituting in spectrum $e_{es}=\beta f^3/[\exp(h_sf/kT)-1]$, for low frequencies, the electromagnetic spectrum is given by,

$$e_{es}=\beta f^3/(h_sf/kT) \qquad (4.2.15)$$

$$e_{es}=\alpha kTf^2 \qquad (4.2.16)$$

where $\alpha=\beta/h_s$.

This is the same as the Rayleigh spectrum except that the constant factor α is different.

For high frequencies, $h_sf>>kT$,

$$1/[\exp(h_sf/kT)-1]\simeq\exp(-h_sf/kT) \qquad (4.2.17)$$

Substituting in spectrum $e_{es}=\beta f^3/[\exp(h_sf/kT)-1]$, for high frequencies, the electromagnetic spectrum is given by,

$$e_{es}=\beta f^3\exp(-h_sf/kT) \qquad (4.2.18)$$

It is the same as the Wien spectrum for high frequencies except for the factor β is different.

V. MECHANISM OF ENERGY TRANSFER FROM LIGHT TO MATTER

Light contains electromagnetic energy. In strict sense, the term 'energy' should not have been used for electromagnetic waves. Because electromagnetic energy is simply a representation of the strength of the waves. Electromagnetic waves themselves do not have a temperature or entropy. When we refer to energy, we are talking about the energy associated with temperature and entropy. When we talk about energy, it is the kinetic energy we are referring to. It is the kinetic energy that is associated with temperature and entropy. There is nothing called electromagnetic energy. Electromagnetic waves do not have energy that has an association with temperature or entropy. Without matter, electromagnetic waves themselves are useless.

Contrary to many claims and meaningless superficial derivations in textbooks, one of which is by Plank himself, light has no momentum. Light cannot be relative when light has no momentum. You cannot give a momentum to massless by forcing a massless momentum on a LaGrange. LaGrange does not apply to massless. Massless has no momentum. Light has no kinetic energy. Light itself has no temperature. Particle of mass in motion has kinetic energy. Lorentz transform does not apply when light is not relative. Lorentz transform is not unique. Lorentz Transform does not exist. Einstein's Relativity fails since light has no momentum. Einstein's Relativity is meaningless since Lorentz Transform is not unique. In fact, Special Relativity is not required since the path of light is fixed in the vacuum and in a medium. When the path of light is fixed, any motion or propagation on the fixed path is naturally observer independent [6].

Light and gravity are mutually exclusive. Light has no effect on gravity and gravity has no effect on light in the absence of a medium. It is only in the presence of a medium that light can affect the gravitational force between objects. It is only in the presence of a medium that gravity can affect the propagation of light. It is a material medium that mediates an interaction between gravity and light.

The ubiquitous claim in General Relativity that the gravity bends light is false. Arthur Ellington's misinterpreted the diffraction of light near the sun due to the density gradient of the medium Gravity does not bend light. Gravity only has an indirect effect on light only in the presence of a medium. Gravity bends light in the presence of a medium. Gravity has no effect on light in a vacuum. Gravity has no effect on massless. Any interaction of light with gravity is only through medium. Any interaction of light with matter is through electrical charges.

Light has an electromagnetic field that interacts with charge particles. Electric charge has no existence without a mass. So, the interaction of light with an object of mass is always through charge particles, mainly the electrons since electrons in an object are much lighter than the nucleus of an atom. Light cannot interact with electrically neutral fundamental particles if such particles exist.

No matter how much light is projected into a space filled with electrically neutral fundamental particles, there will be no increase in temperature since light cannot increase the kinetic energy of electrically neutral fundamental particles. Light or electromagnetic waves have no means of transferring electromagnetic energy into matter in the absence of charge particles.

Since an electric charge has no existence without a mass, a mass is necessary for the transfer of electromagnetic energy into kinetic energy of matter but not sufficient. The constituent elements of a neutral mass must have charge particles for the transfer of electromagnetic energy into kinetic energy. The transfer of electromagnetic energy to matter is possible since all the matter consists of electrons. Light cannot bring the warmth in the absence of electrons or charge particles.

Propagation of light is not a result of a momentum of light particles. Light has no momentum. If light has a momentum, light cannot propagate. Electromagnetic waves have no momentum. Any entity with momentum cannot propagate. Einstein's light particles cannot propagate. One isolated Einstein's light quantum or photon does not know what to do at a medium boundary. Einstein's light quanta or photon do not exist.

It is only that the light or electromagnetic waves can generate a momentum on charge particles. Kinetic energy has no existence without a mass. Light has no mass. Light has no kinetic energy. Perpetual motion of a mass is a result of exchange of kinetic energy and potential energy. Propagation of light or electromagnetic energy is a result of exchange of electric energy and magnetic energy, not a result of a momentum. Forcing a momentum on light is one of the fundamental mistakes in Special Relativity and Quantum Mechanics. Newton laws do not apply to light. Compton's derivation for explaining the result of Compton experiment is incorrect and invalid. Light is not tiny billiard balls and cannot be assumed as such.

Let us consider the situation where an electromagnetic field propagating in x direction encounters an electric charge q. If the electric field $E_y(x,t)$ is varying in y direction and magnetic field $B_z(x,t)$ is varying in z direction, then we have an electromagnetic wave that is propagating in x direction. The electric field $E_y(x,t)$ can be written as,

$$E_y(x,t)=E_o\exp(jkx)\exp(-j\omega t) \quad (5.1)$$

where, the wave number $k=2\pi/\lambda$, λ is the wavelength, $\omega=2\pi f$, $c=f\lambda$, f is the frequency, c is the speed of light in the direction of x.

Now, we have a charge particle q of mass m in an oscillating electric field of frequency f in the direction of y. Electric field in the direction of y generates a force on the charge q in the same direction of y and the force $F_y(t)$ is given by,

$$F_y(t)=qE_y(x,t) \quad (5.2)$$

Substituting for $E_y(x,t)$ from eqn. (5.1),

$$F_y(t)=qE_o\exp(jkx)\exp(-j\omega t) \quad (5.3)$$

$$F_y(t)=qE_y(x)\exp(-j\omega t) \quad (5.4)$$

$$E_y(x)=E_o\exp(jkx) \quad (5.5)$$

If an electromagnetic wave encounters a mass that has no charge, then, there will be no force on it. The presence of an electromagnetic wave has no effect on neutral fundamental particles. If an electromagnetic wave encounters a neutral object of mass m, then, the electrons in the object are affected by it. Any object is affected by electromagnetic waves since each atom in an object of mass m is a composite of negative electrons and positive nucleus. Since nucleus is much heavier, the effect of electromagnetic waves on positive nucleus is negligible compared to the effect of electromagnetic waves on negative electrons. Motion dynamics for electrons in the presence of an electromagnetic wave equally applies to positive nucleus except the fact that the charge and the mass of electron are replaced by the charge and the mass of nucleus.

If the mass of a charge particle is m, then, the acceleration $a_y(t)$ at time t is in y direction orthogonal to the direction of propagation, and it is given by,

$$a_y(t)=(q/m)E_y(x)\exp(-j\omega t) \quad (5.6)$$

Motion in propagation is always orthogonal to the direction of propagation. This is the main difference between the motion and propagation.

Since $a_y(t)=dv_y(t)/dt$, the speed at time t is given by,

$$dv_y(t)/dt=(q/m)E_y(x)\exp(-j\omega t) \quad (5.7)$$

$$dv_y(t)=(q/m)E_y(x)\exp(-j\omega t)\,dt \quad (5.8)$$

$$v_y(t)=(q/m)E_y(x)\int_0^t[\exp(-j\omega t)]dt \quad (5.9)$$

$$v_y(t)=(q/m)(1/j\omega)E_y(x)[1-\exp(-j\omega t)] \quad (5.10)$$

$$v_y^2(t)=(qE_o/m\omega)^2[1-\exp(-j\omega t)][1-\exp(-j\omega t)]^* \quad (5.11)$$

where, E_o is the peak amplitude of $E_y(x)$ and * denotes the conjugate.

$$(1/2)v_y^2(t)=(qE_o/m\omega)^2[1-\cos(\omega t)] \quad (5.12)$$

$$(1/2)mv_y^2(t)=(1/m)(qE_o/\omega)^2[1-\cos(\omega t)] \quad (5.13)$$

Instantaneous kinetic energy $e_{de}(t)$ of the destination charge q of mass m due to an interaction with the electric field of light $E_y(x,t)$ at any time t is given by,

$$e_{de}(t)=(1/2)mv_y^2(t) \quad (5.14)$$

$$e_{de}(t)=(1/m)(qE_o/\omega)^2[1-\cos(\omega t)] \quad (5.15)$$

where, subscript d denotes the destination charge or the electron that is affected by the electric field of light while subscript s denotes the source charge or the electron that generated the light.

The kinetic energy per cycle e_{de} gain by the destination charge particle due to the interaction with light is given by,

$$e_{de}=(1/m)(qE_o/\omega)^2\int_0^\tau[1-\cos(\omega t)]dt \quad (5.16)$$

$$e_{de}=(1/m)(qE_o/\omega)^2\tau \quad (5.17)$$

Since $\tau=1/f$, and $\omega=2\pi f$, we have,

$$e_{de}=(1/m)(qE_o/2\pi)^2(1/f^3) \quad (5.18)$$

$$e_{de}=h_{de}(1/f^3) \quad (5.19)$$

$$h_{de}=(1/m)(qE_o/2\pi)^2 \quad (5.20)$$

Lemma:

The kinetic energy gained by a charge particle of charge q and mass m due to the interaction with light of maximum electric field E_o of frequency f is given by,

$$e_{de}=h_{de}(1/f^3)$$

where, $h_{de}=(1/m)(qE_o/2\pi)^2$.

At the source, oscillating electron generated the electromagnetic wave. The maximum displacement A_o of the source oscillator is related to the maximum electric field E_o by the relationship given in eqn. (3.7),

$$E_o=\gamma q\omega^2 A_o \quad (5.21)$$

Substituting for E_o in eqn. (5.20), we can eliminate the mean of energy transportation, light, from the oscillating source charge particle to destination charge particle. The direct relationship between the source kinetic energy and the destination kinetic energy at a distance is given by,

$$h_{de}=(1/m)(q/2\pi)^2(\gamma q\omega^2 A_o)^2 \quad (5.22)$$

$$h_{de}=(1/m)(2\pi q)^2(\gamma q A_o)^2 f^4 \quad (5.23)$$

Substituting for h_{de} in eqn. (5.19), we can remove the transportation medium of electromagnetic waves from the energy transfer to obtain the direct transfer of kinetic energy of oscillating source-electron to a destination-electron. We now have the kinetic energy per cycle of the destination-electron e_{ds} due to the oscillating source-electron with energy $e_s=h_s f$,

$$e_{ds}=(1/m)(2\pi q)^2(\gamma q A_o)^2 f^4\ (1/f^3) \quad (5.24)$$

$$e_{ds}=(1/m)(2\pi q)^2(\gamma q A_o)^2 f \quad (5.25)$$

$$e_{ds}=h_{ds}f \quad (5.26)$$

$$h_{ds}=(1/m)(2\pi\gamma A_o q^2)^2 \quad (5.27)$$

From eqn. (3.16), we have $(\pi A_o)^2=h_s/m$, and hence,

$$h_{ds}=h_s(2\gamma q^2/m)^2 \quad (5.28)$$

Eqn. (5.26) shows how a source kinetic energy or thermal energy is transferred to a destination particle at a distant via intermediary (thermal energy free) means of electromagnetic waves. If the propagation of light is taking place in a vacuum from source to destination, frequency of the light remains unaltered. As a result, the frequency of the oscillation at the source is the same as the frequency of the destination particle oscillation. However, in the presence of a medium, frequency of light decreases with the distance and hence the oscillation frequency of the destination charge particle will be less than the oscillation frequency of the source charge particle. In other words, if the source charge and the destination charge are separated by a vacuum, spectrum of electromagnetic waves is white or frequency independent in the process of transmitting kinetic energy from a source charge to a destination charge particle.

Source charge oscillated at frequency f with maximum displacement A_o. Kinetic energy per cycle of the source is $e_s=h_s f$, where $h_s=m(\pi A_o)^2$. This oscillation generated electromagnetic waves. Electromagnetic waves propagated without frequency loss in the vacuum and came across a charge particle, the destination charge particle. Destination charge particle started to oscillate in the presence of undulating electric field at frequency, f, generating kinetic energy or thermal energy at the destination. The kinetic energy per cycle of the destination charge particle is $e_{ds}=h_{ds}f$. The coefficients h_s and h_{ds} are not universal constants.

Lemma:

The transfer of kinetic energy per cycle from an oscillating source electron of mass m, frequency f and maximum displacement A_o to a distant electron by using the (kinetic energy free) transportation means of electromagnetic waves is given by,

$$e_{ds}=h_{ds}f$$

where, $h_{ds}=(2\gamma q^2/m)^2 h_s$ and $h_s=m(\pi A_o)^2$.

a) **At the Source of Light**

An electron oscillates at frequency f with maximum displacement A_o and kinetic energy per cycle $e_s=h_s f$ generating electromagnetic energy per cycle e_{es},

$$e_s=h_s f \quad (5.1.1)$$

$$h_s=m(\pi A_o)^2 \quad (5.1.2)$$

$$e_{es}=h_{es}f^3 \quad (5.1.2)$$

$$h_{es}=8(\gamma q\pi^2 A_o)^2 \quad (5.1.3)$$

b) **Transportation of Thermal Energy by Means of Thermal-Energy-Free Electromagnetic Means**

Electromagnetic wave carrying electromagnetic energy per cycle e_e propagates without a loss in a vacuum until it reaches a charge particle at the destination. Electromagnetic waves have no momentum, no kinetic energy, no thermal energy, no temperature, no entropy. Electromagnetic wave carrying electromagnetic energy per cycle e_e given by,

$$e_e=h_e(1/f) \quad (5.2.1)$$

$$h_e=(1/2)E_o^2 \quad (5.2.2)$$

E_o is the maximum amplitude of the electric field.

c) **At the Destination Charge Particle**

The propagating electromagnetic wave with electromagnetic energy per cycle e_e interacts with a charge particle by oscillating the charge particle at the same frequency as the electromagnetic wave. This oscillation generates kinetic energy per cycle e_{ds} given by,

$$e_{ds}=h_{ds}f \quad (5.3.1)$$

$$h_{ds}=(1/m)(2\pi\gamma A_o q^2)^2 \quad (5.3.2)$$

d) **Efficiency of Kinetic Energy Transportation by Electromagnetic Waves**

The energy transportation efficiency η is the ratio of the destination-electron kinetic energy per cycle to the source-electron kinetic energy per cycle,

$$\eta=e_{ds}/e_s \quad (5.4.1)$$

Since $e_{ds}=h_{ds}f$ and $e_s=h_s f$, we have,

$$\eta=h_{ds}/h_s \quad (5.4.2)$$

Since $h_s=m(\pi A_o)^2$ and $h_{ds}=(1/m)(2\pi\gamma A_o q^2)^2$, we have,

$$\eta=(1/m)(2\pi\gamma A_o q^2)^2/m(\pi A_o)^2 \quad (5.4.3)$$

$$\eta=(2\gamma q^2/m)^2<1 \quad (5.4.4)$$

The efficiency of kinetic energy transportation depends only on the square charge to mass ratio of electron. Since $q^2/m<1$ is a constant for an electron and the $\gamma<1$ is a constant, η will be a constant and $\eta<1$. Heat energy from a source charge particle to a destination charge particle cannot be transferred by electromagnetic transportation means with hundred

percent efficiency. The efficiency of the transfer of kinetic energy from one object to another object at distance using electromagnetic waves as an intermediary transportation medium is independent of frequency. Efficiency increases with the charge and decreases with the mass of the charge.

e) **Another Look at the Black Body Spectrum**

Since the transfer of kinetic energy from one object to another using electromagnetic waves, which is free of thermal energy, as the transportation mean is independent of the frequency, blackbody spectrum must be independent of the number of modes a blackbody cavity contains. The frequency spectrum of a blackbody cavity is simply the frequency spectrum of the oscillating electrons on the blackbody itself.

Spectrum measured through a hole on a blackbody cavity must be the frequency spectrum of the oscillating electrons on the inner surface of the blackbody. Frequencies through a hole on a cavity are not discrete and not limited to the discrete frequency modes present in a closed cavity. All the frequencies generated by the oscillating electrons on the inner surface of the cavity can propagate out through the hole on the cavity while only the fundamental frequency determined by the geometry of the cavity and its integer multiples can be present within the cavity. Blackbody spectrum is independent of a cavity. Correct derivation of blackbody spectrum must be independent of a cavity.

VI. RADIATION IN A BLACKBODY CAVITY

If a blackbody is at temperature T, what will be the temperature in the blackbody cavity? Will there be a temperature if cavity is a vacuum? Can there be a temperature inside the cavity if all that is there is the electromagnetic radiation in the cavity? Can you observe what is in a blackbody cavity through a hole on the cavity? Why spectrum through a cavity is continuous while the spectrum inside the cavity is discrete? Can you really derive the continuous spectrum observed through a cavity by analyzing the discrete spectrum inside a cavity?

Do you really know what modes are present in a cavity? Does the maximum number of modes present in a cavity say anything about the modes present in a cavity? Without knowing what modes are present in a cavity, how can you derive the blackbody spectrum by analyzing what modes can be present in a cavity?

What went wrong with the blackbody spectrum estimation? Why is the Plank spectrum incorrect? Is there any blackbody spectrum that is correct? Why are all the blackbody spectra incorrect? What is wrong with the Lenard's experiment? Why are the Lenard's photoelectric conclusions incorrect? Why is the Lenard's experiment incomplete? How can we make the Lenard's experiment complete? What would be the conclusions of a complete photoelectric experiment?

What is wrong with Einstein's photon or light quanta derivation? Can the light be in quanta? Can the Einstein's photons explain the observations of a complete photoelectric experiment? Why can't the photons explain the photoelectric observations of a complete well designed photoelectric experiment? These are the some of the questions we are going to tackle in next few sections.

a) **A Vacuum Blackbody Cavity**

There is no thermal energy without kinetic energy of particles of mass. There is no temperature without particles of mass. It is the collisions of particles of mass that generates heat, a temperature. There is no entropy without temperature. There is no entropy without particles of mass. If a blackbody cavity is a vacuum, there are no particles of mass in the cavity to generate heat, a temperature, thermal energy, entropy. It does not matter how hot a blackbody is, it the cavity is a vacuum, the cavity would be a very cold place where there is no temperature.

It does not matter how much electromagnetic radiation is present in a blackbody cavity, there will be no thermal energy in a vacuum cavity. There will be no temperature in the cavity even though there are electromagnetic waves in the cavity. There is no entropy in a vacuum even when it contains light.

There is no momentum in light. There is no massless momentum. Without momentum, there will be no kinetic energy in light. There will be no kinetic energy without a mass in motion. There is no mass in motion in light. Light does not fit into LaGrange. Motion dynamics do not apply to electromagnetic waves. Newton laws do not apply to massless. You cannot force a momentum on light by defining a LaGrange. LaGrange does not apply to massless. You cannot give light a momentum by forcing light to be relative. Light is not relative. Any entity with a fixed path in the vacuum and in a medium cannot be relative. If you force light to be relative, speed of light will no longer be a constant since it generates Shear Electromagnetic (SEM) waves whose speed depends on the frame of reference.

What electromagnetic radiation has is electromagnetic energy that propagates at the speed of light. Electromagnetic energy is simply a measure of the strength of electromagnetic waves, not a form of energy associated with temperature and entropy. Dividing electromagnetic energy by speed of light c does not produce a momentum since electromagnetic energy is not kinetic energy. Kinetic energy has no existence without a mass. Momentum has no existence without a mass. Thermal energy has no existence without a mass. Entropy has no existence without a mass. Dividing the electromagnetic energy e of light by the speed of light c and calling it momentum p is one of the fundamental mistakes in Modern Physics. As we are going to see, this is where the claim that light comes in energy quanta carrying a momentum will fail. Compton analysis is meaningless. Einstein's photon derivation is wrong since light has no entropy.

It does not matter how much radiation is present in a vacuum, there will be no heat or temperature in a vacuum. The electromagnetic spectrum of a closed

blackbody cavity will be the discrete harmonics of the blackbody spectrum we have already obtained in eqn. (4.2.10),

$$e_{es}=\beta f_n^3/[\exp(h_s f_n/kT)-1] \quad (6.1.1)$$

where f_n is the n^{th} harmonic, n=1, 2, 3, …., and β is a constant.

The spectrum given in eqn. (6.1.1) is the spectrum of a closed cavity. If the cavity is a closed cavity, the spectrum inside is discrete. However, if we make a hole on the cavity to see what is there inside the cavity, what we measure will not be a discrete spectrum inside the cavity. Spectrum through a hole is continuous. All the frequencies generated by the blackbody can propagate through a hole. So, the spectrum of the blackbody cavity observed through a hole on a cavity is no different from the spectrum of a blackbody given in eqn. (4.2.10),

$$e_{es}=\beta f^3/[\exp(h_s f/kT)-1] \quad (6.1.2)$$
$$\beta=\beta_o h_{es} \quad (6.1.3)$$
$$h_{es}=8(\gamma q\pi^2 A_o)^2 \quad (6.1.4)$$
$$\beta_o=(m/2\pi kT)^{3/2} \quad (6.1.5)$$

However, it is important to note that it is not possible to keep a cavity of a hot body a vacuum. We are considering only a hypothetical situation. Einstein's photon derivation is based on radiation in a vacuum cavity, a hypothetical situation. If the cavity is a vacuum, the presence of light in a vacuum does nothing, means nothing. This invalidates the Einstein's derivation of photons.

b) **Blackbody Cavity with Electrically Neutral Fundamental Particles of Mass**

If a blackbody cavity contains electrically neutral fundamental particles of mass, the collision of particles generate heat, thermal energy, temperature. These particles also collide with the inner surface of the blackbody and eventually the temperature of the cavity attains the same temperature as the blackbody.

Although a cavity can hold infinite number of discrete frequency modes, only the modes that the oscillating electrons on the blackbody can generate can be present in the cavity. What is allowed out of what is thrown in can be present in a cavity. Any other frequency generated by the blackbody will dissipate on the inner surface of the blackbody. Any discrete frequency radiation mode that is present in the cavity cannot interact with the particles in the cavity since electromagnetic fields cannot interact with electrically neutral fundamental particles. No energy is transferred to the electrically neutral particles in the cavity through the electromagnetic waves in the cavity. Electromagnetic waves themselves have no kinetic energy that can contribute to the temperature of the cavity and the entropy.

It is only through the charge particles that the light can transfer its energy to objects of mass. It does not matter how much radiation or how many modes are present in a cavity, it makes no contribution to the temperature of the cavity or the kinetic energy of the particles in the cavity when all that is contained in the cavity are electrically neutral fundamental particles. Spectrum inside a closed cavity is the same as the discrete spectrum in a vacuum cavity,

$$e_{es}=\beta f_n^3/[\exp(h_s f_n/kT)-1] \quad (6.2.1)$$

where f_n is the n^{th} harmonic, n=1, 2, 3, …., and β is a constant.

If there is a hole in the cavity, all the frequencies that are generated by the inner walls of the blackbody can propagate out of the cavity, and hence the observed spectrum through a hole will be continuous even though the spectrum inside the cavity is discrete, and it is the same as the spectrum of a blackbody cavity given in eqn. (4.2.10),

$$e_{es}=\beta f^3/[\exp(h_s f/kT)-1] \quad (6.2.2)$$
$$\beta=\beta_o h_{es} \quad (6.2.3)$$
$$h_{es}=8(\gamma q\pi^2 A_o)^2 \quad (6.2.4)$$
$$\beta_o=(m/2\pi kT)^{3/2} \quad (6.2.5)$$

The only difference in this case from a vacuum cavity is that there is a temperature in the cavity whereas there is no temperature in a vacuum cavity. This is also a hypothetical situation since it is not possible to keep electrically neutral fundamental particles of mass inside the confine of a cavity if such particles exist.

c) **Blackbody Cavity Containing Charge Particles or Matter Composite of Charge Particles.**

The spectrum will be the same as the previous case. The only difference is that the electromagnetic waves inside the cavity can transfer electromagnetic energy into the charge particles in the cavity by oscillating them. Although the presence of radiation in a cavity has no effect on the temperature in the cavity containing electrically neutral fundamental particles (if they exist), in the presence of particles of mass composite of charge particles in a cavity, the temperature inside the cavity reaches to the temperature of the blackbody not only through the collision of the particles with the inner wall of the cavity but also through the interaction of the radiation waves with the charge particles inside the cavity. Just as the previous case-b, there is an entropy in the cavity since there is a temperature in the cavity. The spectrum observed through a hole in the cavity is continuous. The spectrum of a closed cavity is discrete even though we cannot observe it.

The spectrum of a blackbody observed through a hole on the cavity is independent of what is inside the cavity. The spectrum of a blackbody observed through a hole on a cavity is independent of the cavity itself. Spectrum of a blackbody is independent of a blackbody cavity. The blackbody spectrum is given by equation (4.2.10),

$$e_{es}=\beta f^3/[\exp(h_s f/kT)-1] \quad (6.3.1)$$
$$\beta=\beta_o h_{es} \quad (6.3.2)$$
$$h_{es}=8(\gamma q\pi^2 A_o)^2 \quad (6.3.3)$$
$$\beta_o=(m/2\pi kT)^{3/2} \quad (6.3.4)$$

VII. RADIATION IN A BLACKBODY CAVITY USING FREQUENCY MODES COUNTING AS IT WAS DONE BY PLANK AND RAYLEIGH-JEANS

Lemma:

The area of a correct blackbody spectrum, which is the total radiation energy per cycle, must increase with the temperature while remaining bounded.

Historically, the derivation of blackbody radiation has always been based on counting the discrete frequency modes for a discrete frequency harmonic in a blackbody cavity under the assumptions,

1. There are infinite number of discrete harmonics in a cavity (not true).
2. All the modes for each harmonic are equally probable (not true).
3. Each mode for a harmonic carries an equal amount of energy (except the Plank Spectrum), no true.
4. Frequency mode density for a harmonic n can be obtained by counting the integer nodes in a sphere of radius n in a linearly laid 3D grid in phase space (not true).

There is a fundamental mistake in the determination of blackbody cavity spectrum using frequency modes counting. As an analogous example, the number of rooms (harmonics) and the capacity (modes) of each room says nothing about the number of guests in a hotel. The number of modes for a harmonic and the number of harmonics a cavity can provide a home for says nothing about what modes and harmonics are there in a cavity. As a result, the modes counting is not a correct method for deriving blackbody cavity spectrum. The maximum number of modes that can be present in a cavity says nothing about the actual number of modes a cavity has. It is the actual number of present in a cavity that defines the spectrum inside a cavity, not the maximum number of modes that can be present in the cavity.

Rayleigh-Jeans spectrum for blackbody radiation is based on frequency modes counting. Wein spectrum is based on modes counting. Celebrated Plank spectrum is based on frequency modes counting used in the Rayleigh-Jeans spectrum. Although the all the blackbody spectra match the observed data withing their respective operational frequency bands, their derivations are based on a foundation that is invalid and meaningless.

In addition to the use of modes counting, Plank spectrum also requires the energy to be quantized. Plank assumed that the energy for a given frequency comes in energy quanta e=hf, where h is a constant. This assumption is not required for the derivation of the blackbody radiation. This assumption is a result of finding a function that matches the observed spectrum rather than deriving the spectrum for blackbody and testing it with experimental results. The equation e=hf is meaningless since all the energies are not created equal. How can frequency define energy? Frequency of what? How can be there energy without a time span? What is the time span of the energy e=hf? Potential energy has no associated frequency and hence cannot be written as e=hf. If energy is represented as e=hf, then, there is no way to distinguish electromagnetic energy from the kinetic energy.

It is not possible to represent both kinetic energy and electromagnetic energy by the same equation. The energy e=hf has no meaning for kinetic energy of a mass moving at constant speed since it has no associated frequency. The energy e=hf only has meaning with kinetic energy of an oscillating mass at frequency f. However, even for the kinetic energy of an oscillating mass, the equation e=hf is meaningless without a specified time interval.

We have already derived the blackbody spectrum without the quantum energy e=hf assumption and it is given in equation (4.2.10). Now we want to show why Plank spectrum is wrong. To demonstrate that the Plank spectrum is incorrect, here we derive the Plank spectrum using the mode counting approach used in the Plank spectrum and In the process, we will demonstrate what is wrong with mode counting approach used in the Plank spectrum and all the rest of the blackbody spectra. As we are going to demonstrate, mode counting is an invalid approach, and the number modes has no simple relationship to square frequency as it was claimed in all the blackbody spectra.

Consider a blackbody with a spherical cavity of radius r. The electromagnetic waves that can remain propagating in the cavity are determined by the radius r of the cavity. Only the primary wavelength λ_1 and its integer harmonics nf_1 can propagate in the cavity,

$$\lambda_1=2(2r) \quad (7.1)$$

The primary frequency f_1 is given by,

$$f_1=c/\lambda_1 \quad (7.2)$$

The n^{th} harmonic f is given by,

$$f=nc/\lambda_1 \quad (7.3)$$

$$\lambda=\lambda_1/n \quad (7.4)$$

where, c is the speed of light and n is an integer, n=1,2,3,4, …

So, a blackbody cavity can support infinite number of harmonics. Only the discrete frequencies nf_1, n=1,2, … of electromagnetic waves can be supported by the cavity,

$$f=nf_1 \quad (7.5)$$

$$f_1=c/2(2r) \quad (7.6)$$

For these frequencies to be there in the cavity, somebody or something must put them there. If nobody put any waves in the cavity, there will not be any wave in the cavity. If you put in only the wave of primary frequency, $f_1=c/2(2r)$, then what is in the cavity is just the primary wave. If you put a wave of frequency nf_1, then, what is in the cavity is just the wave of frequency nf_1. If you put in waves of continuous bandwidth, only the discrete frequencies nf_1, n=1,2,3,4… will be present in the cavity. The rest will be dissipated on the inner walls of the cavity. In the case of a blackbody cavity, who is putting waves in the cavity? It is the oscillating electrons in the atoms that the blackbody made of that is putting the electromagnetic radiation into the cavity.

So, what is in the cavity is only the harmonics and modes for each harmonic that are generated by the oscillating electrons in the blackbody. What harmonics

and what modes of each harmonic are there in the cavity are unknown. Mode counting is frivolous.

We are going to use mode counting only to show that the Plank spectrum could be obtained without the energy quanta. In the process, we can also see the effect of cavity on the blackbody spectrum. A blackbody cavity of radius r can provide a home for infinite modes of frequencies does not mean all the frequencies are there or they have an equal amount of energy. What frequency modes for each harmonic are there in the cavity is unknown. What harmonics out of all the infinite number of possible harmonics and possible modes for each harmonic are there in a blackbody cavity is determined by the oscillating electrons in the atoms of the blackbody themselves.

The electromagnetic radiation produced by the oscillating electrons is determined by the kinetic energy of the oscillating electrons and the frequency of the oscillation. As a result, we cannot distribute the electromagnetic energy for a given frequency in the cavity equally among all the modes for that frequency the cavity can provide a home for. It is the mistake of allocating electromagnetic energy equally among all the modes a cavity can possibly hold, in the absence of knowledge to what modes are there in the cavity, that led to a blackbody catastrophe. There was never a blackbody catastrophe. Blackbody catastrophe is a mistake in derivation of the blackbody spectrum.

We cannot allocate energies equally into all the possible modes since we have no idea what modes are present in the cavity. If we know what modes are put into the cavity, we do not have to deal with the cavity at all; we can directly deal with the oscillators that generated the modes. Counting the modes in a cavity is a wrong approach to blackbody spectrum derivation.

Spectrum in a closed cavity is discrete. Spectrum through a hole on a cavity is continuous. Not all the frequencies observed through a hole on a cavity can be possible modes in the cavity. What is observed through a hole on a cavity has no relation to what modes are there in the cavity.

a) **Rayleigh-Jeans Spectrum**

Rayleigh-Jeans spectrum is a result of counting the number of different discrete waves or modes (capacity of a room) for each harmonic (room) a cavity (hotel) can provide a home for. Consider the n^{th} harmonic of frequency f. The wave equation is given by,

$$E(x,y,z)=E_o\exp[j(2\pi/\lambda)\mathbf{n}\bullet\mathbf{r}]\exp(-j\omega t) \quad (7.1.1)$$

$$\mathbf{n}=(n_x, n_y, n_z) \quad (7.1.2)$$

$$\mathbf{r}=(r_x, r_y, r_z) \quad (7.1.3)$$

where, ● is the dot product, n, n_x, n_y, n_z are all integers.

Equation (7.1.1) satisfies the wave equation,

$$\nabla^2E=(1/c^2)\partial^2E/\partial t^2 \quad (7.1.4)$$

where, $\nabla=(\partial/\partial x, \partial/\partial y, \partial/\partial z)$.

As a result, we have,

$$n^2=(n_x^2+n_y^2+n_z^2) \quad (7.1.5)$$

The frequency f of n^{th} harmonic that the cavity can provide a home for is given by,

$$f=nc/\lambda \quad (7.1.6)$$

where, λ=2(2r), r is the radius of the spherical cavity and λ is the primary wavelength of the cavity.

Substituting for λ, we have,

$$f=nc/2(2r) \quad (7.1.7)$$

$$n/r=4f/c \quad (7.1.8)$$

Early researchers working on blackbody spectrum around 1900 AD determined the blackbody spectrum by evaluating the maximum mode density per unit frequency. They assumed that the number of modes present in a cavity for a harmonic could be determined by counting the integer nodes in a uniformly laid 3D grid in phase space of radius n. Since $n_x>0$, $n_y>0$, $n_z>0$, we have n>0 and hence they only had to consider 1/8 of the sphere of radius n. Further, since each mode can have two polarities, positive and negative, they considered twice the modes.

So, the modes density of the n^{th} harmonic is given by,

$$N_n=2(1/8)[(4\pi/3)n^3]/[(4\pi/3)r^3] \quad (7.1.9)$$

$$N_n=(1/4)(n/r)^3 \quad (7.1.10)$$

Substituting for n from eqn. (7.1.8), we have,

$$N_n=(1/4)(4f/c)^3 \quad (7.1.11)$$

$$N_n=(16/c^3)f^3 \quad (7.1.12)$$

Mode density gradient $\grave{N}_n$ is given by,

$$\grave{N}_n=dN_n/df \quad (7.1.13)$$

Substituting from eqn. (7.1.12),

$$\grave{N}_n=(48/c^3)f^2 \quad (7.1.14)$$

The overall average energy of an oscillating electron in the blackbody at temperature T is kT, where k is the Boltzmann constant. They incorrectly assumed that the average energy of each mode of frequency f is the same and given by kT. Since light or electromagnetic waves have no temperature, this is not true for frequency modes in a cavity. It is only that the average energy of an oscillating electron in the black body is kT, not the energy of electromagnetic waves. Electromagnetic waves have no kinetic energy or temperature. So, under that false assumption, the spectral energy density $\mathcal{E}(f)$ is given by,

$$\mathcal{E}(f) =\grave{N}_n\, kT \quad (7.1.15)$$

Substituting for $\grave{N}_n$ from eqn. (7.1.14), we have,

$$\mathcal{E}(f, \text{spherical cavity}) =(48/c^3)kTf^2 \quad (7.1.16)$$

This is the Raleigh-Jeans spectrum for a spherical cavity. Rayleigh-Jeans obtained the spectrum for a cubic cavity, not for a spherical cavity. In the case of cubic cavity, the ubiquitous spectral density is given by [1],

$$\mathcal{E}(f, \text{cubic cavity}) =(8\pi/c^3)kTf^2 \quad (7.1.17)$$

Note that the factor π present in the Rayleigh-Jeans spectrum for a cubic cavity disappears when a spherical cavity is used. Rayleigh-Jeans spectrum for a cubic cavity is different from Rayleigh-Jeans spectrum for a spherical cavity. Rayleigh-Jeans spectrum depends on the geometry of a cavity. If the spectrum depends on the geometry of a cavity, then, the derivation must be flawed. Blackbody spectrum must be independent of the cavity geometry. Rayleigh-Jeans spectrum is fundamentally incorrect.

The Rayleigh-Jeans spectrum provides the energy density spectrum. In order to obtain the radiation density, we have to consider the radiation energy

density per unit area on a surface at an angle θ, and it is given by ρ(f,θ),

$$\rho(f,\theta)=(48/c^3)kTf^2(c/2)\cos^2\theta \quad (7.1.18)$$

where, c is the speed of light.

The factor 1/2 is there since radiation can be both in positive and negative directions. Averaging over θ, the radiation density spectrum ρ(f) is given by,

$$\rho(f)=(48/c^3)kTf^2(c/4) \quad (7.1.19)$$

$$\rho(f, \text{spherical cavity})=(12/c^2)kTf^2 \quad (7.1.20)$$

This is the Rayleigh-Jeans radiation density for a spherical cavity. To get the radiation density, all we must do is multiply the spectral energy density by c/4.

For the case of a cubic cavity, we have the radiation spectral density for the Rayleigh-Jeans spectrum [1],

$$\rho(f, \text{cubic cavity})=(2\pi/c^2)kTf^2 \quad (7.1.21)$$

Rayleigh-Jeans obtained the spectrum for a cubic cavity. The constant coefficient for cubic cavity is different from the constant coefficient for a spherical cavity. The factor π that is inherent in both Rayleigh-Jeans and Plank spectra for a cubic cavity disappears when a spherical cavity is used.

Constant coefficient does not matter in the case of a spectrum if the frequency function is correct. Engineers do not care about the multiplication factor. They only care about frequency function. However, for physicists, the multiplication factor is extremely important since that is the place where the underline structure lies. That is where the physics of the physical process lies. Frequency function does not tell us the underline process that generated the radiation in a blackbody. If all you need is the frequency function, you can get it simply by fitting a frequency function to the observed data using least squares approach together with a good guestimate for the function.

Rayleigh-Jeans frequency function is the same for both a spherical cavity and a cubic cavity. Frequency function itself is independent of the cavity. However, the multiplication factor of the Rayleigh-Jeans spectrum is dependent on the cavity. As a result, the spectral density is dependent of the cavity geometry. If the spectrum depends on the cavity geometry, it is a clear indication that there hidden is a serious problem in the methodology used in the derivation of the spectrum. Rayleigh-Jeans spectrum is flawed.

Lemma**:** Spherical Cavity

Rayleigh-Jeans blackbody radiation spectrum for a spherical cavity is given by,

$\mathcal{E}(f)=(48/c^3)kTf^2$.

Lemma**:** Cubic Cavity [1]

Rayleigh-Jeans blackbody radiation spectrum for a cubic cavity is given by,

$\mathcal{E}(f)=(8\pi/c^3)kTf^2$.

"*The Rayleigh-Jeans spectrum is proportional to $1/c^3$ and hence $\mathcal{E}(f)\cong 0$. This itself is an indication that the derivation is incorrect*."

Lemma:

Rayleigh-Jeans Spectrum is temperature unbound.

For any finite frequency, since the Rayleigh-Jeans spectrum is directly proportional to the temperature T, as the temperature approaches infinity, Rayleigh-Jeans spectrum becomes unbound; as $T\to\infty$, $\mathcal{E}(f)\to\infty$. Blackbody spectrum must be temperature bound for any finite frequency. Rayleigh-Jeans spectrum cannot be the correct Blackbody spectrum. As we are going to see later, the Plank spectrum is also temperature unbound and cannot be the true Blackbody spectrum.

Lemma:

Rayleigh-Jeans Spectrum is frequency unbound.

For any finite temperature T, since the Rayleigh-Jeans spectrum $\mathcal{E}(f)$ is directly proportional to the square frequency, as the frequency approaches infinity, the Rayleigh-Jeans spectrum becomes unbound; as $f\to\infty$, $\mathcal{E}(f)\to\infty$. Correct blackbody spectrum must be bound in frequency for any finite temperature. Rayleigh-Jeans spectrum cannot be the true blackbody spectrum.

Corollary:

Rayleigh-Jeans spectrum is cavity dependent, unbound in both frequency and temperature, and hence cannot be the true blackbody spectrum.

Note that the Rayleigh-Jeans spectrum for cubic cavity is different from the Rayleigh-Jeans spectrum for a spherical cavity. They have the same frequency function, but the coefficients are different indicating that the derivations are cavity dependent. This should not have been the case if the derivation had been correct. Blackbody spectrum cannot be cavity dependent. The derivation of the Rayleigh-Jeans spectrum is incorrect.

Corollary**:**

Rayleigh-Jeans blackbody radiation spectrum is dependent of the shape of a cavity. Blackbody spectrum must be cavity independent.

Lemma:

The area of the Rayleigh-Jeans spectrum is unbounded both in frequency for a given temperature and in temperature for a given frequency and hence Rayleigh-Jeans spectrum does not represent an energy spectrum.

b) **Plank Spectrum**

Plank used the mode density for frequency f in the Rayleigh-Jeans spectrum as the starting point. Plank used a cubic cavity just like Rayleigh-Jeans did. Here, we follow the Plank's derivation for a spherical cavity. For a spherical cavity, mode density gradient is given by eqn. (7.1.14),

$$\dot{N}_n=(48/c^3)f^2 \quad (7.2.1)$$

Plank realized that not all oscillators are equally probable since they have different energies. Probability of an oscillator of a mass at temperature T

oscillating at frequency f with kinetic energy E is given by the Maxwell-Boltzmann distribution. Note that the Maxwell-Boltzmann distribution applies only for particles of mass. It does not apply for massless. Maxwell-Boltzmann distribution does not apply to light or electromagnetic radiation. Boltzmann entropy does not apply to electromagnetic radiation.

So, Plank assumed that the energy E of an oscillator of frequency f comes in energy quanta e=hf, where h is a constant and hence E=ne. The energy of frequency f is a result of many oscillators of energy quanta E=ne, n=1,2,3, ... that are not equally probable. The probability of having an oscillator oscillating at energy E=ne is given by the Maxwell-Boltzmann distribution Prob(ne,T),

$$Prob(E,T)=\beta_o exp(-E/kT) \quad (7.2.2)$$

$$\beta_o=(m/2\pi kT)^{3/2} \quad (7.2.3)$$

where, m is the mass of the electron, k is the Boltzmann constant, T is the temperature.

However, that is not what Plank used. Plank modified the Maxwell-Boltzmann distribution to match the observation deliberately. In the derivation of Plank spectrum, what is used was,

$$Prob(E,T)=[exp(-ne/kT)]/\{\sum_1^\infty[exp(-ne/kT)]\} \quad (7.2.4)$$

This is not a probability distribution of the energy of a mass m at temperature T. Probability distribution of energy of a mass m at temperature T in a population must depend on the mass m of a particle and temperature T by the Maxwell-Boltzmann distribution $Prob(E,T)=(m/2\pi kT)^{3/2}exp(-E/kT)$.
Here, $(m/2\pi kT)^{3/2}$ plays an important role in the distribution.

Although this Probability function gave the results Plank was hoping for, this does not describe the probability of a mass m in a population at temperature T having energy E. There is no realistic meaning for using this probability function in eqn. (7.2.4) except that it gave the expected result that matches the observation. This exactly what made the Plank spectrum unbounded at high temperatures. If Plank had used correct Maxwell-Boltzmann distribution, there would be no unbound spectrum at high temperatures, however, what Plank would have gotten in this case would not be what he was hoping for.

With Plank's unreasonably modified probability distribution given in eqn. (7.2.4), the average energy $\bar{E}$ of oscillators at frequency f is given by,

$$\bar{E}=\{\sum_1^\infty[(ne)exp(-ne/kT)]\}/\{\sum_1^\infty[exp(-ne/kT)]\} \quad (7.2.5)$$

$$\bar{E}=e/[exp(e/kT)-1] \quad (7.2.6)$$

The average energy of frequency f is $\bar{E}$. Plank made another assumption. Plank assumed that the energy of an electromagnetic radiation mode of frequency f in the cavity is the same as the average energy of oscillators of mass on the blackbody oscillating at frequency f. Plank assumed that the kinetic energy of an of a mass oscillating at frequency f is the same as the electromagnetic energy of the radiation in the cavity at frequency f. His energy quanta do not distinguish electromagnetic energy of frequency f from a kinetic energy of a mass oscillating at frequency f since h, the Plank constant, is assumed to be a universal constant.

From Rayleigh-Jeans derivation, Plank already had the mode density $\dot{N}_n$ in the cavity, which is the number of different electromagnetic waves of the same frequency per unit volume per unit frequency at frequency f. He also had the average energy of a mode at frequency f if it is assumed that the energy of frequency f comes in energy quanta e=hf, and the energy of frequency f is a result of many oscillators with energy E=ne, n=1,2,3,… oscillating at the same frequency f. Plank disregarded the ambiguity resulting from the fact that the energy n(hf) cannot be distinguished from the energy h(nf) by energy itself since they are equal, yet they are a result of two different processes.

Plank's assumptions are already self-contradictory since kinetic energy is not the same as the electromagnetic energy and energy n(hf), the total energy of n oscillators at frequency f, is not the same as the h(nf), the energy of a single oscillator at frequency nf. If energy comes in quanta, n(hf) is same as h(nf) even though they are not the same physically.

So, the Plank spectral density is given by,

$$\mathcal{E}(f)=\dot{N}_n\bar{E} \quad (7.2.7)$$

The $\dot{N}_n$ is given by the Rayleigh-Jeans spectrum in eqn. (7.1.14),

$$\dot{N}_n=(48/c^3)f^2 \quad (7.2.8)$$

Substituting for $\dot{N}_n$ in eqn. (7.2.4), we have,

$$\mathcal{E}(f)=(48/c^3)f^2\bar{E} \quad (7.2.9)$$

Substituting for $\bar{E}$ from (7.2.6), we have,

$$\mathcal{E}(f)=(48/c^3)f^2e/[exp(e/kT)-1] \quad (7.2.10)$$

Plank had already assumed that the energy of frequency f comes in energy quanta e=hf. Substituting for e, we have,

$$\mathcal{E}(f)=(48h/c^3)f^3/[exp(hf/kT)-1] \quad (7.2.11)$$

The Plank spectrum for a spherical cavity is given by,

$$\mathcal{E}(f,\text{ spheric-cavity})=(48/c^3)hf^3/[exp(hf/kT)-1] \quad (7.2.12)$$

Plank did not derive the spectrum for a spherical cavity. Plank obtained the spectrum for a cubic cavity.

The ubiquitous Plank spectrum for a cubic cavity is given by [1],

$$\mathcal{E}(f,\text{ cubic- cavity})=(8\pi/c^3)hf^3/[exp(hf/kT)-1] \quad (7.2.13)$$

Plank radiation density spectrum can be obtained simply by multiplying Plank energy spectrum $\mathcal{E}(f)$ by c/4 as we did in the Rayleigh-Jeans spectrum.

The Plank radiation density spectrum for a spherical cavity is given by,

$$\rho(f)=(12h/c^2)f^3/[exp(hf/kT)-1] \quad (7.2.14)$$

$$\rho(f,\text{ spheric-cavity})=(12h/c^2)f^3/[exp(hf/kT)-1] \quad (7.2.15)$$

The Plank radiation density spectrum for a cubic cavity is given by,

$$\rho(f)=(2\pi h/c^2)f^3/[exp(hf/kT)-1] \quad (7.2.16)$$

$$\rho(f,\text{ cubic-cavity})=(2\pi h/c^2)f^3/[exp(hf/kT)-1] \quad (7.2.17)$$

The Plank spectrum for a spherical cavity is different from the Plank spectrum for a cubic cavity. Although they only differ by the constant factor, it is a

clear indicator that the derivation used in Plank spectrum is fundamentally wrong and invalid. Blackbody spectrum must be independent of the cavity. Since the derivation of the Plank Spectrum is incorrect, Plank's assumption of quantized energy no longer applies.

Lemma**:** Spherical Cavity

Plank's blackbody energy spectrum for a spherical cavity is given by,

$\mathcal{E}(f)=(48h/c^3)f^3/[\exp(hf/kT)-1]$.

Lemma**:** Cubic Cavity [1]

Plank's blackbody energy spectrum for a cubic cavity is given by,

$\mathcal{E}(f)=(8\pi h/c^3)f^3/[\exp(hf/kT)-1]$.

Lemma:

Plank spectrum is frequency bound.

Independent of the cavity, since the Plank spectrum $\mathcal{E}(f) \propto f^3/[\exp(hf/kT)-1]$, for any finite temperature T, as $f\rightarrow\infty$, $\mathcal{E}(f)\rightarrow 0$, and hence the Plank spectrum is frequency bound. Although the Rayleigh-Jeans spectrum is frequency unbound, Plank spectrum is frequency bound as it should be. Although Plank spectrum is not the true blackbody spectrum, it is an improvement over Rayleigh-Jeans spectrum.

Lemma:

Plank spectrum is temperature unbound.

Irrespective of the shape of the cavity, Plank spectrum $\mathcal{E}(f) \propto 1/[\exp(hf/kT)-1]$. For any finite frequency f, as the temperature T approaches infinity, Plank spectrum $\mathcal{E}(f)$ approaches infinity or becomes unbounded, as $T\rightarrow\infty$, $\mathcal{E}(f)\rightarrow\infty$. Blackbody spectrum must be bound for all temperatures and for all frequencies. Plank spectrum is not bound in temperature.

Corollary:

Plank spectrum is cavity dependent, temperature unbound, and hence cannot be the true blackbody spectrum.

Lemma:

Plank spectrum is frequency insensitive.

In the Plank spectrum the coefficient h/c^3 is negligibly small since $h=6.626(10^{-34})$ and $c=3(10^8)$, $h/c^3=(6.626/9)(10^{-58})\cong 0$. In fact, it is nearly zero. This is an indication that there is something very wrong with the derivation, and the Plank spectrum cannot represent the blackbody spectrum.

As we can see, Plank's spectrum for a spherical cavity is different from the Plank's spectrum for a cubic cavity. Although the blackbody spectrum for a square cavity is different from the spectrum for a spherical cavity, the frequency function of the Plank's spectrum is independent of the cavity. In fact, frequency function of all the blackbody spectra is independent of the cavity. This is the only reason why the Plank Spectrum and the rest of the blackbody spectra passed as correct.

The agreement of the frequency function of a blackbody spectrum with the observation does not guarantee that the spectrum or the derivation of the spectrum is correct. Frequency function is only a part of the blackbody spectrum, not the blackbody spectrum itself. The agreement of the frequency function with observation is necessary but not sufficient for the spectrum to be correct.

However, if the derivations of the blackbody spectra are correct, they all must be independent of the cavity. Correct blackbody spectrum must be independent of a cavity totally. Plank spectrum and all the other blackbody spectra depends on the cavity since their constant factor depend on the cavity. This is a clear indication that their derivations are incorrect. This a clear indication that the assumption associated with the derivations are invalid. This is a clear indication that the assumption of quantized energy used by Plank in the derivation of the blackbody spectrum is incorrect.

Lemma**:**

There is no radiation without an electric charge. Correct blackbody spectrum must depend on the electric charge. Plank spectrum is independent of an electric charge and hence it cannot represent blackbody radiation. Rayleigh-Jeans and Wein spectra are also independent of electric charge and hence cannot represent blackbody spectrum. None of the blackbody spectra is correct.

Corollary**:**

Plank's blackbody radiation spectrum depends on the shape of a cavity. This should not have been the case if the derivation of the Plank Spectrum had been correct. The derivation of the Plank Spectrum is incorrect. Rayleigh-Jeans and Wein spectra are also cavity dependent and hence cannot represent blackbody spectrum. None of the blackbody spectra is correct.

Theorem**:**

The agreement with the observation is necessary for a spectrum to be correct but not sufficient. Spectrum must also be charge and temperature dependent and cavity independent. The magnitude of the spectrum should not be nearly zero and hence the spectrum should not be inversely proportional to the speed of light c.

Lemma:

Blackbody radiation spectrum has nothing to do with the speed of light c. It is only the blackbody spectrum against the wavelength λ that depends on the speed of light, not the spectrum against frequency.

Lemma**:**

Energy is not quantized. Energy cannot come in quanta since all the energies are not created equal.

Theorem**:**

If an entity is quantized, quanta must contain the belonging information as well as the mechanism (blueprint) to form a one unique whole. Except the matter, nothing in nature can come in quanta.

Lemma:

The area of the Plank spectrum does not increase with temperature while remaining finite and hence the Plank spectrum does not represent a blackbody spectrum.

Lemma:

Plank spectrum is unbounded at high temperatures and hence Plank spectrum does not represent a blackbody spectrum.

Lemma:

True blackbody spectrum must be bounded for all frequencies and temperatures up to infinity. It must also be a function of charge and the mass of the charge.

"*The correct frequency function for the observed spectrum can also be determined by using least square estimation, but the correct frequency function itself says nothing about the underline physical process that generated the radiation*."

c) **What went Wrong with the Derivation of Plank Spectrum as Well as All the Other Blackbody Spectra**

The area of a blackbody spectrum represents the total radiation energy per cycle. Since the radiation energy is finite, the area of the blackbody spectrum must be finite. The radiation increases with the temperature and hence the area of the blackbody spectrum must increase with the temperature. Correct blackbody spectrum must have an increasing area with temperature while remaining bounded.

"*Plank spectrum is unbounded at high temperatures. The area of the plank spectrum does not increase with the temperature while remaining bounded for all temperatures and hence Plank spectrum does not represent the true blackbody spectrum*. *In fact,* n*one of the blackbody spectra represents the true blackbody spectrum*."

All the blackbody spectra are based on the same foundation, the analysis of maximum number of modes in a cavity. As a result, all the blackbody spectra depend on the shape of the cavity. Correct blackbody spectrum must be independent of the shape of a cavity and hence the derivations of all the available blackbody spectra are incorrect. Here are some of many problems with the available blackbody spectra for their respective frequency bands:

1. All the blackbody spectra including Rayleigh-Jeans and Plank spectra assume that a blackbody cavity contains all the modes of a harmonic, and all the modes are equally probable. This assumption is incorrect.

A cavity is not guaranteed to contain all the modes of a harmonic. It is only that a cavity can provide a home for infinite number of discrete harmonics determined by the dimension of the cavity and for all the modes of a harmonic. A cavity can provide a home for an infinite number of discrete harmonics and for all the modes of a harmonic does not mean that they are all there in the cavity.

If a hotel has infinite rooms with increasing capacities with the room number in an unknown manner does not mean all the rooms are occupied to full capacity of each room. If a cavity has energy E, it already has a belonging unbeknown to us. We cannot allocate it to all the rooms and the modes the way we want; that is not possible. A room contains whoever it occupies, which is unknown.

What is in a cavity is whatever that is thrown into it by the blackbody. Oscillators can generate whatever the frequencies they are capable of, but cavity can accept only the discrete modes allowed by the cavity. The rest simply dissipate in the inner wall of the cavity. Spectrum of a blackbody cannot be determined by analyzing the modes of each harmonic since we do not know which modes are put into the cavity. The maximum number of modes a cavity can hold at any frequency says nothing about actual modes present at that frequency.

2. If we use a hole on the cavity to observe the spectrum of a cavity, the spectrum observed through a cavity is not the spectrum of a closed cavity. In a closed cavity, spectrum is discrete. However, if there is a hole on the cavity, any frequency generated by the inner walls of the blackbody can propagate through the hole. The spectrum through a hole is continuous although spectrum inside a cavity is discrete. Spectrum observed through a hole is the spectrum of the blackbody itself, not the spectrum of a blackbody cavity. The continuous spectrum observed through a hole on the cavity cannot be derived by analyzing the discrete spectrum of a closed cavity. Observed spectrum through a hole on the cavity is not limited to the allowed modes in the cavity.

"*You cannot observe what is inside a blackbody cavity through a hole on the cavity; it is not possible.*"

3. The mode density for a discrete harmonic f, where f=nc/2(2r), cannot be determined by counting all the nodes in a linearly laid 3D grid sphere of radius n in phase space. Not every node in a 3D grid sphere of radius n in phase space is a valid node of the cavity. A valid mode for harmonic n must satisfy the Pythagoras integer quadruple,
$n^2=n_x^2+n_y^2+n_z^2$, where n, $n_x \leq n$, $n_y \leq n$ $n_z \leq n$ are integers.

This is also the solution to 3D Fermont problem of second order. The number of solutions to Pythagoras

integer quadruples is not proportional to n^2. The number of solutions to the 3D Fermont problem of second order is not proportional to n^2. In other words, the mode density $\grave{N}_n$ per unit frequency for the discrete harmonic frequency f in a cavity is not proportional to f^2,
$\grave{N}_n \neq \beta n^2$ and $\grave{N}_n \neq \beta f^2$.

Number of integer-quadlets (n, n_x, n_y, n_z) that satisfies the relationship $n^2=n_x^2+n_y^2+n_z^2$ for given n is not proportional to n^2. Therefore, the number of modes for a discrete harmonic frequency f in a cavity is not proportional to f^2. Determining all the allowed modes in a cavity is equivalent to determining Pythagoras integer quadruples for all n, n=1, 2, 3, … up to infinity. For any n it is guaranteed to satisfy for three different modes (n, 0, 0), (0, n, 0), and (0, 0, n). For the rest, there is no known relationship that relates the number of solutions to n for the Pythagoras integer quadruple problem.

"*The modes density per unit frequency for a discrete harmonic frequency* f *in a cavity is not proportional to* f^2 *since no such relationship exist for the solution to the Pythagoras integer quadruple problem that determines the mode density.*"

4. Plank's arbitrary assumption of energy quanta e=hf cannot exist. The energy quanta e=hf is meaningless for potential energy since potential energy has no association with a frequency. The energy quanta e=hf has no meaning for the kinetic energy of a particle moving at constant speed since it has no association with a frequency. Energy as a general entity cannot be represented as energy quanta e=hf since all the energies have no associated frequency; not all the energies are created equal and hence a universal energy quantum is not possible.

Lemma**:**
The potential energy of a mass cannot come in energy quanta e=hf since potential energy has no association with a frequency f. Kinetic energy of a mass moving at constant speed cannot come in quanta e=hf since the kinetic energy of a mass moving at constant speed has no association with frequency.

5. If energy comes in quanta, then, there is an ambiguity when there are n quanta. The problem is that the n(hf) is mathematically the same as h(nf), but physically n(hf) is not the same as h(nf) since h(nf) may knock out an electron from an atom while n(hf) may not, depending on f. If energy comes in quanta, then there is an energy ambiguity since h(nf)≠n(hf) physically. Any quantity that has a belonging cannot come in quanta since there is no mechanism in nature to carry the belonging information. There is no way to distinguish h(nf) from n(hf) if energy comes in quanta.

There cannot be an energy ambiguity in nature. If mechanical energy comes in energy quanta e=hf and electromagnetic energy also comes in quanta e=hf, then, there is no way to distinguish mechanical energy from electromagnetic energy. Electromagnetic energy and kinetic energy are not the same. When energy cannot come in quanta, Plank's blackbody spectrum derivation does not hold. In addition.

Plank's blackbody derivation does not hold due the abovementioned mode counting problem. When, number of modes for discrete harmonic f is not proportional to f^2, there is no Plank spectrum. Besides, the continuous spectrum through a hole on a blackbody cavity cannot be obtained by analyzing discrete spectrum in a closed cavity. Discrete spectrum in a closed cavity says nothing about the frequencies in between the harmonics observed through a hole on the cavity. The spectrum observed through a hole on a cavity is not the spectrum inside the cavity.

Lemma:
The e=hf is not an energy quantum. The entity e=hf is the KINETIC ENERGY PER UNIT CYCLE of a harmonic oscillator of frequency f and mass m. The parameter h is not a constant, and it is a function of the mass m and the maximum displacement A_o of the oscillating mass m.

The relationship e=hf is meaningless for electromagnetic waves or light. In the case of light or electromagnetic waves, the electromagnetic energy PER UNIT CYCLE is given by $e_e=h_e/f$, where h_e is not a constant. The h_e depends on E_o^2, where E_o is the maximum amplitude of the electric field. Energy cannot come in quanta. However, e=hf applies to the kinetic energy of an electron generated by an electromagnetic wave. The h here is different from the h_s for the oscillating source-electron that generated the electromagnetic radiation as well as the h_e for the electromagnetic energy of an electromagnetic wave itself.

Lemma:
Energy is not quantized.

6. Observed spectrum of a blackbody cavity through a hole on the cavity is continuous. Frequency spectrum of a cavity is discrete. What is observed through a hole on a cavity is not the discrete spectrum of the cavity. Observed spectrum of a blackbody cavity through a hole cannot be derived by analyzing the discrete spectrum of a cavity. What is observed through a hole on a cavity is the spectrum of the blackbody itself, which is continuous. The derivations of all the blackbody spectra are incorrect and invalid.

"*What is observed through a hole on a blackbody cavity is not just what is inside the cavity. It is much more than what is in the cavity*."

"*What is observed through a hole on a blackbody cavity is the continuous blackbody spectrum, not the discrete spectrum inside the cavity*."

7. Energy cannot come in quanta e=hf since all the energies are not created equal. Mechanical energy is not the same as the electromagnetic energy. Kinetic energy of an oscillating mass is not the same as the potential energy. If energy comes in quanta, it loses the identity. The identity of the energy must be maintained since the electromagnetic energy is not the same as the mechanical energy.

8. Although the Plank spectrum is bounded for all frequencies for a limited band of temperatures, Plank's blackbody spectrum is not bounded for all temperatures. Plank spectrum is not bounded for high temperatures. Correct blackbody spectrum must be bounded for all the frequencies and temperatures up to infinity. For low frequencies, Plank's spectrum is approximately linearly proportional to temperature and hence go on increasing with temperature without a bound.

Lemma:

Correct spectrum cannot go on increasing without a bound with temperature at any frequency.

9. Blackbody radiation must be a function of charge since there is no radiation without a charge. In addition, since there is no charge without a mass, blackbody radiation must also be a function of the mass of the charge. Plank spectrum is independent of the charge and the mass of the charge by design in its effort to find a matching frequency function for the observed data with the least effort.

10. Blackbody radiation has nothing to do with the speed of the propagation of radiation. The generation of the blackbody radiation is not dependent on the speed of propagation of electromagnetic radiation, or speed of light. Blackbody radiation should not be proportional to the inverse of the cubic speed of light or to $1/c^3$. If the blackbody radiation is proportional to the cubic speed of light inversely, the spectrum is approximately zero independent of frequency, and hence frequency independent in effect, or frequency insensitive. It is only the blackbody spectrum against the wavelength λ that is inversely proportional to the speed of light, not the blackbody spectrum against frequency f. Speed of light has no place in the blackbody spectrum.

11. Plank's blackbody radiation only has the correct frequency function, nothing else. The temperature function is incorrect since it is unbounded for all the temperatures. It is not a function of charge even though it should. It is not a function of the mass of the charge even though it should.

"*The correct frequency function of a blackbody spectrum is necessary for the blackbody spectrum to match the observation and considered to be a possible contender for the blackbody spectrum, but it not sufficient for it to be the correct blackbody spectrum and the derivation of the spectrum to be correct and the assumptions to be valid.*"

VIII. BLACKBODY CAVITY WITH A SMALL HOLE FOR OBSERVATIONS

We know theoretically that the spectrum of a closed cavity is discrete. When we observe the cavity through a hole what is observed is much more than what is in the cavity. The observed spectrum through a hole on a cavity says nothing about what modes are present in a cavity.

Lemma**:**

What is in a blackbody cavity cannot be observed through a hole on the cavity.

Lemma**:**

Analysis of modes in a cavity says nothing about the observed spectrum through a hole on a cavity.

In the case of a closed cavity, the radiation frequencies that can be present in the cavity are discrete. Even though a continuous spectrum of frequencies is generated by the black body, only the discrete frequencies that a cavity can support be inside the cavity. The primary frequency f_1 that is determined by the geometry of the cavity and its integer harmonics nf_1, n=1,2,3, … are the only frequencies that can keep propagating inside the cavity. A cavity can support an infinite number of discrete frequencies and many modes for each discrete frequency do not mean all the harmonics and all the modes for each harmonic are there in the cavity. What is in a cavity is what is allowed in the cavity out of what is put into it, nothing more.

However, if there is a hole on a cavity, the frequencies that can propagate through the hole is not discrete, not limited. Whatever the frequencies generated by the blackbody can propagate through a hole on a cavity. In other words, the blackbody radiation observed through a hole on a cavity is the same as the spectrum of a blackbody at temperature T. We already obtained the spectrum of an object at temperature T, and it is given in eqn. (4.2.10),

$$e_{es}=\beta f^3/[\exp(h_s f/kT)-1] \quad (8.1)$$

$$\beta=\beta_o h_{es} \quad (8.2)$$

$$h_{es}=8(\gamma q\pi^2 A_o)^2 \quad (8.3)$$

$$\beta_o=(m/2\pi kT)^{3/2} \quad (8.4)$$

m is the mass of an oscillating electron, q is the charge of an electron, A_o is the maximum displacement of oscillating electron.

The kinetic energy PER UNIT CYCLE of an oscillating electron at frequency f is given by $e_s=h_s f$. The parameter h_s is not a constant. The h_s depends on the mass and the maximum displacement of the oscillator. The $e_s=h_s f$ is not an energy quantum.

In engineering point of view, the proportionality constant β is not important in a spectrum and as a result the mistakes in the derivation of Plank spectrum as well as the rest of the blackbody spectrum went unnoticed since they all have the correct frequency function even though all of them were based on a

flawed foundation. However, in the point of view of physics, spectrum is useless without the correct proportionality factor β. It is this factor β that relates the spectrum to underline process that generated the blackbody radiation. If all we need is the frequency function that fit the observed data, then we can get it simply by fitting a curve using the least squares method. The aim is not to obtain a frequency function that matches the data but to obtain the spectrum that describes the underline process that generated the radiation, which fits the observation.

IX. THE INVALIDITY OF MODE COUNTING IN DERIVING THE BLACKBODY CAVITY SPECTRUM

A cavity can support infinite number of harmonics and many modes of a harmonic. What mode counting refers to is counting the maximum number of different waves that can be present for a harmonic or in other words the capacity of a room in a hotel.

The counting the maximum number of different modes for a harmonic in a cavity used in the derivation of the blackbody radiation is meaningless and invalid. The problem is that it assumes that all the different modes for a given harmonic are equally likely. Further, it also assumes all the possible modes of a harmonic are present in a cavity. Besides, the mode counting has not been done correctly in the derivation of any of the blackbody spectra.

Plank used the mod counting that was done in the Rayleigh-Jeans spectrum under the assumption that all the modes are equally probable, and all the modes are present in a cavity. Then, Plank assumes energy of frequency f comes in quanta e=hf and an oscillator having energy E=ne, n=1,2,3, ... is determined by the Maxwell-Boltzmann distribution. He mixed up the radiation energy of frequency f and kinetic energy of an oscillator of frequency f as if they are equal. Kinetic energy of an oscillating mass at frequency f is not the same as the electromagnetic energy of an electromagnetic wave of frequency f. Energy transfer cannot be done at one hundred percent efficiency.

The assumption that the different modes of a discrete harmonic f are equally probable and the assumption that the harmonics themselves are equally probable are in direct conflict with the assumption that an oscillator oscillating at frequency f with n energy quanta having energy E=ne is determined by the Maxwell-Boltzmann distribution, where n=1,2,3, … and e=hf.

In addition, a blackbody cavity can provide a home for the fundamental frequency of the cavity and all the infinitely many integer harmonics does not mean all the harmonics and all the modes for each harmonic are present in a cavity. What a cavity contain is what is allowed in the cavity out of whatever that is being put into the cavity. Cavity cannot have something that is not put into it. Just because you put something does not mean it is there in the cavity unless it is an allowed item in the cavity. If you put into a cavity an item that is allowed in the cavity, that item will be there in the cavity. If you throw and item that is not allowed in the cavity, that item will not be there in the cavity. If oscillators on the inner surface of the blackbody generates a wave that is not an allowed harmonic in the cavity, that wave will not be in the cavity; that wave will dissipate on the inner surface of the cavity.

The maximum modes a cavity can contain and what is in the cavity are not the same. What is in a cavity is the union between what is generated by the inner surface of the blackbody cavity and what is allowed in the cavity.

If a hotel has 100 rooms, that does not mean the hotel has guests in all the rooms or each room is occupied to full capacity. If the hotel has 5 guests, we cannot distribute 5 guests equally into 100 rooms. If there are 5 guests, they may be in up to 5 different rooms or in a single room with a capacity 5 or spread out at most in five rooms; the rest of the rooms are empty. The same applies if the hotel has infinitely many rooms with each room having a capacity proportional to the room number in an unknown manner. We cannot find the number of guests in a hotel by analyzing the number of rooms and the maximum capacity of each room in the hotel. It is the same for a blackbody cavity.

If a cavity has one allowed mode of a harmonic, the energy already has an owner. We cannot distribute the energy equally among all the allowed modes for that harmonic. What blackbody cavity has is whatever the allowed modes that are thrown into it. There was never a blackbody catastrophe since a cavity can provide a home for infinite harmonics and all the modes for each harmonic does not mean all the modes for each harmonic and all the harmonics are there in the cavity. It is only the allowed modes that are generated by the oscillators on the inner walls of the blackbody cavity that is present in a cavity, and it is unknown. We cannot count unknown. That is the problem with all the spectrum derivation methods originated in late 19^{th} and early 20^{th} centuries. In fact, that is the problem with all the blackbody spectrum methods available to date.

The mode counting-based derivations of blackbody spectrum is incorrect and invalid. The spectrum in a cavity is discrete but the spectrum through a hole on a cavity is continuous. The maximum number of modes for a discrete harmonic in a cavity says nothing about the observed frequencies in between the discrete harmonics. The maximum number of modes a cavity can contain, and the actual number of modes present in a cavity are not the same. The actual modes present in a cavity are unknown. You cannot find the number of guests in a hotel by analyzing the number of rooms and the capacity of each room in the hotel.

Foundation of Rayleigh-Jeans, Wein, and Plank spectra are incorrect. Plank spectrum also requires an additional assumption that both the electromagnetic radiation energy of any mode of each discrete harmonic frequency f in a cavity as well as the kinetic energy of the oscillators of frequency f on the blackbody come in quanta e=hf, where h is a constant. If energy of frequency f comes in quanta, there is no way of determining two distinct quantities n(hf) and h(nf) since they are mathematically the

same. The fact is that physically n(hf)≠h(nf), yet mathematically n(hf)=h(nf).

Kinetic energy of an oscillating mass of frequency f is not the same as the electromagnetic energy of frequency f. Both kinetic energy and electromagnetic energy cannot come in the same quanta e=hf. Energy conversion at hundred percent efficiency is not possible. The energy cannot come in quanta. If energy comes in quanta, it creates an ambiguity. Kinetic energy and electromagnetic energy are not the same.

Different waves or modes of a given harmonic frequency f present in a cavity cannot be counted since actual number of harmonics present in a cavity is unknown. Number of modes for a discrete harmonic frequency f is not proportional to square frequency or f^2 since the determination of the maximum possible modes for a discrete harmonic frequency is the solution to the Pythagoras integer quadruple or the solution to the extended 3D Fermont problem of second order.

Both modes counting and the assumption of quantized energy are not necessary for deriving the blackbody spectrum since the spectrum observed through a hole on a blackbody cavity is the same as the spectrum of a blackbody itself. Determining the spectrum of a blackbody does not require a cavity. Blackbody spectrum must be cavity independent.

"*The Spectrum observed through a hole on a cavity has nothing to do with the cavity.*"

We already obtained the energy spectrum of a blackbody at temperature T, and it is given in eqn. (4.2.10),

$$e_{es}=\beta f^3/[\exp(h_s f/kT)-1] \quad (9.1)$$

$$\beta=\beta_o h_{es} \quad (9.2)$$

$$h_{es}=8(\gamma q\pi^2 A_o)^2 \quad (9.3)$$

$$\beta_o=(m/2\pi kT)^{3/2} \quad (9.4)$$

The parameter β depends on the mass of the electron and the maximum displacement A_o of the electron oscillating at frequency f. The subscript s denotes the source electron, and the subscript es denotes the electromagnetic radiation generated by the source electron.

The kinetic energy e_s per cycle of the source-electron oscillating at frequency f that generated the electromagnetic radiation is given by,

$$e_s=h_s f \quad (9.5)$$

Energy e_s is not an energy quantum. Energy e=hf applies only for kinetic energy per cycle of an oscillating mass at frequency f. The e=hf does not apply to electromagnetic energy. Electromagnetic energy per cycle generated by an oscillating electron is given by,

$$e_{es}=h_{es} f^3 \quad (9.6)$$

where, $h_s \neq h_{es}$.

For any electromagnetic wave of maximum electric field E_o, the energy per cycle e_e is given by,

$$e_e=h_e(1/f) \quad (9.7)$$

$$h_e=(1/2)E_o^2 \quad (9.8)$$

$$h_s \neq h_{es} \neq h_e \quad (9.9)$$

When an electromagnetic wave interacts with an electron or charge particle at a destination, it oscillates the destination-electron or the charge particle at the same frequency as of the electromagnetic wave generating kinetic energy per cycle e_{de} given by,

$$e_{de}=h_{de}(1/f^3) \quad (9.10)$$

where h_{de} depends on the mass of the particle, the subscript d denotes the destination electron, subscript e denotes the electromagnetic radiation, subscript de denotes the effect of electromagnetic radiation on the destination electron,

$$h_s \neq h_{es} \neq h_e \neq h_{de} \quad (9.11)$$

If we have a blackbody cavity with radius r, then the primary frequency f_1 of the cavity is given by,

$$f_1=c/2(2r) \quad (9.12)$$

where, c is the speed of light.

Both Rayleigh-Jeans and Plank spectra cannot provide the observed frequencies through a hole on a cavity for f, where $(n-1)f_1<f<nf_1$, n=1,2,3, … since they are based on the analysis of the discrete modes for a harmonic nf_1 that could be present inside a cavity and frequencies $(n-1)f_1<f<nf_1$, n=1,2,3, … are not covered in that analysis.

Frequencies $(n-1)f_1<f<nf_1$, n=1,2,3, … are not in the cavity even though those frequencies can be generated by the inner surface of the blackbody and propagate out of blackbody through the hole in the cavity resulting in a continuous observed spectrum through a cavity. Plank and Rayleigh-Jeans spectra do not cover frequencies in between the discrete harmonics in their derivation. Plank and Rayleigh-Jeans spectra are derived based on the discrete frequencies in a cavity, even though spectrum through a hole on a cavity is continuous. Plank and Rayleigh-Jeans spectra are not designed to cover the frequencies in between the discrete harmonics in the cavity. Plank and Rayleigh-Jeans spectra do not represent a complete spectrum of a blackbody.

An oscillating electron in a source object at temperature T can transfer its kinetic energy $e_s=h_s f$ per cycle to an electron at a distance using the mass-less, momentum-less, entropy-less, kinetic-energy-less, thermal-energy-less electromagnetic waves as a transportation mean. Kinetic energy does not radiate. Thermal energy does not radiate.

Heat does not radiate. Kinetic energy of an oscillating electron generates electromagnetic waves that radiates. Electromagnetic waves have no thermal energy, no momentum, no kinetic energy, no temperature, no entropy, no mass. Electromagnetic waves travel without an energy loss or frequency redshift in a vacuum. When electromagnetic waves encounter another electron in an object at a destination, the destination-electron starts oscillating at the same frequency as of the electromagnetic wave or light generating kinetic energy, thermal energy, entropy on the destination object. In effect, what has happened is that a source object has transferred its thermal energy to a distant object via the transportation mean of electromagnetic waves.

The kinetic energy e_{ds} per cycle transferred from one object to another distant object is given by,

$$e_{ds}=h_{ds}f \quad (9.13)$$

$$h_{ds}=(1/m)(2\pi\gamma A_o q^2)^2 \quad (9.14)$$

Since $(\pi A_o)^2=h_s/m$, h_{ds} can also be written as,

$$h_{ds}=h_s(2\gamma q^2/m)^2 \quad (9.15)$$

The h_{ds} depends on the mass m of the electron and the maximum displacement A_o of the oscillating source-electron. The kinetic energy per cycle e_s of the source-electron is given by,

$$e_s=h_s f \quad (9.16)$$

where, $h_{ds}<h_s$.

The transfer of kinetic energy of an oscillating electron at frequency f to electromagnetic energy is proportional to f^3. The transfer of electromagnetic energy to kinetic energy of an oscillating electron is proportional to $1/f^3$. As a result, the overall transfer of kinetic energy of one object to kinetic energy of a distant object by means of electromagnetic waves is frequency independent. The frequency is unaffected by the energy transfer from source object to destination object by means of electromagnetic waves if the propagation of electromagnetic waves take place in a vacuum.

X. EINSTEIN'S DERIVATION OF PHOTON OR LIGHT QUANTA

Maxwell-Boltzmann distribution, Boltzmann entropy, Wein principle of entropy, and Wein's energy spectrum are all results of the applications of Newton's laws, thermodynamics laws together with the statistical analysis for particles of mass in a volume V at temperature T. Einstein made an arbitrary claim that light comes in energy quanta and used Maxwell-Boltzmann distribution, Boltzmann entropy, Wein's principle of entropy, and Wein's spectral density for a blackbody cavity for high frequency range that are only applicable for particles of mass [1]. The problem is light has no mass. Einstein's light particles have no mass. Light has no kinetic energy. Light has no thermal energy. Light has no momentum. Light has no temperature. Light has no entropy. Relationship derived for particles of mass do not apply for particles of massless. Any assumption must be logical. Einstein's assumptions are not logical, not realistic. If you use nonrealistic assumptions, it will lead to non-realistic behaviors. Light is simply useless in the absence of matter. It does not matter how intense the light is, light has no effect in a vacuum.

Einstein's derivation of light quanta or photons involved several steps that require the use of relationships that do not apply for massless. Einstein uses entropy relationship for light that has no entropy.

Step-1: Wein's Principle of Entropy

$$\partial\phi(f)/\partial\mathcal{E}(f)=1/T \quad (10.1)$$

where, $\phi(f)$ is the entropy density distribution and $\mathcal{E}(f)$ is the energy density distribution of particles of mass at temperature T.

Problem: Electromagnetic radiation or Light has no thermal energy. Light has no temperature. It does not matter how much light there is in a vacuum, vacuum has no temperature. Wein's principle of entropy does not apply for light. Wein's principle does not apply to light particles. Light is not particles. Particles cannot propagate.

Step-2: Wein's Energy Distribution Function

Wein's energy distribution function requires oscillation of charges, oscillation of electrons, or charge particles of mass at temperature T. It is given by,

$$\mathcal{E}(f)=\alpha f^3 \exp(-\beta f/kT) \quad (10.2)$$

where, α and β are constants, k is the Boltzmann constant.

Problem: Wein distribution does not apply to light quanta since light quanta in a vacuum has no temperature. Wein distribution does not apply to massless. Wein distribution only applies to the generation of radiation, not for light.

Step-3: Boltzmann Entropy S

Boltzmann entropy is given by,

$$S=k \ln P \quad (10.3)$$

where S is the entropy of particles of mass with P probability in that state, ln is the natural logarithm.

Problem: Light has no temperature and hence no entropy. Boltzmann entropy does not apply for light. Light has only one unique state and as a result S=0. There is no probability in the propagation of light. Propagation of light is a deterministic process, not probabilistic.

Step-4: Spatially Random Particles

If volume V contains n particles, then, the probability of all n particles being in sub-volume v is given by,

$$Prob=(v/V)^n \quad (10.4)$$

Problem: Coherent light cannot be spatially random. What is applicable to spatially random particles does not apply to coherent light. Light cannot randomly concentrate in a sub-volume just like particles of mass do. Particles do not propagate, waves do. Particles move. Waves do not move, particles do. Although waves do not move, wave bursts move relative to observers. However, motion of wave bursts is not random. Light propagates on fixed paths in the vacuum and in a medium. Light bursts move unaltered relative to observers [6]. It is the path of light that moves unaltered relative to an observer just as a mountain moves relative to a runner, not the light itself. Any entity with a momentum cannot propagate. If you assume light to be particles with momentum, then, those particles cannot propagate.

Step-5: Maxwell-Boltzmann Distribution

Probability Prob(E,T) of a particle having kinetic energy E, at temperature T is given by the Maxwell Boltzmann distribution,

$$Prob(E,T)=(m/2\pi kT)^{3/2} \exp(-E/kT) \quad (10.5)$$

where, k is the Boltzmann constant.

Problem: Maxwell-Boltzmann distribution is zero when mass m=0. Maxwell-Boltzmann distribution does not apply to massless. Light has no temperature. Light has no kinetic energy. Maxwell-Boltzmann distribution does not apply to light.

Corollary:

For light, m=0, and hence Prob(E,T)=0.

Step-6: Einstein's Derivation of Photons

Despite their inapplicability for light, Einstein applied them for light under the assumption that light consists of energy quanta or photons and tried to obtain the energy of a quantum or a photon. He first combined the probability of all the photons being in a sub-volume v in Step-4 with the Boltzmann entropy in Step-3 to obtain,

$$S_v\text{-}S_V=k\ln(v/V)^n \quad (10.6)$$

$$S_v\text{-}S_V=nk\ln(v/V) \quad (10.7)$$

Light cannot occupy a volume randomly. Propagation of light is not a random process. It is a deterministic process. Light has no entropy.

Solving the Wein's principle of entropy in Step-1, and Wein Blackbody spectrum for high frequency range in Step-2, he obtained the relationship between entropy density $\phi(f)$ and the energy density $\mathcal{E}(f)$,

$$\phi(f)=-[\mathcal{E}(f)/\beta f]\{\ln[\mathcal{E}(f)/\alpha f^3]-1\}+D \quad (10.8)$$

where, D is the integration constant.

If all the particles are in the sub-volume v, then the entropy S_v and energy E are given by,

$$S_v=v\phi(f) \quad (10.9)$$

$$E=v\mathcal{E}(f) \quad (10.10)$$

Substituting eqns. (10.9) and (10.10) in eqn. (10.8),

$$S_v=-[E/\beta f]\{\ln[E/\alpha f^3 v]-1\}+D \quad (10.11)$$

Light cannot occupy volume randomly and hence these relationships are meaningless.

If the light particles occupy the Total volume V, the entropy S_V is given by,

$$S_V=-[E/\beta f]\{\ln[E/\alpha f^3 V]-1\}+D \quad (10.12)$$

Subtracting eqn. (10.12) from eqn. (10.11),

$$S_v\text{-}S_V=[E/\beta f][\ln(v/V)] \quad (10.13)$$

If light is assumed to behave as particles generating thermal energy or temperature, Boltzmann entropy gave S_v-S_V in eqn. (10.7). If light is assumed to have Wein spectral distribution at high frequencies, even though what determines high or low is unknown, at high frequencies, the entropy S_v-S_V is given by eqn. (10.13). Since these two equations represent the same quantity that are determined by two different means, the equality of eqns. (10.7) and (10.13) gives,

$$E/\beta f=kn \quad (10.14)$$

$$E=n(\beta k)f \quad (10.15)$$

$$E=nhf \quad (10.16)$$

where, h=βk, the Plank constant.

There is no reason to consider Plank constant h to be the same for both kinetic energy and electromagnetic energy. There is no justification for it since kinetic energy is not the same as the electromagnetic energy.

Einstein assumed light consists of energy quanta or photons and then imposed a momentum p=e/c on the light particles. This cannot be done since the energy e of light is not kinetic energy. He assumed collision of photon generates thermal energy and hence a temperature. This cannot be done since light has no mass. It is obvious that Einstein's assumptions for the derivation of photon or light quanta are invalid. The decrease of temperature with the height from the earth is a good indication that light itself has no momentum, no kinetic energy, no thermal energy, and no temperature.

Light cannot generate thermal energy in the absence of charge particles. Einstein imposed Newton's kinematic theory on light forcing light to behave as particles carrying momentum. Einstein considered the light as particles that collide randomly in space. Coherent light cannot be spatially random particles.

XI. EINSTEIN'S PHOTON IS MEANINGLESS

The derivation of photon is based on the forcing of a non-existent momentum on the photon. In the derivation of photon, photon is treated as a little golf ball in motion carrying a momentum and energy e=hf. Although a photon is incorrectly treated as a particle with momentum and universal energy quantum e=hf, a photon is illustrated as a wavelet of finite span. This representation of photon as a wavelet of finite span is self-contradictory.

In Special Relativity and in Quantum Mechanics, it is incorrectly assumed that a photon has a momentum p, and the momentum p and position x are a Fourier Transform pair. If photon has a finite span, the span of the momentum will be infinite since they are incorrectly assumed to be a Fourier Transform pair. If the span of the momentum is infinite, the energy of a photon cannot be finite. As a result, the representation of the photon as a wavelet of finite duration is self-contradictory.

You cannot claim photon is a particle with momentum p and energy e=hf and then represent it as a wavelet of finite span. A particle cannot be a wavelet. Waves are waves. Particles are particles. Waves are not particles. Particles are not waves. Light has no momentum. You cannot represent a photon or light particle as a wavelet. Wavelets cannot behave as little golf balls. Waves and particles have nothing in common.

Particles move. Particles cannot propagate. Variation in propagation is orthogonal to the direction of propagation. A particle carrying a momentum could be able to be stopped by applying equal and opposite momentum. Light cannot be stopped by any mean since light has no existence without propagation. There are myriads of reasons why Einstein's derivation of light quanta or photons is incorrect:

1. Newton's laws and thermodynamic laws apply for particles of mass. They do not apply for massless. Massless has no momentum. Massless do not move. Massless propagates. If an entity has a momentum, that entity must be able to be stopped by applying equal and opposite momentum. Light has no existence without propagation. Light has no

momentum. If light has a momentum, light cannot propagate. It is only that the light can generate a momentum on charge particles. There are no massless particles. Massless particles are hypothetical.

2. Wein spectral density, which was specifically derived for generation of electromagnetic radiation by charge particles of mass, cannot be used for presumed massless light particles, photons, or light quanta. Wein spectral density applies only for high frequencies. High and low are vague human conceptions. There are no high and low for nature itself. Light or electromagnetic waves in general are propagating waves irrespective frequency. Light behaves as a wave irrespective of frequency. There is no magic threshold above which light must behave as particles and below which light must behave as waves. Particles cannot propagate.

3. Light has no mass. Light has no momentum. Light has no kinetic energy. No amount of light can generate thermal energy in a vacuum. It does not matter how much light a given vacuum contains, a vacuum has no temperature. There is no temperature without particles of mass. If a blackbody cavity is a vacuum, it does not matter how much radiation is in the cavity, cavity has no thermal energy, no temperature, no entropy. Without temperature, there is no Wein spectrum. Wein spectrum does not apply to light itself. Wein spectrum applies to oscillating charge particles generating radiation.

4. In the presence of charge particles, light can oscillate charge particles at the same frequency as of light generating momentum, kinetic energy, and hence heat and temperature. Interaction of light with particles of mass is not a momentum transfer through collisions.

5. Einstein's light particles in a blackbody cavity do not have any mass. Einstein's blackbody cavity is a vacuum cavity with coherent radiation waves. His blackbody cavity only contains conceptual massless light particles or photons. Einstein's blackbody cavity has no entropy even though his derivation relied on entropy.

A cavity containing electromagnetic radiation alone has no entropy, no temperature. None of the equations Einstein relied on the derivation of photons or light quanta applies for light. Einstein's photon is simply meaningless. There cannot exist light quanta or photons.

Light comes in continuous light bursts of finite span as they were generated. You can call those bursts of light photons if you wish. However, e=hf does not apply to those bursts. The e=hf does not apply to electromagnetic waves. It is only the kinetic energy per cycle of a mass oscillating at frequency f that is given by e=hf. The e=hf is not a light quantum. For electromagnetic waves e≠hf.

6. Newton laws and thermodynamic laws do not apply for light or for massless. LaGrange is not defined for massless.

7. Boltzmann entropy, which Einstein cannot derive photon without, does not apply for massless. Boltzmann entropy has no place for light. Light has no place for Boltzmann entropy.

8. The transfer of electromagnetic energy from light to matter or particles of mass is not a momentum transfer in a collision. It is a momentum generation due to the action of an electric field on charge particles. Since electric charge has no existence without a mass, there is no electromagnetic energy transfer from light without a mass involved. There is no electromagnetic energy transfer from light to neutral fundamental particles (if exist). Light can only transfer electromagnetic energy to charge particles of mass by oscillating the charge particles and in effect generating momentum on the charge particles even though the light itself has no momentum.

Lemma:

The transfer of electromagnetic energy from an electromagnetic wave into kinetic energy of a charge particle of mass or an electron is not a momentum transfer, it is a momentum generation. Light has no momentum to transfer. Light can generate a momentum on a charge particle of mass.

9. When an electron moves from a higher energy level to a lower energy level, an electromagnetic wave burst of finite duration is released. The electromagnetic energy contains in the burst is proportional to the energy level difference of the electron. It is this electromagnetic wave burst of finite span that can be called as a photon if one wants to. However, it is still a wave. It is not a particle. It is not an energy quantum since it can be divided to reflected and transmitted parts at a medium boundary.

Unlike an oscillating particle of frequency f where the kinetic energy of the oscillating mass per cycle is given by e=hf, the relationship e=hf does not apply for electromagnetic waves. For electromagnetic waves, the electromagnetic energy per cycle is given by $e=h_e(1/f)$. For electromagnetic waves energy per cycle e≠hf. Here, h_e is proportional to the square amplitude of the electric field, not a universal constant.

10. No matter how many Einstein's presumed photons are colliding, they do not generate thermal energy or temperature. Waves do not collide, they interfere. Interference of waves does not generate kinetic energy, heat, temperature, or entropy.

11. Einstein assumed that the hypothetical photon or light particles are spatially random. He considered that all the light can randomly occupy a sub-volume v in a volume V. Spatially random particles cannot generate coherent waves. All the light cannot randomly concentrate in a sub-volume v in a volume V. If light

consists of particles that can occupy space randomly, there will be no coherent propagation of light. Particles cannot be assembled randomly into a pie in the sky. Randomness is a human assumption, not a nature's mechanism. We use random behavior assumption when the physical process is unknown to us. The derivation of Einstein's light quanta is at odd with propagation of light. Coherent propagation of light cannot consist of spatially random particles.

12. The direction of a light burst is determined by a source. Once light burst is released from a source, the speed of the propagation of light waves is determined by the vacuum and can only be altered by a medium. The speed, direction, and the path of light waves are fixed in the vacuum and in a medium. Every burst has a specific fixed propagation path once released from a source. Speed of light on a fixed path is independent of observers. The speed we measure as dx/dt is the speed of light bursts, not the speed of propagation of light. The speed of light bursts we measure is relative. The speed of propagation of light we calculate is not relative. We cannot experimentally measure the speed of propagation of light, we calculate it using the measured quantities f and λ.

13. Electrons in an object oscillate. Hotter the object is the higher is the frequency and the displacement of oscillation. Kinetic energy of an oscillating electron per cycle at frequency f is given by $e_s=h_sf$. The energy e_s depends not only on the frequency f, but also on the maximum displacement A_o of the oscillator and the mass m of the oscillator. Oscillation of an electron generates electromagnetic radiation waves that propagates with electromagnetic energy per cycle $e_{es}=h_{es}f^3$. Electromagnetic waves propagate in a vacuum without any energy lost. When we consider electromagnetic wave itself, the electromagnetic energy per cycle is given by $e_e=h_e(1/f)$. For electromagnetic waves $e\neq hf$. When propagating electromagnetic waves encounter charge particles at a destination, they generate electromagnetic force on charge particles. The force on a charge particle varies with the variation of the electric field at the same frequency f generating kinetic energy $e_{de}=h_{de}(1/f^3)$. The transfer of kinetic energy from an oscillating source-electron to an electron at a distant per cycle is given by $e_{ds}=h_{ds}f$. The $e=hf$ applies only for the kinetic energy e per cycle of an oscillating particle of mass m.

14. Light acts as an intermediary in transferring kinetic energy from one source object to a destination object at a distant. This process takes place irrespective of whether an object is energy rich or poor. This process takes place irrespective of the temperatures of the objects. Energy can transfer between two distant objects irrespective of their temperatures in both directions. It is only that the net transfer of energy is always from the object at higher temperature to object at lower temperature.

Light can achieve this energy transfer without a loss along the path in a vacuum. However, the efficiency of conversion of kinetic energy to electromagnetic energy at the source-electron is not hundred percent. Similarly, the efficiency of conversion of electromagnetic energy to kinetic energy at a destination-electron is not hundred percent since the conversion factor $\gamma<1$. Although there is no propagation loss for light in a vacuum, the conversion loss is still there making kinetic energy transfer from a source-charge to a destination-charge at a distant by mean of light is less than hundred percent.

15. Light is always a wave, never a particle. Light is released from a source in electromagnetic wave bursts of finite duration. Electromagnetic energy per cycle generated by an oscillating source-electron is given by $e_{es}=h_{es}f^3$, where h_{es} is a constant specific to the transfer of kinetic energy of an oscillating electron at frequency f into electromagnetic radiation of frequency f. The kinetic energy generated by an electromagnetic wave acting on a charge particle at a destination is given by $e_{de}=h_{de}(1/f^3)$, where h_{de} is a constant specific to the transfer of electromagnetic energy of an electromagnetic wave of frequency f into kinetic energy of an oscillating charge particle at the same frequency f, $h_{de}\neq h_{es}$.

Since $e_{de}e_{es}=h_{de}h_{es}$, the transfer of kinetic energy from an oscillating source-electron to a destination-electron at a distant by mean of electromagnetic waves is frequency independent.

Source kinetic energy per cycle $e_s=h_sf$.
Destination kinetic energy per cycle $e_{ds}=h_{ds}f$.
$h_{ds}<h_s$.

"Kinetic energy cannot be transferred a distance without a loss by any mean."

16. Photon is not a particle. Photon is not an energy quantum. Light comes in a continuous wave burst of finite span. Einstein's derivation does not apply to wave bursts or light in general. There are no light quanta. There are no photons or light particles.

17. Einstein's derivation of photons or light quanta is incorrect and invalid. Light is not a collection of spatially random particles. Particle cannot propagate. An entity with a momentum cannot propagate. Any propagating entity cannot have a momentum. Only the massless and momentum-less propagate.

18. The claim that the magnitude of an electromagnetic wave determines the number of photons present in light is meaningless. Lenard did not carry out his photoelectric experiment for varying amplitudes. You cannot change the amplitude of light by varying the intensity of a source. Electric and magnetic fields of an electromagnetic wave are vectors. Vectors cannot come in quanta. Electric and magnetic fields of light cannot come in quanta. The magnitude of an electromagnetic wave cannot come in quanta.

19. The energy quantum e=hf has no meaning since energy of an oscillator or a wave is meaningless without a specific time interval. The energy of a wave or an oscillator must always be associated with a time interval. If e=hf, how long one must wait to have e=hf?

In e=hf, the energy is Joule/second or Joules per specific time interval. In the case of kinetic energy of an oscillating mass, e=hf is the energy per cycle. This e=hf does not hold for light. For a mass oscillating at frequency f, kinetic energy e=hf is not an energy quantum; it is simply the kinetic energy per cycle. The cycle length varies with frequency and hence n(hf)≠h(nf) and ne(f)≠e(nf), where e(f) indicates e as a function of f, and n(hf) represents the n times the hf.

20. If energy is quantized with energy quanta e=hf, then, n(hf) and h(nf) will be mathematically the same even though they are physically distinct two different entities. Energy E_n=h(nf) may be able to knock out an electron from an atom while E_n=nh(f) may not, even though they are the same if light comes in energy quanta e=hf. Light with energy E=h(nf) may damage the skin while light with energy E=n(hf) may be safe. Energy cannot come in quanta. If energy is quantized, it loses physical reality. Light has no energy that has any association with temperature or entropy.

21. Since energy e=hf only has a meaning as kinetic energy per unit cycle, units of h must be Joule second^2 or Kg m^2.

22. Light has no entropy. As a result, Einstein's photons or light quanta derivation fails where it started. Light cannot consist of spatially random particles. A wave cannot consist of spatially random particles. A source releases light as wave bursts of finite durations, not in light quanta or photons. These wave bursts are not light quanta since they must be further divided into reflected and transmitted parts at a medium boundary, and e≠hf for light.

"*Einstein's presumed photons or light quanta do not know what to do at a medium boundary*. *A single photon is in limbo at a medium boundary*."

23. It is the overall average kinetic energy of an electron at temperature T that is kT, where k is the Boltzmann constant. Electromagnetic energy of a frequency mode in a cavity is not kT. Electromagnetic waves have no kinetic energy. The term kT is meaningless for light or electromagnetic radiation since light has no temperature in a vacuum.

24. The claim that the square amplitude of an electromagnetic wave determines the number of photons present in a wave is meaningless. Amplitude of an electromagnetic wave is a vector, and vectors cannot be quantized.

25. Energy e=hf is meaningless for an oscillator of frequency f unless it is kinetic energy per unit cycle. The e=hf is the kinetic energy per unit cycle of a harmonic oscillator of a mass oscillating at frequency f. The e=hf is not an energy quantum. The e=hf does not apply for electromagnetic energy. The e=hf is not a universal energy quantum. The parameter h is not a universal parameter. Energy comes in different flavors and hence cannot be represented by a universal quantum.

26. Einstein's light quanta or photons do not exist. Einstein's derivation of photon is invalid, and it defy the fact that light has no entropy. Light cannot behave as particles at high frequencies and as waves at low frequencies since it is we who define high and low, not the nature. Light has no reason to care about what we define. There is no objective criterion to define a threshold that separates the low and high. High and low are relative.

27. The kinetic energy transfer from an oscillating source-electron to a distant electron by means of electromagnetic waves is frequency independent.

"*Light is never a particle at any frequency*. *Light has no magical power do decide should the light act as particles or beyond what threshold frequency should the light act as particles*. *Light cannot take subjective decisions. Propagation of light is deterministic, not probabilistic, or fuzzy. Nature does not make its decision based on probability. It is we who use probability to gather information when the complete knowledge of natural phenomena is not available to us.*"

XII. LENARD'S EXPERIMENTAL OBSERVATIONS ON PHOTOELECRIC EFFECT

Around 1902 AD, Philip Lenard in Germany carried out experiments to explore the photoelectricity and made several experimental observations:

1. Number of electrons released increased with the increase of the intensity or the brightness of the light source. Number of electrons released decreased with the decreasing intensity of the source. Intensity of the light source affected the photoelectric current or the number of electrons released. Photoelectric current increased with the increase of the intensity of the light source.

2. The intensity of the light source did not affect the speed of electrons that were released. Although the increased intensity increased the number of electrons released, increased intensity did not affect the speed of the dislodged electrons.

3. Increased frequency of light did not increase the number of electrons released or the photoelectric current. However, if the frequency of the light is below a certain threshold, no electrons were released. There was no photoelectric current if the frequency is below a threshold frequency or a cut-off. For photoelectric current to be present, the frequency must be above a

certain threshold frequency or a cut-off frequency. If did not matter how intense the light source is, if the frequency is below a certain threshold, not photoelectric current was generated.

4. Although the increase in frequency of the light source did not affect the number of electrons release or the photoelectric current, the increase of the frequency increased the speed of the dislodged electrons. The increase of the frequency of the light source increased the speed of the dislodged electrons but not the number of electrons released, or the photoelectric current.

a) **Theoretical Confusion Around 1900 AD**

At the time in early twentieth century, Lenard's photoelectric experiment appeared to be complete. No body casted any doubt about the experimental observations and its conclusions. So, the effort was to find a theoretical explanation for the Lenard's photoelectric experimental conclusions. If you consider the Lenard photoelectric experiment tells the truth, the whole truth, nothing but the truth, then, the photoelectric experimental results appear to be contradictory to the wave theory of light. They were so confident that the Lenard's photoelectric experiment was complete, they tried to find an alternative explanation outside the wave theory of light.

Like everyone else at the time, Einstein had no doubt that the Lenard's photoelectric experiment was complete, and the observations were true. Or he did not care if the experiment was complete or not, he just wanted to find an explanation for what was observed. He also knew Lenard's photoelectric experimental observations were contradictory to the wave theory of light. Plank had already claimed that the energy is quantized, and energy comes in energy quanta e=hf in explaining the blackbody radiation and deriving the blackbody spectrum. Einstein already had one step further and claimed that the light itself in a blackbody cavity comes in particle or energy quanta later came to be known as photons. He had already used the Wein's blackbody spectrum for high frequencies to show that the light itself in a blackbody cavity comes in light particles of energy quanta e=hf.

Einstein realized that he could use his light quanta or photons to explain the photoelectric effect observed by Lenard in his photoelectric experiment. Although light has no mass and hence no momentum, he imposed an artificial momentum on his photon or light particles. He claimed that the photon carries a momentum p=e/c and energy e=hf, where h is the Plank constant and c is the speed of light. He started treating his photons as massless billiard balls carrying momentum p=e/c. He failed to realize the energy e here is electromagnetic energy, which is different form the kinetic energy. Kinetic energy has no existence without a mass and hence $e=(1/2m)p^2$, p=mv, where v is the speed. Massless has no momentum. Electromagnetic energy has no associated mass and hence for light p≠e/c.

Einstein's massless momentum happened to be the one of the biggest unfortunate mistakes in physics that steered physics away from reality. Massless has no momentum. Electromagnetic waves have no momentum. There is no momentum in propagation. Artificial Quantum Mechanics is a result of this artificial momentum of artificial photons. Einstein found, even though nobody could make a sense of the Lenard's photoelectric observations, he could explain the Lenard's observation using his artificial photons or light quanta e=hf. Nobody knew that Lenard's photoelectric experiment was incomplete and hence the observations were not conclusive. The real reason why the photoelectric experimental observations of Lenard were not explainable using the wave theory of light was because Lenard's experiment was not complete. It is only a partially complete photoelectric experiment that happened to be explainable using light quanta or photons. Observations made by complete photoelectric experiment cannot be explained by light quanta or photons.

Einstein had already proclaimed that electromagnetic radiation of magnitude E_o and frequency f consist of wave particles, photons, or energy quanta e=hf. With this proclamation, electromagnetic energy came in particles. It never occurred to them that if the energy, whether it is kinetic energy or electromagnetic energy, comes in quanta, it leads to an unresolvable natural confusion since there is no way to distinguish one quantum of frequency nf and n quanta of frequency f since h(nf)=n(hf) even though they are physically distinct. Since the power or electromagnetic energy per second of a wave of amplitude E_o is $(1/2)E_o^2$, if the electromagnetic energy comes in quanta e=hf, the magnitude of the wave must also come in quanta. The $(1/2)E_o^2$ must be equal to n(hf), where n is an integer. For that to happen E_o itself must be quantized. The problem is that for light to come in quantum particles, electric field itself must come in quanta. The electric field is a vector and vectors cannot be quantized. Vectors cannot come in quanta. Nature has no mechanism to incorporate the belonging information into energy quanta. Without a blue-print, quanta do not know how they themselves can be combined into a unique whole. If energy comes in energy quanta e=hf, there is no way to distinguish kinetic energy from the electromagnetic energy. Since kinetic energy is not the same as the electromagnetic energy, energy cannot come in quanta e=hf.

We have already seen that the energy $e_s=h_sf$ only applies to the kinetic energy of an oscillating source particle, and the $e_s=h_sf$ represents the energy per unit cycle of the oscillator. The energy e=hf is not an energy quantum. The relationship e=hf has no meaning for electromagnetic waves. In the case of electromagnetic waves, the energy per cycle is given by $e_e=h_e(1/f)$. The parameter h_e is not a constant and depends on the square magnitude of the maximum electric field.

The magnitude of radiation generated by an oscillating source-electron is frequency dependent.

The magnitude of electromagnetic wave of frequency f generated by an oscillating electron of frequency f is proportional to f^2. Electromagnetic energy per cycle e_{es} generated by an oscillating source-electron at frequency f is given by $e_{es}=h_{es}f^3$. Electromagnetic waves cannot come in energy quanta.

Increasing the frequency of light also increases the energy of light not by a single fold as the kinetic energy of the oscillating electron, but by three folds. A wave of electromagnetic energy per cycle $e_{es}=h_{es}f_e$ interacts with an electron making it to oscillate with kinetic energy per cycle $e_{ds}=h_{ds}f$. This wave theoretic information is sufficient for explaining the photoelectric effect as well as blackbody spectrum using wave theory of light. This information is sufficient for explain the observations of the Lenard's experiment using the wave theory of light, no energy quanta are required.

b) **Problem with the Lenard's Photoelectric Experiment**

Lenard thought he can change the amplitude of light by changing the intensity or the brightness of a light source. You cannot change the amplitude of light by changing the intensity of a light source. If you double the intensity, you are not doubling the amplitude of light. We have no access to the amplitude of light at the source. We only have the access to the amplitude of light once the light has left the source. You cannot change the amplitude of light by dimming or strengthening a light source. Using two bulbs instead of one does not double the amplitude of light. Philip Lenard did not carry out the photoelectric experiment for different amplitude of light. Unless the photoelectric experiment is carried out for different amplitude of light, the experiment will not be complete, the conclusions will not be conclusive. Lenard's photoelectric experiment is not complete. The reason why wave theory of light could not explain the Lenard's experimental observations on photoelectric effect was that it was not done for different amplitude of light and hence it was incomplete. If the photoelectric experiment had been done for both varying frequency and varying amplitudes, the observations could have been explained using the wave theory of light.

XIII. WAVE EXPLENATION OF PHOTOELECTRIC EFFECT

The dislodging of an orbiting electron in an atom takes place if the oscillation frequency of the electron is in synchrony with the orbiting frequency f_o of the electron. To dislodge an electron from an atom, it must oscillate at a certain minimum frequency f_o, which is the dislodge frequency or the orbiting frequency of the electron. If the electron is in the energy level e_o, then the oscillating energy per cycle must be at least e_o for it to be dislodged. The dislodge-frequency f_o is given by $e_o=h_sf_o$. An electron is dislodged from an atom if the oscillating frequency of an electron is in resonance with the orbiting frequency of the electron. Orbiting frequency determines the energy level e_o per cycle of an electron and vice versa.

An electron oscillating at dislodge frequency f_o has the energy per cycle $e_o=h_sf_o$. If a light wave of frequency f interacts with an electron of dislodge frequency f_o and $f > f_o$, then the electron will be dislodged from the atom and is subjected to an excess oscillating residue kinetic energy per cycle,

$$e_d=e_{ds}-e_o \quad (13.1)$$

$$e_d=h_{ds}f-h_sf_o \quad (13.2)$$

The dislodge frequency f_o is also the orbiting frequency of an electron in an atom. Kinetic energy per cycle e_d of a dislodged electron will increase with the increase of the frequency of light f. The increase in the kinetic energy of a dislodged electron per cycle is a result of the increase in the average speed of a dislodged electron with the frequency f.

The increase kinetic energy per cycle with the increase of the frequency f means that the speed of the dislodge electron is increased with the increase of the light frequency f. The speed of dislodged electrons increases with the increase of the frequency as observed by the Lenard's experiment.

What Must Take Place:

The speed of dislodged electrons must increase with the frequency f of light. This agrees with the Lenard's photoelectric experimental observations. It is explainable with plain old wave theory of light. No light quanta of any sort are required. The kinetic energy PER CYCLE of an oscillating mass of frequency f is e=hf. The e=hf only applies for oscillating masses of frequency f. The e=hf does not apply to light or any other energies. The e=hf is not an energy quantum. Light is not particles. There are no photons. If you want to call a light burst that is released when an electron changes the orbit a photon, there is no harm for doing that if photons are not considered to be light quanta. However, in this case a photon is a wave burst, not a particle. Light cannot be a particle. Coherent light cannot consist of particles. Massless cannot be particles. Waves cannot be particles.

An oscillating source-electron of frequency f has the kinetic energy per cycle $e_s=h_sf$. When a source-electron oscillates at frequency f, it releases electromagnetic wave bursts of energy $e_{es}=h_{es}f^3$ per cycle that propagates. When this propagating electromagnetic burst interacts with another destination-electron along the path, it makes the destination-electron to oscillate with kinetic energy $e_{de}=h_{de}(1/f^3)$ per cycle. This nonlinear frequency dependence of the amplitude of light prevents light from being particles or light quanta. Light cannot consist of photons or light quanta. From this, it is clear that the light does the transfer of kinetic energy from source-electron to a destination-electron in a frequency independent manner in the form of electromagnetic energy that incurs no energy loss or frequency loss along the path in a vacuum. In the presence of a medium, as it is the case in space, when light travels long distances, light undergoes red

shift due to the charge particles present in the medium. The red shift of light from distant galaxies is a result of this frequency down shift due to the presence of charge particles in space.

"*The galactic red shift is a result of light undergoing a frequency down shift due to the energy loss in the presence of charge particles along the path of light*, *not a result of a hypothetical universe expansion."*

"It is the same path loss of light in the presence of charge particle along the path of light that limits our visible universe. Our visible universe varies as we travel in space; it is a bubble we carry with us. Our visible universe is limited by the path loss of light."

"*The use of galactic red shift to claim that universe is expanding is incorrect. Space cannot expand or contract. It is the matter that moves, accelerate, expands and contracts, not the space. Space cannot move or accelerate. Space cannot propagate. Massless cannot expand or contract. Massless cannot accelerate or decelerate. There is no acceleration without a mass. There is no motion in propagation. Light does not move; light propagates on a fixed track in the vacuum and in a medium. Motion or propagation of any entity on a fixed track in the vacuum and in a medium is observer independent. Propagation of light is observer independent. It is the path of light that moves unaltered relative to observers, not the light itself, just as the motion of a mountain relative to a runner. It is the motion of light bursts that is relative. What we see is not the propagation of light. What we see is the motion of light bursts. Universe cannot expand. Universe cannot accelerate*. *Misinterpretation of observation cannot make universe to expand at an accelerated rate.*"

Not all the energies are created equal. Kinetic energy of an oscillating mass of frequency f is not the same as the electromagnetic energy of a propagating electromagnetic wave of frequency f. The existence of energies of different kind also prevents energy from being quantized since quantization of energy prevents from being different. If energy is quantized, irrespective of the maximum displacement, the kinetic energy of an oscillating mass of frequency f will be the same as the electromagnetic energy of an electromagnetic wave of frequency f, irrespective of the amplitude of the wave since the Plank constant h is assumed to be a universal constant. This is impossible. Kinetic energy cannot be the same as the electromagnetic energy. It is only that the kinetic energy can be transformed into electromagnetic energy and vice versa, and the transformation is never one hundred percent efficient.

The direct kinetic energy transmitted from the source-electron to a destination-electron per cycle e_{ds} by means of electromagnetic waves as an intermediary is given by $e_{ds}=h_{ds}f$. Electromagnetic waves get the job done in transmitting kinetic or thermal energy of a source-electron to a destination-electron at a distant while guaranteeing the frequency independence of the transportation in a vacuum. No such guarantee is possible in the presence of a medium. Frequency of light degrades or gets redshifted in the presence of a medium. The attribution of the red shift of light in the presence of a medium to a universe expansion is simply wrong. Space cannot expand. It is only the matter expands or contracts. Space itself cannot expand or contracts. Einstein's Special Relativity and General Relativity are meaningless since Lorentz Transform is not unique. If the light is relative, speed of light is no longer a constant since it generates Shear Electromagnetic (SEM) waves whose speed depends on the frame of reference [2]. Time is not an axis. For time to be an axis, all the points must be accessible, but this is not possible in the case of time. Time is a moment, not a dimension. Past does not exist. Future does not exist. It is only the present that exists. Time is a concept we have defined. There is no time for unconscious.

We have no ability to change the amplitude of a light wave at the source. Amplitude of a light wave is an intrinsic parameter of a source, which we have no access. Intensity or the brightness of a source has nothing to do with the amplitude.

Definition: Intensity (Brightness) of Light

Intensity or brightness of a light source is the rate at which light bursts of constant duration is released by a source. Wave bursts emitted by a source propagate and further divided into reflected and transmitted parts at a medium boundary and hence they are no light quanta.

Corollary:

Any light burst, irrespective of its energy, amplitude, or frequency, must be divided into reflected and transmitted counterparts at a medium boundary making light quanta or photons not possible.

If we increase the intensity of a light source, we are increasing the rate at which light bursts are released. If we are decreasing the intensity of a light source, we are decreasing the rate at which light burst are released by a source. By changing the intensity or the brightness of a light source, we are not changing the amplitude of light bursts.

Problem with Lenard's Claims:

Lenard thought he was changing the amplitude of light when he changed the intensity of the light source. Einstein thought the same. We cannot change the amplitude of light emitted by a source by changing the intensity of the source. By changing the intensity of the light source, Lenard did not change the amplitude of light. By changing the intensity, Lenard only changed the rate of light bursts emitted by the source.

"*When we dim a light source, we are not decreasing the amplitude of light bursts the source is emitting. By increasing or decreasing the intensity of a light*

source, all we are doing, in effect, is controlling the rate at which light bursts are emitted by the source."

By dimming a light source, we are controlling the number of light bursts emitted per second. If more light bursts are emitted by a source per second, the source is intense or brighter. We cannot change the amplitude of a light burst by meddling with a source. We have no access to the amplitude of light within the source.

Corollary:

We cannot change the amplitude of light waves emitted by a source by dimming or enhancing the light source.

When a burst of light of frequency f interacts with an electron in an atom, if the frequency f of the light is greater than the dislodge frequency f_o or the orbiting frequency of the electron, the electron will be dislodged. More the bursts of light are there per second, more the interactions of electrons and the light bursts will take place per second, and more the electrons will be dislodged per second. In other words, the more intense or brighter the source of light is, more the electrons will be dislodged and hence the increase in the photoelectric current.

Photoelectric current will be increased with the intensity or the brightness of the source. The amplitude of light has nothing to do with changing photoelectric current with the change of the intensity of a light source. The amplitude of light remains unchanged with the change of intensity of a source.

a) **The Effect of Varying the Intensity of a Light Source on the Photoelectricity**

The number of light bursts emitted by a light source per second increases with the increase intensity of a light source. As a result, photoelectric current increases with the increase of the intensity of a light source.

Increasing intensity or the brightness of a light source does not change the magnitude of a light wave. The energy of an emitted electron per cycle is given by $e_d=h_{ds}f-h_sf_o$, where f_o is the orbiting frequency. The increase of intensity does not change the h_{ds} and h_s. As a result, the energy e_d per cycle of a dislodged electron does not change with the change of the intensity of a light source. Lenard's experimental observations agrees with this.

Although we cannot control the amplitude of light by controlling the intensity of a light source, we can control the amplitude of a light wave along the path of propagation by using a semi-transparent reflector. Lenard did not carry out his photoelectric experiment using variable semi-transparent reflectors along the path of light from the source to the proto-detector. If he had, his conclusions would have been very different, and Einstein's light quanta would not have seen the day light; no one would be talking about light quanta. If Lenard's experiment had been complete, Einstein's light quanta would have been DOA (Dead On Arrival).

b) **Varying the Amplitude of Light Along the Path of Propagation**

We have seen that we cannot change the magnitude of light by controlling the intensity of a light source. By controlling the intensity of a light source, we are only controlling the rate at which light bursts are emitted by a source. More intense or brighter the light source, higher the rate of light bursts emitted by a source. It is only by controlling the medium along the path of propagation that we can control the amplitude of light. It is only along the path of the propagation of light that we have the access to the amplitude of light.

We can control the amplitude of light by using a semi-transparent reflector along the path of propagation so that a part of light is reflected while the rest is propagated through. In other words, we are changing the amplitude of light by using a semi-transparent reflector. The amplitude of the light propagated through the semi-transparent reflector is smaller than the incident wave at the semi-transparent reflector. This is also one of the major reasons why light cannot consist of light quanta or particles. If light consists of particles, a light particle or photon will be in limbo at a semi-transparent interface. Light cannot be undecisive at an interface. As a result, light cannot come in quanta or photons.

Light at a semi-transparent reflector must divide into a reflected part and transmitted part. According to the definition of the photon, a photon or light quantum cannot split into parts. Reflection and transmission of light at a boundary is a deterministic process, not a probabilistic process. There is nobody at a boundary flipping a coin to direct the photon what it should do, whether photon should reflect or should continue. If light comes in particles or light quanta that cannot be further divided, then, there is no way for light to break into a reflected part and a transmitted part at a boundary. Probability cannot determine whether a photon should reflect or transmit at a boundary. Light cannot come in unbreakable light quanta. The concept of light quanta or particles is against the very nature of the light, against the very nature of the nature.

Lemma:

Light cannot come in indivisible quanta since light must be divisible into reflected and transmitted parts at a boundary.

By using semi-transparent reflectors, we can vary the amplitude of light that enters a photoelectric device. The kinetic energy of an electron per cycle generated by the interaction of the electron with light is $e_{ds}=h_{ds}f$. The parameter h_{ds} varies with the amplitude of light. Although we cannot increase the amplitude of light, we can decrease the amplitude by using a semi-transparent reflector. The h_{ds} decreases with the decrease amplitude of light. As a result, the photoelectric current decreases with the decrease amplitude of light. If the amplitude of light is high

enough, several electrons can be dislodged per cycle instead of one. The number of electrons that can be dislodged per cycle decreases with the decreasing amplitude.

If the amplitude of light is reduced, the speed of the dislodged electrons will also be reduced since the kinetic energy per cycle of a dislodged electron is proportional to h_{ds}. As a result, the speed of a dislodged electron will be dependent on the frequency of light as well as the amplitude of light.

Both the photoelectric current as well as the speed of the electrons decrease with the decrease of the amplitude of light. In addition, there will be a minimum threshold amplitude below which there will be no photoelectric current just as there is a minimum threshold frequency below which there is no photoelectric current. There is a frequency cut-off as well as an amplitude cut-off for photoelectric effect.

Frequency Cut-Off:

The minimum frequency below which there will be no photoelectric current when the amplitude of the light E remains constant, where $E>E_o$, E_o is the amplitude cur-off or the dislodge amplitude.

Amplitude Cut-Off:

The minimum amplitude below which there will be no photoelectric current when the frequency f of the light remains constant, where $f > f_o$, f_o is the frequency cut-off or the dislodge frequency.

If we plot the photoelectric current against the amplitude of light for varying amplitudes while keeping the frequency constant and above the frequency cut-off, $f>f_{cut\text{-}off}$, then, we will get a graph where the photoelectric current increases with the amplitudes for $E>E_{cut\text{-}off}$, where E is the amplitude of light. Note that the frequency cut-off will also be the orbiting frequency or the dislodge frequency f_o of the electron in an atom.

We can control the amplitude of light by controlling the amount of light enters to a photoelectric device by using a semi-transparent reflector. In other words, we can control the intensity or brightness at the destination by controlling the amplitude.

The intensity of light at the source has a different meaning than the intensity of light at a destination. Once the light bursts are out of a source, the rate of light bursts is fixed. We cannot change the rate of light bursts along the propagation path. We can only control the intensity of light along the path of propagation by controlling the amplitude of light.

Lemma:

Intensity of light at the source is determined by the rate of light burst emission by the source. Higher the rate of burst, higher is the intensity. Intensity along the path of propagation is determined by the attenuation of the amplitude of the light bursts. Higher the attenuation, lower is the intensity.

When we decrease the intensity at a destination, we do it by controlling the amplitude of light. At the destination or along the path of propagation, we cannot change the rate of light bursts. We can only decrease the intensity at a destination by decreasing the amplitude.

When we decrease or increase the intensity of light at the source, we do it by increasing or decreasing the rate of light bursts. We cannot change the amplitude of light by adjusting the intensity of a source. We have no access to amplitude at the source.

Lenard only controlled the rate of light bursts by controlling the intensity of the source. He did not change the intensity by changing the amplitude. He did not change the amplitude of light by using a semi-transparent reflector before light entered the photoelectric device. He did not study the effect of amplitude variation of light on photoelectricity.

So, when we talked about brightness or intensity, we have two intensities, intensity at the source and the intensity along the path of propagation or at the destination. At the source we can increase or decrease the intensity by controlling the rate of light bursts emitted by the source. At the destination we can only decrease the intensity by decreasing the amplitude by using a semi-transparent reflector.

Definition: Intensity of a Light Source:

Intensity or brightness of a source is the rate of light bursts emitted by a source. Amplitude of light is unchanged with the change of intensity of a source.

Definition: Intensity of Light at a Destination:

Intensity or brightness of light at a destination is determined by the amplitude of light. Amplitude of light can be decreased by using a semi-transparent reflector along the path of light. The rate of light bursts remains unchanged with the change of amplitude of light.

XV. LENARD'S PHOTOELECTRIC EXPERIMENT IS INADEQUATE FOR CONCLUSIVE ANALYSIS OF PROTOELECTIC EFFECT

Photoelectric effect can be fully explained with classical theories of physics using electromagnetic wave theory. We do not have to invent unrealistic and non-existent artificial light quanta or photons to explain photoelectric effect. The reason why light quanta could explain the photoelectric effect was that Lenard photoelectric experiment was incomplete and his observations were not complete. The observations of a properly designed photoelectric experiment cannot be explained using invented light quanta or photons.

The concept of light particles is artificial since interactions of light with particles of mass are not Newtonian particle collisions. Light has no interaction with neutral fundamental particles if they exist. Transfer of electromagnetic energy to kinetic energy of a charge particle of mass cannot be a momentum transfer since electromagnetic energy has no momentum. Light has no momentum. Light is not

relative. Einstein forced upon a momentum on light to make the light relative to artificially justify Special Relativity. Special Relativity cannot be a reality since Lorentz Transform is not unique. Massless has no momentum. You cannot force a momentum on massless.

Any entity with momentum must be able to be stopped with equal and opposite momentum. You cannot stop light by applying equal and opposite momentum. Light has no existence without propagation. Light cannot possess a momentum. Light cannot be assumed to have a momentum since light cannot be stopped by opposite momentum. Electromagnetic energy is not mechanical energy. Electromagnetic energy cannot be assumed to be mechanical energy. It is only that electromagnetic energy can be converted to mechanical energy and vice versa. Compton's momentum analysis of light is not even wrong, it is a meaningless farce.

Light does not consist of particles. Light has no entropy and hence Einstein's photon or light quanta derivation is invalid. Coherent light cannot be assumed to be spatially random particles that can be concentrated into sub-volume all at once as it has been assumed in Einstein's derivation of light quanta. There are no light particles to explain the photoelectric effect. Particle of light or photons are not required to explain a properly designed complete photoelectric experiment.

Photon explanation of photoelectric effect is incomplete since Lenard's photoelectric experiment is incomplete. Wave theory of light cannot explain the Lenard's photoelectric experiment mainly because it was half-complete. Wave theory of light can explain a properly designed complete photoelectric experiment. The classical theory of electromagnetic waves provides much more realistic insight into the complete photoelectric effect than the photon explanation provided for the Lenard's observation of an incomplete photoelectric experiment. Lenard's photoelectric experiment is incomplete and inconclusive for several reasons. On one side there are experimental design mistakes. On the other side there are conceptual mistake.

Lenard never carried out the photoelectric experiment for different amplitudes of light. Without carrying out the photoelectric experiment for different amplitudes of light, experiment is incomplete. Lenard only considered the control of the intensity or brightness of the source. You can control the intensity of a source by using a dimming switch. But you cannot change the amplitude of light by using a dimming switch. This a major mistake in Lenard experiment.

By dimming a light source, what you are controlling is the rate of light burst emitted by the source of light, not the amplitude of light. You have no access to the amplitude of light bursts before they are emitted by the source. Without access to the amplitude of light, you cannot change it before they are emitted at the source by adjusting the source.

For conclusive analysis of the photoelectric effect, one must carry out the photoelectric experiment for varying amplitudes of light. The amplitude of light can only be controlled along the path of propagation or at the destination at the photodetector. We can use semi-transparent reflector to vary the amplitude of light that goes into the photoelectric experiment. By varying the semi-transparent reflector, we can change the amplitude of light that goes into the photoelectric experiment. It is only when a part of light is reflected or dispersed at a boundary that the amplitude of the transmitted light can be reduced. When amplitude is reduced, the transmitted intensity of light is reduced.

We reduce the intensity of light along the path of propagation by reducing the amplitude using a semi-transparent reflector. At the source, we can reduce the intensity of the light source by changing the rate at which the light bursts are emitted.

If we run the photoelectric experiment by reducing the amplitude at the destination or along the path to destination using a semi-transparent reflector, we will find both amplitude and frequency have a similar effect on photoelectric effect. There should be a frequency cut-off as well as amplitude cut-off for the photoelectricity. Lenard's claim that the frequency itself determines whether to eject an electron from atom or not is obviously false since frequency has no existence without amplitude.

Corollary:

There is no frequency without an amplitude. Hence, any entity that is affected by the changing frequency of light must also be affected by the changing amplitude. Decreasing the amplitude of light affect the parameter h in the energy per cycle e=hf. The h is dependent on the square amplitude.

XVI. **PROPER PHOTOELECTRIC EXPERIMENT**

Photoelectric experiment must be run under two situations to make a conclusive analysis of photoelectric effect.

1. Keep the amplitude at the destination constant using a semi-transparent reflector. Run the experiment for different frequencies. It is important to maintain the intensity of light at the photodetector constant. The amplitude of light varies with the frequency. Therefore, it is important to keep the intensity of light constant for all frequencies by adjusting a semi-transparent reflector at the photodetector.

The variation of photoelectric current against frequency under constant amplitude of light at the photodetector provides clues to the one half of the puzzle on photoelectricity.

2. Keep the frequency of the light source constant. Run the experiment for varying amplitudes of light by using a semi-transparent reflector at the photodetector. By varying the amplitude of light, you are varying the intensity of light entering the photodetector. The variation of the photoelectric

current against the amplitude of the light while frequency remains constant provide the other half of the puzzle for photoelectricity.

No Light particles or photons are required to explain the photoelectric effect. It is the incompleteness of the Lenard's photoelectric experiment that required artificial light particles to explain the observations. Lenard's experiment was half-complete; that was the reason it was not explainable using the wave theory of light. Properly designed complete photoelectric experiment will make Einstein's hypothetical corpuscular light theory unnecessary.

The whole concept and the derivation of photon is invalid since light has no entropy. Light cannot come in energy quanta since light has no energy that has any association with temperature and entropy. Both kinetic energy and electromagnetic energy cannot have the same quantum e=hf since they are two distinct entities. Kinetic energy and electromagnetic energy are not the same. Potential energy and kinetic energy of a particle moving at constant speed has no association with a frequency and hence cannot be represented by e=hf. Equation e=hf is meaningless for potential energy.

XVII. WHAT TO EXPECT FROM A PROPERLY DESIGNED PHOTOELECTRIC EXPERIMENT THAT IS BOTH FREQUNCY CONTROLLED AND AMPLITUDE CONTROLLED AT PHOTODETECTOR

1. Both amplitude and frequency affect the photoelectric current.

2. Both amplitude and the frequency of light affect the speed of ejected electrons.

3. Decreasing the amplitude of light under constant frequency decreases the photoelectric current and decreases the speed of the ejected electrons.

4. Decreasing the frequency of light under constant amplitude of light decreases the photoelectric current and decreases the speed of the ejected electrons.

Lenard's photoelectric experiment is incomplete. Complete photoelectric experiment requires not only the brightness or intensity control at the source using a dimming switch but also the amplitude of light control at the destination using a variable semi-transparent reflector. It is not possible to change the amplitude of light at a destination by controlling the intensity of a source. By controlling the intensity of a source, you are only changing the rate of light bursts, not the amplitude of light.

False Claims in Photoelectricity:

1. The claim that the ejection of electrons is determined only by the frequency of light, and it is unaffected by the amplitude, is false. This claim is simply silly and meaningless since frequency has no existence without amplitude.
2. The claim that the speed of ejected electrons is determined by the frequency, and it is unaffected by the amplitude, is false.
3. The claim that the photoelectric current is determined by the amplitude of light alone is incorrect. Number of electrons emitted is dependent of both the amplitude and the rate of light bursts. Rate of light bursts is determined by the intensity of the source. Intensity at the destination is determined by the amplitude of the light.
4. The claim that frequency alone can determine certain aspects of photoelectricity is false since frequency has no existence without amplitude.

XVIII. BLACKBODY RADIATION SUMMARY

Lemma:

Energy is Not Quantized, e≠hf.

Heat does not radiate. It is not the heat that radiate from a hot object. It is the electromagnetic waves that is generated by a hot body that radiates. Electromagnetic waves have no heat, no thermal energy, no mechanical energy, no momentum, no kinetic energy, no temperature and hence no entropy. Electromagnetic waves only have electromagnetic energy. Electromagnetic energy is simply a representation of the strength of the wave. Electromagnetic energy has no association with temperature. Electromagnetic waves have no kinetic energy. Electromagnetic waves have no energy as we consider energy to be. If electromagnetic waves have energy, the space would not be a cold place.

If we have two objects separated at a distance, electromagnetic waves generated by one object propagates and reaches the other object. When propagating electromagnetic waves reach another object, oscillating electric field in the wave oscillates the electrons in the object generating thermal energy. Electromagnetic radiation is the only mean for transferring thermal energy from one object to another object at a distant separated by a vacuum. It is not the heat that radiates. Electromagnetic waves have no thermal energy or heat. It is not the heat that propagates from a hot object. It is the heat-less electromagnetic waves that propagates from an object. The widely used phrase "Heat Radiation" is meaningless.

Propagating electromagnetic waves can generate heat in the presence of charge particles. It is only if the propagating electromagnetic waves encounter electrons or charge particles, oscillating electric field in electromagnetic wave oscillate the electrons generating kinetic energy or thermal energy.

The phrase "heat radiation" in physics is incorrect since heat never radiates. It is electromagnetic waves that have no heat that radiate. It does not matter how much light is there, there is no heat without a mass. There is no heat transfer from one object to another separated by a vacuum without electromagnetic waves.

Late 19th and early 20th century researchers failed to realize that there are several steps to transfer of heat from one object to another object with electromagnetic waves as the intermediary.

Step-1:

Electrons in an object of temperature T oscillate. An electron oscillating at frequency f with maximum displacement A_o has the kinetic energy per cycle given by,

$$e_s=h_sf \quad (18.1)$$

where, h_s depends on the mass m of the charge and the square of the maximum displacement, A_o^2.

"The $e_s=h_sf$ is not an energy quantum. It is kinetic energy per cycle of an oscillating mass m of frequency f."

Step-2:

An oscillating electron in a source object generates electromagnetic wave bursts that propagates in a vacuum without an energy loss. Electromagnetic waves have no mass, no momentum, no kinetic energy, no thermal energy, no temperature, no entropy. It is this electromagnetic wave bursts that act as a transferring agent of energy from source-electron to a destination-electron at a distance separated by a vacuum. There is a transfer function associated with the energy transfer. At the source-electron, kinetic energy of the oscillating electron is transformed into electromagnetic energy. The electromagnetic energy generated by an oscillating electron at frequency f per cycle e_{es} is given by,

$$e_{es}=h_{es}f^3 \quad (18.2)$$

The generation of electromagnetic energy by an oscillating electron is proportional to the cubic frequency, f^3, where h_{es} is proportional to the charge q of the electron and the square maximum displacement, A_o^2 of the oscillating electron.

Step-3:

For electromagnetic waves to generate thermal energy, electromagnetic waves must interact with charge particles, especially with electrons in an object at a destination along the path of the propagating electromagnetic waves. Electromagnetic waves can transfer electromagnetic energy onto matter only through the interaction with charge particles. Electromagnetic radiation carrying $e_{es}=h_{es}f^3$ propagates in a vacuum without any energy loss. When these electromagnetic radiation waves encounter a mass, particles, air molecules, or any object of mass composite of charge particles, electrons in the object oscillates at the same frequency as the frequency of the radiation generating kinetic energy, heat, or thermal spectrum. The electromagnetic energy to thermal energy transfer function in such interaction e_{de} is given by,

$$e_{de}=h_{de}(1/f^3) \quad (18.3)$$

Electromagnetic radiation does this energy transfer from source-electron to destination-electron without affecting the frequency in a vacuum. The overall transfer of kinetic energy of an oscillating source-electron onto an electron at a destination separated by a vacuum by means of electromagnetic radiation is frequency independent. In other words, the spectrum of light is white or flat.

Lemma:

The energy spectrum of a destination-electron is the same as the energy spectrum of a source-electron if they are separated by a vacuum. In the presence of a medium the destination spectrum will be a red shifted version of the source spectrum.

Step-4:

Since the energy transfer from one object to another object by means of electromagnetic radiation is frequency independent or white, the thermal energy spectrum observed is the same as the thermal energy spectrum of the source. In the case of blackbody cavity, what generated thermal energy is the oscillating electron on the inner surface of the cavity. Therefore, the thermal spectrum observed through a hole on a blackbody cavity is the same as the thermal spectrum of oscillating electrons on the inner surface of the cavity. There is no difference between the oscillating electrons on the inner surface of the cavity and any other oscillating electrons of the blackbody.

Electromagnetic radiation energy spectrum of an electron in an atom of a blackbody is given by,

$$e_{es}=h_{es}f^3 \quad (18.4)$$

This the kinetic energy of an isolated electron. In a blackbody, electrons are not in isolation; they are bounded in atoms. An electron oscillating at frequency f can be at different energy levels in an atom that are not equally probable. The probability of an electron being on energy level ne of an object at temperature T is given by Maxwell-Boltzmann distribution, where n is an integer,

$$Prob(ne,T)=(m/2\pi kT)^{3/2}exp(-ne/kT) \quad (18.5)$$

Therefore, the average energy spectrum of a blackbody is determined by the average radiation of an electron in an atom. Electromagnetic radiation energy spectrum of an atom or the blackbody spectrum is given by,

$$\rho(f)=h_{es}f^3N_n \quad (18.6)$$

where, N_n is the bound electron fraction in an atom equivalent to one isolated electron.

One isolated electron oscillating at frequency f is equivalent to N_n electron fraction oscillating at frequency f in an atom. The electron fraction N_n in an atom oscillating with kinetic energy e per cycle at frequency f at temperature T is given in eqn. (4.1.17),

$$N_n=(m/2\pi kT)^{3/2}\{1/[exp(e/kT)-1]\} \quad (18.7)$$

$$\rho(f)=\beta f^3\{1/[exp(e/kT)-1]\} \quad (18.8)$$

$$\beta=h(m/2\pi kT)^{3/2} \quad (18.9)$$

where, β is a constant that depends on the mass m of the charge particle, the charge q, and temperature T.

Since the kinetic energy of an electron oscillating at frequency f PER CYCLE is given by e=hf, the blackbody radiation spectrum ρ(f) is given by,

$$\rho(f)=\beta f^3\{1/[exp(hf/kT)-1]\} \quad (18.10)$$

Note that the correct blackbody spectrum given in equation (18.10) is bounded both in frequency and temperature. When m=0, blackbody spectrum is zero. Since there is no charge in the absence of a mass, blackbody spectrum has no existence in the absence of a mass.

XIX. **SOME MAIN POINTS**

1. Blackbody spectrum must be bounded for all frequencies and for all temperatures. Any spectrum that is unbounded at any frequency at any temperature cannot be a spectrum of a blackbody.
2. Plank spectrum is unbounded in temperature. Plank spectrum is virtually frequency independent at high temperatures. The correct spectrum must be unbounded for all temperatures up to infinity.
3. When hf<<kT, especially at low frequencies and high temperatures, Plank spectrum is approximately linearly proportional to the temperature. As a result, Plank spectrum goes on increasing linearly with temperature, which is not natural. Nothing in nature can go on increasing.
4. Independent of frequency, Plank spectrum is unbounded at high temperatures.
5. Area of a blackbody spectrum must increase with the temperature while being bounded.
6. The amplitude of the spectrum at any frequency must increase with the temperature while being bounded.
7. Blackbody spectrum should not be proportional to $1/c^n$ since $1/c^n \cong 0$, where $n \geq 1$ and c is the speed of light. Blackbody spectrum is not a function of speed of light. Speed of light c only come into the picture if you want blackbody radiation energy per cycle wavelength spectrum $\mathcal{E}(\lambda)$ in place of blackbody energy per cycle frequency spectrum $\mathcal{E}(f)$ or blackbody radiation density per cycle $\rho(\lambda)$ in place of blackbody radiation density per cycle $\rho(f)$.
8. e=hf is the kinetic energy PER CYCLE of an oscillating mass of frequency f.
9. e=hf is NOT an energy quantum.
10. Energy is NOT quantized. Plank's blackbody spectrum derivation is flawed.
11. Energy cannot come in a universal energy quantum since all the energies are NOT created equal. If energy comes in quanta e=hf, there is NO way of distinguishing kinetic energy quanta e=hf from electromagnetic energy quanta e=hf. Kinetic energy is NOT the same as the electromagnetic energy. If energy comes in quanta e=hf, these energy quanta are meaningless for the potential energy of a mass and for the kinetic energy of a mass moving at constant speed since they have no associated frequency. You cannot express potential energy in terms of e=hf. You cannot express the kinetic energy of a mass moving on a linear path at constant speed in terms of e=hf. It is simply not possible. This point alone makes the Schrodinger equation meaningless. In any case, Schrodinger equation has no existence when Plank spectrum is invalid. In fact, Quantum Mechanics in general has no existence when Plank Spectrum is invalid. Photons or light particles have no existence when Plank spectrum is invalid. Light can propagate peacefully as a wave on paper as well as on textbooks when Plank spectrum is invalid. In nature, light is always a wave. Light or electromagnetic waves cannot come in quanta. The concept of light quanta is not even wrong, it is silly and meaningless.
12. Energy cannot come in quanta since h(nf) is physically not the same as n(hf) although they are mathematically the same.
13. Blackbody spectrum must be cavity independent. A blackbody cavity has nothing to do with a blackbody spectrum.
14. Plank's spectrum is cavity dependent and hence the derivation is invalid.
15. All the blackbody spectra are cavity dependent and hence the derivations are invalid. However, they all have the correct frequency functions withing their respective frequency bands. That is the only reason they were accepted as correct. The correct frequency function that matches the observation does not make the derivation correct. Wrong derivation can give the correct frequency function especially when reverse engineering is used to derive it as it has been the case with the Plank Spectrum.
16. The number of modes for a harmonic in a cavity cannot be obtained by counting the nodes in a linearly laid 3D grid in phase space.
17. Mode density is not proportional to square frequency.
18. The number of modes for a harmonic in a cavity is given by the Pythagoras integer quadruples or solutions to the 3D Fermont problem of second order.
19. Blackbody spectrum observed through a hole on a cavity is continuous while the spectrum inside a cavity is discrete.
20. It is not possible to see what is inside a blackbody cavity by peeking into it through a hole on the cavity.
21. Continuous blackbody spectrum observed through a hole on a cavity cannot be derived by analyzing a discrete spectrum of a cavity.
22. Blackbody spectrum cannot be obtained by analyzing the discrete spectrum of a cavity just as the number of guests in a hotel cannot be determined by analyzing the capacity of the rooms in a hotel.

23. How many modes of a harmonic a cavity can hold says nothing about how many modes of a harmonic the cavity contains. How many guests a hotel room can hold says nothing about how many guests a hotel room has.
24. By reducing the intensity of a source further and further, you can isolate radiation bursts. These isolated bursts are further divided into reflected and transmitted waves at a semi-transparent reflector. If these isolated bursts are photons, they will be in limbo at a medium boundary since light quanta cannot be further divided. These individual light bursts are not light quanta or photons since they can be further divided into reflected and transmitted parts at a boundary.
25. Light cannot come in quanta since light must know what to do at a semi-transparent reflector.
26. Any light burst must be able to be further divided at a medium boundary, and hence light cannot come in quanta or photons.
27. Source intensity is the rate of light burst emitted by a source. By reducing the intensity, we are isolating the light bursts. These light bursts are further divided into reflected and transmitted parts at a medium boundary.
28. Light has no entropy. Einstein's photon derivation is invalid.
29. None of the equations Einstein used in the derivation of photon can be applied to massless.
30. Massless has no entropy. Massless has no temperature. Massless has no momentum. Massless has no kinetic energy. LaGrange does not apply to massless. Newton's laws do not apply to massless.
31. Lenard photoelectric experiment is incomplete and hence inconclusive.
32. Lenard did not run the experiment for different amplitude of light.
33. There is a frequency cut-off as well as an amplitude cut-off for photoelectric effect.
34. Frequency itself cannot be a determining factor in any photoelectric effects since frequency has no existence without amplitude.
35. No entity in photoelectric effect can be affected by frequency or amplitude alone.
36. Intensity at the source and intensity along the path of propagation are defined by two different phenomena.
37. Intensity at a source is controlled by varying the rate of radiation bursts emitted by a source. Amplitude of waves are constant at the source.
38. Intensity at a destination is controlled by varying the amplitude of propagating waves. Rate of radiation wave bursts is constant.
39. Intensity along the path can only be controlled by using a semi-transparent reflector.
40. A complete photoelectric experiment is an experiment that includes amplitude control at the photodetector using a semi-transparent reflector in addition to the frequency control as well as the source intensity control. Both photoelectric current as well as the speed of electrons will depend on both frequency and the amplitude of electromagnetic waves.
41. It is only the kinetic energy of a mass divided by the speed of the mass that is proportional to momentum. What you get by dividing the electromagnetic energy by speed of the propagation of light is nonsense, not momentum. Electromagnetic energy has no associated mass.
42. You cannot give or take away a momentum from massless. If you cannot give or take away a momentum from an entity, that entity has no momentum.
43. Variation of electromagnetic fields in propagation is orthogonal to the direction of propagation. Momentum is in the direction of motion. In the absence of a motion of a mass, there is no momentum along the direction of propagation. Light has no momentum. Electromagnetic energy has no association of a mass or a momentum. Electromagnetic energy e divided by speed of light c or e/c has no meaning. Electromagnetic energy is not real energy that is associated with a temperature or entropy. Electromagnetic energy is simply a representation of the wave strength. Light has no energy that has any association with temperature, momentum, or entropy.
44. De Broglie's particle wave conjecture is false at the very start since $p \neq e/c$. There is no wave particle duality.
45. When Plank's derivation of blackbody spectrum is invalid, Quantum Mechanics and Special Relativity have no existence. The whole of Modern Physics falls apart. There is no prize for disproving claims. So, everyone is trying to prove things even when the claims are so outrageous. Some of such outrageous claims are energy being quantized, particle being waves and waves being particles, mass being generated by electromagnetic waves, mass being popping up in a vacuum, particle being multiple places at the same time, which are obviously not possible.
46. There are no particle waves. There are no wave particles. There is no wave-particle duality. Oscillation of a particle at frequency f is not a wave. One cycle of a wave is not a particle. Oscillating an electron on its circular orbit is not a wave; it is just a wavy path that an electron takes while orbiting.
47. Light is not relative. Any entity that cannot be relative cannot possess a momentum.
48. Speed of propagation of light c is calculated as

c=fλ using measured f and measured λ, not measured directly as speed. The speed measured as the distance r light travels per unit time is the speed of light bursts c_r=dr/dt. The speed of propagation of light c is the same as c_r only if the observer is in a stationary frame relative to the vacuum. In general, c_r>c. If observer is in a stationary frame c=c_r. Speed of propagation of light c is independent of observers. The speed of light bursts c_r depends on the observers. What we see as light is the motion of light bursts. We cannot see the propagation of light. The light bursts that we see are relative. The propagation of light waves that we do not see are not relative.

49. Speed of light has no effect on the speed of other objects. There is no speed limit in the universe.
50. The recurrent claim in Modern Physics that "nothing can travel faster than light" is false.
51. Anything and everything can travel faster than light.
52. Energy is not quantized.
53. There are no photons or light particles.
54. It is the path or track of light that moves unaltered relative to moving observers, just as the motion of mountain relative to a runner. The propagation of light on its track remains unaltered relative to moving observers. It is the train track that moves relative to observers, not the train itself. Speed of a train on its track is independent of observers. Propagation of light on its fixed track in the vacuum and in a medium is independent of observers [6]. Relativity of light is no different from the motion of a mountain relative to runner or motion of a train relative to a moving observer since what we see is the motion of light bursts, not the propagation of light. Motion of light bursts is relative, the propagation of light on its fixed track is not. Motion or propagation of any entity on a fixed rail is independent of the motion of observers. It is the fixed path that moves unaltered relative to observers, not the entity moving or propagating on the fixed rail.

The probability of having an oscillator oscillating at energy E=ne is given by the Maxwell-Boltzmann distribution,

$$Prob(E,T)=\beta_o exp(-E/kT)$$

$$\beta_o=(m/2\pi kT)^{3/2}$$

where, m is the mass of the electron, k is the Boltzmann constant, T is the temperature.

However, that is not what Plank used. Plank modified the Maxwell-Boltzmann distribution without any logical reason just for the sake of obtaining a spectrum that matches the observation deliberately. If he had used the Maxwell-Boltzmann distribution as one must, his approach would not have produced a spectrum that matches the observation. His goal was to obtain a spectrum that matches the observation by any mean and find a justification later. He was very clear about his conviction stating that he was not sure what he was doing except that he was very clear why he was doing. In the derivation of the Plank spectrum, what is used was a probability distribution that is meaningless,

$$Prob(E,T)=[exp(-ne/kT)]/\{\sum_1^\infty[exp(-ne/kT)]\}.$$

There is no temperature without a mass and hence this distribution without a mass m is meaningless. This is not a probability distribution of the energy of a mass m at temperature T in a population. Probability distribution of energy of a mass m at temperature T in a population must depend on the mass m of a particle and temperature T by Maxwell-Boltzmann distribution,

$$Prob(E,T)=(m/2\pi kT)^{3/2}exp(-E/kT).$$

The factor $(m/2\pi kT)^{3/2}$ play an important role in the distribution. It is this factor that prevent spectrum becoming unbounded at high temperatures. It is this factor that prevents the spectrum becoming hypersensitive at high temperatures or at low temperatures. Without this mistake, there would be no Plank distribution. It is this mistake that made Plank blackbody spectrum unbounded at high temperatures. Plank's blackbody spectrum is incorrect, invalid, illogical, unrealistic, and not a natural selection. It is incorrect in every sense, both mathematically and conceptually. There is no universal energy quantum. With Plank spectrum being wrong, there would be no Quantum Mechanics in Modern Physics. Since the Plank Spectrum is incorrect, the Modern Physics itself has no existence.

"*ENERGY IS NOT QUANTIZED*"

XX. EIGEN BASIS REPRESENTATION OF A STATE OF A PARTICLE IN QUANTUM MECHANICS AND SCHODIGER EQUATION

Both the derivation as well as the interpretation of Schrodinger equation is incorrect. Yes, Schrodinger equation is no longer valid since energy is not quantized. Even with the quantized energy assumption, Schrodinger equation is invalid since the potential energy cannot be represented by energy quanta e=hf; potential energy has no associated frequency for that representation. Any energy that has no associated frequency cannot be represented by e=hf.

Using Plank energy quantum e=hf and Einstein's $e=mc^2$, de Broglie claimed that a particle behaves as a wave of wavelength λ=h/p described by momentum of the particle p. No particle has the energy required to have λ=h/p [3,4]. If particle behaves as a wave with frequency f=e/h and wavelength λ=h/p, then, by substituting for f and λ in plane wave equation, we have the wave equation that describes the particle waves. Since it is a function of momentum, position, frequency, and time, it is referred as a wave function ψ. If you differentiate the wave function ψ with respect to time t and position x, and momentum p, we have the energy operator, the momentum operator, and the position operator for the particle. Here, the

observables are given by the energy operator, momentum operator, and position operator. Observables are given by operators. Position and momentum are given by operators.

Schrodinger substituted the position and momentum operators in the total energy that is the potential energy plus the kinetic energy and obtained the Schrodinger equation that describes the evolution of the wave function ψ in time. So, Schrodinger equation gave us a way to calculate the wave function ψ at any potential energy. The problem is the wavefunction is not unique. When the wavefunction is not unique, observables are not unique.

An operator can be represented by its eigen basis vectors ψ_n, n=1,2,3, … If we project the wave equation ψ onto basis vectors, we have the estimate of momentum for momentum operator and the position for the position operator. The problem is that for a given observable, we have many estimates corresponding to each eigen function. So, it was claimed that each observable has multiple values simultaneously or position and momentum are not unique. In other words, particle is at multiple states simultaneously in Quantum Mechanics. Eigen values are not unique in its nature and hence non-uniqueness is expected in wavefunction representation of a particle.

Eigen representation is simply another basis of representation, which is no different from 3D representation. In 3D representation, we have the identity operators, the trivial operators. So, eigen vectors are trivial **x**=(1,0,0), **y**=(0,1,0), and **z**=(0,0,1) axes. When state ψ is projected to the basis eigen function ψ_n, the projection is λ_n, n=1,2,3, … This does not mean particle is at all the states λ_n, n=1,2,3, … simultaneously with probabilities described by square wave function $|\psi_n|^2$, n=1,2,3, …. Probability has nothing to do with eigen space representation. Particle is none of those states ψ_n, n=1,2,3, ... Particle is in state ψ. Eigen representation describe the state of a particle collectively, not separately by individual eigen functions.

Consider the two representations,

$\Psi=\lambda_1\psi_1+\lambda_2\psi_2+\lambda_3\psi_3+\ldots$ (Schrodinger's n-dimensional eigen basis)

$\mathbf{r}=r_x\mathbf{x}+r_y\mathbf{y}+r_z\mathbf{z}$ (3-dimension trivial eigen basis)

These two representations are similar. The wave function represented by eigen basis is no different from the 3D representation of a position of a particle by unitary operator. Assume we have a particle at position $\mathbf{r}=(r_x,r_y,r_z)$ in 3D, which is the same as the $\mathbf{r}=r_x\mathbf{x}+r_y\mathbf{y}+r_z\mathbf{z}$, where **x**=(1,0,0), **y**=(0,1,0), and **z**=(0,0,1). Here **x**=(1,0,0), **y**=(0,1,0), and **z**=(0,0,1) are trivial eigen functions, vectors or simply the x, y, and z axes of unitary operator. The r_x, r_y, r_z are trivial eigenvalues or projection of **r** on to trivial eigenvectors **x**, **y**, and **z** respectively. We do not call square of these basis vectors or axes probabilities. This does not mean particle is at state r_x with probability $|\mathbf{x}|^2$ or particle is at state r_y with probability $|\mathbf{y}|^2$ or particle is at state r_z with probability $|\mathbf{z}|^2$. Actual particle is at state **r** in 3D space represented by basis vectors x-axis, y-axis, and z-axis. Its location is unique. The particle is not on x-axis, not on y-axis, not on z-axis with any probability.

The 3D representation of the position of a particle does not make the position of the particle not unique. Particle is never in all three axes **x**, **y**, and **z** simultaneously. Our representation of the state of a particle with our choice of coordinate system does not make particle to be simultaneously on all the bases vectors in the coordinate system. When particle in state ψ is represented by eigen basis ψ_n, n=1,2,3, … particle is not in any of the basic functions.

We can rotate all the basis vectors by the same amount and obtain another basis representation with different projections or eigenvalues for the same state. Eigen representation is not unique. Similarly, 3D representation is not unique. The eigen states of Schrodinger or any eigen basis is not unique and particle is not in any of those states. Our coordinates representation does not alter the state of a particle. At any time t, particle is at a unique position moving at unique speed and how we represent it does not change the position and momentum of the particle. Eigen vectors or functions in eigen basis representation are not probabilities just as 3D axes **x**, **y** and **z** are not probabilities. A particle cannot be multiple states concurrently.

Do you claim a particle at position **r** in 3D space has values r_x described by probability $|\mathbf{x}|^2$, value r_y described by probability $|\mathbf{y}|^2$, and r_z described by probability $|\mathbf{z}|^2$? The (Eigenvalue, Eigenvector) pairs provide a bases for representation. Eigenvalue Eigenvector pairs are not unique. You can rotate eigen space and still represent the same state. Particle is not at any of eigenvectors or functions just as a particle is not on x-axis, y-axis, or z-axis in 3D space, Particle is none of the axes, x, y, and z. No matter how much you try, you cannot find the particle on x axis unless $r_y=0$ and $r_z=0$, you cannot find the particle on y axis unless $r_x=0$ and $r_z=0$; you cannot find the particle on z-axis unless $r_x=0$ and $r_y=0$.

Particle is at **r**. Position of the particle is unique. However, representation of the state of a particle using any basis is not unique. The claim in Quantum Mechanics that a particle can be in multiple state simultaneously is simply meaningless. The λ_n is not a state of a particle with probability $|\psi_n|^2$, where (λ_n, ψ_n) is n^{th} eigenvalue and eigenvector pair of the operator of an observable.

A recurrent claim in physics, especially in Quantum Mechanics, is that "it is experimentally proven". The fact is that experiments do not prove anything. Experiments give observations, data. We interpret (most of the time misinterpret) data to prove theoretical claims. You can misinterpret data to support a theory. Double-slit experiment in support of particle wave is such a misinterpretation. As we have seen, photons or light quanta are a result of such a misinterpretation. Spin quanta is a misinterpretation of Stern-Gerlach experiment. Arthur Ellington's use of the deflection of light to support the General Relativity is experimental misinterpretation.

So called quantum logic gates in Quantum Computer are nothing more that optical processors. The ability of light to be present in both polarities at the same time has nothing to do with quantum superposition. The ability of a wave burst to be divided into reflected ant transmitted parts at a semi-transparent boundary and the reflected and transmitted waves to be present simultaneously has nothing to do with quantum super position. There is no quantum superposition. No physical entity can be in multiple states concurrently.

Taking a clock around the globe to prove time dilation in Special Relativity is an experimental misinterpretation [4]. Special Relativity only applies for moving bodies at constant speed on linear path. You cannot go on a circular path to confirm Special Relativity. You cannot use Global Positioning System (GPS) to claim GPS is not possible without Special Relativity. GPS satellites do not go on linear paths at constant speed. GPS has nothing to do with Special Relativity. Special Relativity is not required since light travel at constant speed in a fixed direction on a fixed path in the vacuum and in a medium. The speed of any entity on a path that is fixed in the vacuum and in a medium is observer independent naturally.

No particle of mass has the energy to be at de Broglie wavelength; particle of mass has only a half the energy required [3]. As a result, quantum half does not exist. Quantum half is self-contradictory. Quantum is an indivisible quantity. There cannot be a quantum half. Quantum is no longer a quantum if there is a quantum half. The direction of spin of a charge particle can be positive or negative relatively. Spin does no com in quanta. Spin is either directed in one side or in the opposite side; it is not a quantization. Spin is simply bi-polar. Spin-up and spin-down are not a spin quantization. Spin is a vector. Vectors cannot be quantized. The direction of a magnetic field of a spinning charge, which is its spin, is determined by the magnetic field it is in. It always aligns with an external magnetic field. Two particles have opposite spins due to magnetic coupling. You cannot permanently set a spin in a particular direction using Stern-Gerlach device; once the particle is out of the device, the direction of the spin is no longer at the set direction.

Lemma:

Eigenvalue-eigenvector representation of a state is not unique. Schrodinger representation in Quantum Mechanics is not unique.

Corollary:

When a state of a particle is represented by an eigenvector or eigen function basis, particle is on none of the basis vectors or functions just as when position of a particle is represented in 3D space, particle is on none of the axes, x, y, z.

Corollary:

Any individual coordinate is not a state. It is only the collection of all the coordinates that represent the state. Basis vectors or axes are not probabilities.

XXI. SHRODINGER EQUATION IS INVALID

One hand cannot clap. One cannot tango. A single field cannot propagate. Propagation requires a conjugate pair of fields. Single type of energy cannot propagate. It is the oscillatory transfer of one field to another field or one type of energy to another type of energy that generates propagating waves. Propagating wave requires mutual oscillatory energy transfer between two types of energies. Mechanical wave is a result of oscillatory energy transfer between potential energy and kinetic energy. Electromagnetic wave is a result of oscillatory mutual energy transfer between electric and magnetic conjugate field pair. Momentum itself cannot generate propagating waves. Momentum of a particle has nothing to do with speed of light, $e \neq pc$. There are no particle waves. It is only that the oscillating momentum of a charge particle generates electromagnetic waves that propagates at the speed of light c. There are no momentum waves. There are no particle waves that propagates. Waves are not probability distributions. A particle taking wavy path centering its circular orbit is not a propagating wave. If an orbiting electron at speed v oscillate at frequency f about its orbit, then the electron will have a wavey orbit with wavelength $\lambda=v/f$. This is not a propagating wave; it is the orbit of the electron.

By considering the derivation of the Schrodinger equation, we can clearly see what went wrong with the Schrodinger equation. At any temperature T, orbiting electrons in an atom of an object oscillates. These oscillations are not waves. De Broglie made the strange claim that particles behave as waves that propagate at the speed of light with wavelength $\lambda=h/p$ and frequency f, where p is the momentum of the particle. Schrodinger used De Broglie's wave idea and represented as plane wave,

$$\Psi(t)=A_o \exp(jkx) \exp(-j\omega t) \quad (21.1)$$

where $k=2\pi/\lambda$ and $\omega=2\pi f$.

De Broglie's claim $\lambda=h/p$ and Plank's assumption that the energy is proportional to frequency, $E=\hbar f$ led to,

$$\Psi(t)=A_o \exp[j(p/\hbar)x] \exp[-j(E/\hbar)t] \quad (21.2)$$

Schrodinger's substitution of $k=p/\hbar$ and $\omega=E/\hbar$ are invalid. Although Position x and wave number k are mutually independent and represent a conjugate pair, position and momentum are not mutually independent does not represent a conjugate pair. Position and momentum are mutually dependent. There is no change in momentum without change of the position. Although the time and frequency are mutually independent, energy and time are mutually dependent. Time is inherent in energy. There is no change of energy without time. Although time and frequency are a conjugate pair, time and energy are not a conjugate pair.

In the case of electromagnetic waves, the mutual transfer of electric energy and magnetic energy makes the wave propagate. What makes the mechanical wave propagates is the mutual transfer of

kinetic energy and potential energy. A particle moving at constant speed has a momentum, yet it does not generate a wave since there is no mutual energy transfer between two different types of energies. Momentum does not define a frequency. A particle moving at constant speed has no associated frequency. De Broglie represented energy of a particle as the momentum times the speed of light is meaningless; it is this representation that led to de Broglie wavelength, which is erroneous. De Broglie's wavelength $\lambda=h/p$ is invalid [3,4].

The substitution of $E=\hbar f$ is incorrect. Frequency f is the independent variable. Although an oscillation of a particle at frequency f generates kinetic energy, the reverse is not true since all kinetic energies are not associated with an oscillating frequency f. Kinetic energy of a mass moving at constant momentum does not have a frequency association. Potential energy has no association with frequency. Oscillation of a particle at frequency f does not generate potential energy. Not all energies are associated with frequency and hence frequency cannot be substituted by total energy E.

Further, E is the mechanical energy of a mass, the kinetic energy plus the potential energy. Substitution of mechanical energy of a particle for the frequency of a plane wave propagating at speed of light c is meaningless. Energy of a particle is not determined by frequency of oscillation. Particles have energies that have no association with frequency. It is only that the oscillation of a particle at frequency f can generates kinetic energy, the reverse does not hold. Frequency does not determine the total mechanical energy of a particle. Substituting potential energy in place of frequency is invalid since potential energy has no association with a frequency. It is the electromagnetic waves generated by an oscillating charge that propagates at the speed of light c. You cannot substitute a wavenumber determined by a mass, and frequency determined by the energy of an oscillating mass in a wave equation that propagates at the speed of light c unless the mass is moving at speed of light c. If you claim that no mass can reach the speed of light c, how do you write e=pc as de Broglie did in his wavelength derivation. Of course, there is nothing preventing any entity travelling at the speed of light. There is no speed limit. Speed of light has nothing to do with the speed of other objects.

Taking the derivative of eqn. (21.2) with respect to time t, we have,

$$d\psi(t)/dt=-j(E/\hbar)\psi(t) \quad (21.3)$$

$$j\hbar d\psi(t)/dt=E\psi(t) \quad (21.4)$$

$$\boldsymbol{E}\psi(t)=E\psi(t) \quad (21.5)$$

$$\boldsymbol{E}=j\hbar\partial/\partial t \quad (21.6)$$

where, $\boldsymbol{E}$ is the energy operator.

Eigen value E in eqn. (21.5) is not unique. Eigne value E_n, $\psi_n(t)$ pair only says that the projection of state vector $\psi(t)$ on n^{th} Eigenvector, $\psi_n(t)$ is E_n.

In eqn (21.5), the energy E is the eigenvalue of the energy operator $\boldsymbol{E}=j\hbar\partial/\partial t$.

Differentiating $\psi(t)$ with respect to position x,

$$d\psi(t)/dx=j(p/\hbar)\psi(t) \quad (21.7)$$

$$-j\hbar d\psi(t)/dx=p\psi(t) \quad (21.8)$$

$$\boldsymbol{P}\psi(t)=p\psi(t) \quad (21.9)$$

$$\boldsymbol{P}=-j\hbar d/dx \quad (21.10)$$

The energy E for a particle of momentum p and potential energy V is given by,

$$E=(1/2m)p^2+V \quad (21.11)$$

The energy E here is general mechanical energy. $E=hf$ only applies for kinetic energy. In fact, $E=hf$ is the kinetic energy per cycle. The mechanical energy E cannot be represented as $E=hf$. This is one of the major problems with Schrodinger equation, $E\neq hf$. You cannot stick in hf for any energy E whenever you come across energy E. It does not apply to all energies.

If the particle is at state $\psi(t)$ with energy operator $\boldsymbol{E}$, momentum operator $\boldsymbol{P}$ and potential energy operator $\boldsymbol{V}$, particle has energy,

$$E\psi(t)=(1/2m)p^2\psi(t)+V\psi(t) \quad (21.12)$$

$$\boldsymbol{E}\psi(t)=(1/2m)\boldsymbol{P}^2\psi(t)+\boldsymbol{V}\psi(t) \quad (21.13)$$

Substituting for $\boldsymbol{E}$ from eqn. (21.6), and $\boldsymbol{P}$ from eqn. (21.10),

$$j\hbar\partial\psi(t)/\partial t=-(\hbar^2/2m)(\partial^2\psi(t)/\partial x^2)+\boldsymbol{V}\psi(t) \quad (21.14)$$

This is the Schrodinger equation. It is nothing more that the derivative of wave equation under assumption $E=\hbar\omega$ with invalid and unreal substitutions. You cannot represent the parameters of a system uniquely by eigenvalues. Eigenvector representation is just another multi-dimensional basis vector representation that is no different from the three-dimensional coordinate representation. Nothing more. Eigen vectors are not probabilities just as x-axis, y-axis, and z-axis do not represent probabilities in 3D. Eigen values are not unique and cannot represent parameters of a system since parameter representation must be unique. Eigenvalues are simply the projections of the state vector on the Eigenvectors, which are the basis vectors. It does not say that a particle is on each basis vectors (Eigenvectors) simultaneously, just as the position of a particle in 3D does not say that particle is on x-axis, y-axis, and z-axis simultaneously. Observables are not on any of the eigen vectors just as position of a particle is not on any of the axes (not on x-axis, not on y-axis, not on z-axis).

As we have seen, its derivation is invalid and unreal in every aspect. The frequency is not determined by the total energy of a particle. It is only the kinetic energy e of a particle oscillating at frequency f that can be represented by $e=hf$. There are no particle waves. The de Broglie wavelength is meaningless. Energy of a particle cannot be written as momentum times the speed of light, $e\neq pc$.

De Broglie derived his particle waves by using Einstein's $e=mc^2$ and Plank's $e=hf$. He replaced Einstein's $e=mc^2$ by $e=pc$, which is invalid. In $e=pc$, p is not any momentum p. it is momentum of a particle travelling at speed c from the start. De Broglie treated it as a particle with any momentum $p=mv$. For a particle with any momentum, energy of the particle is $e=(1/2)mv^2$, and hence $e\neq pc$ [4]. No particle can have a starting speed c. Any particle must accelerate from

standstill to reach the speed of light. There is nothing preventing a particle travelling at speed of light [6].

Since Lorentz Transform is not unique, Special Relativity does not hold and $e \neq mc^2$ [2]. Further, as we have shown earlier, Plank spectrum is invalid and hence his assumptions no longer hold true and $e \neq hf$. As a result, Schrodinger equation is invalid. Spin is not quantized. Any one of the x, y, or z components of a spin cannot be aligned with an external magnetic field. It is the total spin that is aligned with an external magnetic field, never a component of a spin. As a result, Bell's theorem is meaningless. The x, y, or z component of a spin cannot be set to a desired direction using Stern-Gerlach magnetic field. It is always the total spin that is aligned with an external magnetic field, not a component of it. If an atom or particle is sent through a Stern-Gerlach device, it is the total spin that is aligned either with the Stern-Gerlach magnetic field or against it. The setting of the spin of an atom using Stern-Gerlach device is volatile, temporary. Permanent setting of the spin of an atom is not possible [4]. You cannot set s, y, or z component of a spin to a desired direction, not possible.

"*The spin of an atom cannot be set permanently by using Stern-Gerlach device or by any device. The alignment of spin with an external magnetic field is always temporary and only present if the atom is within the magnetic field*."

XXII. THERE ARE NO GRAVITATIONAL WAVES

A field is not a wave. One cannot tango. One hand cannot clap. A single field cannot propagate. Uni-field cannot propagate. Uni-energy cannot propagate. Electric field is a Uni-field. Electric field is not a wave. Electric field cannot propagate. Gravitational field is a Uni-field. Gravitational field cannot propagate. Nothing can generate a disturbance in a Uni-field such as gravitational field of a mass or electric field of a charge. Gravitational field has no existence without an attachment to a mass. A field that is anchored to a source cannot propagate. Static electric field has no existence without an attachment to a charge. A field without independent existence cannot propagate. Gravitational field has no independent existence without an attachment to a source. Static electric field has no independent existence without an attachment to a source. Static electric field, static magnetic field, and gravitational fields are not waves; they cannot be waves. Waves propagate. Propagation requires the cyclic exchange of energy between conjugate fields. Electromagnetic fields propagate by cyclically exchanging energies between electric field and magnetic field. Electromagnetic field is not anchored to a source.

Propagation requires conjugate field pair or dual-fields, dual-energy. Propagation requires the mutual exchange of one field to another field or the exchange of one type of energy to another periodically. Mutual exchange of potential energy and kinetic energy generates mechanical wave. Mutual exchange of electric energy and magnetic energy generates electromagnetic propagation. There is no wave without the mutual exchange of conjugate dual energies. When one counterpart of dual-energy increases the other counterpart of the dual-energy decreases, and vice versa.

Gravitational field does not have a conjugate pair or a duality that it can mutually exchange energy with. Change of gravitational field does not generate mutually orthogonal field. The only way to change the gravitational potential of an object is by changing its mass. You cannot disturb a gravitational field. You can separate the gravitational field to its constituent parts by breaking the mass into its constituent masses since the superposition applies to gravitational field. The gravitational field of an object of mass is the superposition of the gravitational field of the constituent particles that make up the mass.

By blowing up a mass, we cannot generate a disturbance in the gravitational field. Gravitational fields of the broken pieces after the blowing up are no different from the gravitational field of the constituent pieces of the object before the blowing up. There is no change in the gravitational field without the change of mass. Mass of an object and its associated field are a single entity. Gravitational field of a mass cannot be disturbed since it is a part of the mass. There is no mass without its constituent gravitational field. There are no propagating disturbances in a gravitational field. There cannot be a disturbance in a gravitational field. There is no duality or a conjugate pair in a gravitational field to generate a wave that propagates. Propagating wave must have an existence independent of the source. Gravitational field has no existence independent of a source. Gravitational waves cannot exist. The effect of gravity must be immediate, not time delayed. There are no dual fields to exchange the energy within a gravitational field. Without dual fields to exchange the energy with, there cannot be a propagating wave. Without dual fields out of phase oscillations, there will be no wave.

Gravity is independent of space. Space is independent of gravity. What is bent or warped by the gravity is a material medium surrounding a gravitational object, not the space. Mass cannot bend space. Space is not warp-able or alterable. Only the matter is warp-able or alterable. Warped medium, not the space, which can guide the propagation of light. Space cannot tell an object how to move. Object can tell the material medium surrounding the object how to warp or how to change the density of the medium. Gravitational object has no effect on a vacuum. Gravitational object has no effect on light in a vacuum [5,4].

The distance is not affected by gravity. Once a meter is defined, a meter is a meter whether a gravitational object is present or not. However, a ruler that is used to measure the distance contracts in the presence of a gravitational object. Distance is not affected by gravity. The ruler is affected by gravity. An object is affected by gravity. Similarly, time is not affected by gravity. Once time is defined, a second is a second whether a gravitational object present or not.

It is the mechanism of a clock that is affected by gravity. The display of a clock is affected by gravity. The time is not affected by gravity. Time is not what clock says. Just like a ruler is what we use to measure the distance, a clock is what we use to measure the time.

A ruler provides the correct measurement when the ruler is in an environment that meets the design specification. Similarly, a clock provides the correct time when the clock is in an environment that meets the design specification. A ruler is an engineered device. A clock is an engineered device. Engineered device does not determine the laws of nature. The time on a clock does not determine the laws of nature. The definition of time exists without a clock. The distance exists as a definition. Ruler is what we use to measure the distance. Time exists as a definition. A clock is what we use to measure time. A second is independent of gravity. A meter is independent of gravity. It is a clock that is dependent on gravity, not the time itself. Time is independent of gravity. The distance in space is independent of gravity.

"*The readings on engineered devices such as clocks and rulers do not determine the laws of nature*."

"*Our inability to synchronize clocks does not determine the laws of nature. Laws of nature exists independent of our presence.*"

There is no bending of space. Space cannot move. Space cannot expand or contract. Space cannot bend. Space cannot undergo warping. The phrase "warped space" is meaningless. Only the matter can move and bend. An object cannot change the space. Space cannot change the path of an object. There is no warping of space due to the presence of an object. It is only that there is a warping of a material medium in the presence of a gravitational object. Object cannot tell space how to warp since there is no space warping. The "warped space" is meaningless. Space cannot tell object how to move since space is unaffected by the presence of an object. Space and objects are mutually exclusive. Mutual exchange of potential and kinetic energy determines the movement of an object, not the space. A force determines the motion of an object. Exchange of energies between conjugate pair of fields determine the propagation.

An object of mass can warp the density of a medium. A medium with varying density of a medium can bend light. Gravity cannot bend light. Gravity generates a density gradient in a medium that diffract light. Gravity and propagation of light are mutually independent. Gravity has no effect on massless. Massless do not possess gravity. Light is massless. Massless has no momentum. Propagating entities have no momentum. Gravity has no existence without a mass. Gravity cannot bend light in the absence of a medium or in a vacuum. It is a medium that mediates an interaction between gravity and light.

Arthur Ellington's attribution of the diffraction of light near the sun to General Relativity is a pure misinterpretation of observation. The bending of light near gravitational object has nothing to do with General Relativity. General Relativity only exists on paper, not in nature. Special Relativity only exists on paper, not in nature. The so-called space warp in special relativity is nothing more than a medium density change near a gravitational object. Special Relativity only applies to moving objects at constant speed on paper. Lorentz Transform only applies to hypothetical moving frames at constant speed on paper. Global Positioning System (GPS) satellites are not on linear paths on constant speed and hence nothing to do with Special Relativity or General Relativity. The claim that GPS is not possible without Special Relativity has no merits, simply meaningless.

Gravity cannot be a wave. Gravity is a Uni-field. Uni-fields cannot be a wave. Only conjugate field pair or dual fields can be waves. Waves travel at finite speed. A wave has a propagation delay. Effect of gravity must be present without a propagation delay. Infinite span gravitational field of an object is associated with its mass. Infinite span of the gravitation field of an object cannot be changed without the change of mass. The mass of an object and its infinite span of gravitational field is a single entity. Propagation of a wave requires a detachment from a source. Gravitational field has no detached existence. Electric field of a charge has no detached existence. A magnetic field of a magnet has no detached existence.

"*Uni-fields cannot propagate. Uni-fields cannot be waves. Uni-fields such as electric, magnetic, and gravitational fields are not waves*."

"*It is only the conjugate pair of fields or Dual-fields such as electromagnetic fields that are propagating waves*."

"*Single hand cannot clap. One cannot tango. Single field cannot propagate. Gravity is one lonely field. One lonely gravitational field cannot propagate, not a wave.*"

"*A field that is anchored to a source cannot propagate. Gravity is anchored to a mass, the source. Gravity cannot propagate. There are no gravitational waves.*"

Oscillation of electric charge generates electromagnetic waves that propagates at the speed of light. However, an oscillation of mass does not generate an oscillating gravitational field since gravitational field cannot vary independent of the mass. The gravitational field of a mass does not change with the motion of a mass. The gravitational field at distant r from the mass is the same whether the mass is moving or not. Oscillation of a mass does not generate gravitational waves. Oscillating mass does not change its gravitational field. Gravity has nothing to do with the speed of light. You cannot generate a gravitational disturbance. Gravitational field of a mass cannot be disturbed.

Oscillating charge does not change its static electric field. However, oscillating charge generates electromagnetic waves that is independent of its static electric field of the charge. Electromagnetic waves are not disturbances in the static electric field. Static electric field of a charge cannot be disturbed by any mean since it is anchored to a charge just like gravitational field is anchored to a mass. You cannot generate a disturbance in the static electric field just as you cannot generate a disturbance in the gravitational field. Electromagnetic wave is not a disturbance of the static electric field. There are no propagating electric waves. There are no propagating magnetic waves. There are no propagating gravitational waves. What is there is propagating electromagnetic waves.

The claim that gravitational waves exist, and they travel at the speed of light are pure fabrications. Gravity has nothing to do with light or the speed of light. If there are gravitational waves that travel at constant speed, then, the whole de ja vu with Special Relativity again since gravitational waves must also be a constant with reference to an observer. You cannot have two different waves having constant speeds with reference to observers if you believe Special Relativity. Gravity is not a wave. A single field cannot be a wave. There are no propagating gravitational disturbances. Gravitational field cannot be disturbed since gravitational field has no independent existence from a mass. Uni-field, Uni-energy cannot propagate. Conjugate pair of fields or Dual-fields, dual-energies propagate. Gravity has no conjugate partner field, field duality, or energy duality, and hence there are no propagating gravitational waves.

LIGO gravitational wave observatory is simply an organized deception. What is observed at LIGO are not gravitational waves. In 2015, LIGO claimed that it detected gravitational waves. What is the direction of that detected gravitational wave? What is the direction of the simulated test signal used to test the system prior to the system being commissioned for observations? What is the direction of the simulated test signal used to test the staff reediness? Are they different? What is the chance of receiving a real gravitational wave from the same direction as the simulated test signal? Those are some of the questions that needs to be answered regarding the LIGO's gravitational waves. At least some of the people at LIGO should know the true story behind the proclaimed gravitational wave detection at LIGO in 2015.

It is the material medium that is warped by the presence of a gravitational object, not the space itself. The change of the object generates the pressure waves in the medium just like the acoustic waves on earth. An oscillating mass generates pressure waves in the medium. These waves in the medium are not gravitational waves. It is these pressure waves that propagates and attenuates with the distance in the presence of a material medium. The speed of these pressure waves in the medium is determined by the medium itself. These pressure waves do not travel at the speed of light. These pressure waves are not gravitational waves.

Object cannot change the space. Object can only change the density of the medium. Gravitational object can change the medium density or in other words gravitational object can warp a material medium, not the space. This warped medium density can change the direction of light. In the absence of a medium or in a vacuum, direction of light is not affected by gravity. There is space. Then there is time that we have defined. Time is absolute. Display of a clock is relative. A clock does not determine the time. A clock is an engineered device that we use to measure time. The display of a clock near a gravitational object is not the correct time just as the display of a clock with a weak battery is not the correct time. Engineered measuring instruments do not determine the laws of nature. Space neither span nor contract. It is the matter that expands or contracts. Space does not move.

If an empty box is moving at speed v, space inside is not moving with it. It is the walls of the box that is moving. If we make the thickness of the walls of the box approach zero, then there is no box, nothing is moving. Einstein's 1952 claim that the space inside the box is moving when the thickness of the box approaches zero is illogical and meaningless. An empty box has no association with the space in a box. The space inside a box does not move with the motion of a box. We cannot FedEx space in a box. If you FedEx an empty box in a vacuum, what you are sending is just the walls of the box, the material, not the space.

Any theory of gravitation should explain not only the gravitation but also the electric field of an electric charge. Newton's theory of gravitation explains not only the gravity but also the electric field of a charge. If General Relativity provides the theory of gravitation, then, it must explain not only the gravity but also the electric field of a charge. General Relativity has been so far silent about the electric field of charge since its inception. General Relativity cannot provide the electric field of a charge. If space is warped by the presence of a mass as it is suggested by the General Relativity, what does the electric charge warp to generate a static electric field. If gravitational field of a mass is the warping of spacetime, the electric field of a charge is warping of what?

A single field cannot propagate. Propagation of a wave requires the mutual energy exchange between two conjugate field pair or dual fields. Gravitational field is single. Gravity does not have a conjugate partner field for propagation. There are no propagating gravitational fields. Gravitational field cannot be disturbed by oscillating the gravitational mass since gravitational field has no independent existence. A moving mass does not leave its gravitational field behind just as a porcupine does not leave its spiky jacket behind when it moves.

Gravitational field exists relative to a mass. Oscillating mass does not leave its field behind it

when the mass moves of oscillates. You cannot generate a disturbance on a gravitational field of an object by any means. You can blow up a mass, but that does not generate a disturbance in the gravitational field since the gravitational field of a piece after the blowing up is same as the gravitational field of that piece when it was a part of the integrated object before the object was blown up. There are no gravitational disturbances. Gravitational field does not propagate. A propagating disturbance requires two conjugating fields that gravity does not have. There are no gravitational waves. This is direct contrast to an electric charge where the oscillation of a charge generates a propagating electromagnetic field that exists independent of the electric field of the charge and the oscillating charge itself.

Electric field of a charge is a single field. Electric field of a charge does not have a conjugate partner field for propagation. There are no propagating electric fields. Magnetic field is single. Magnetic field has no conjugate partner field. Magnetic field itself cannot propagate. There are no propagating magnetic waves. The oscillation of a charge particle does not change its static electric field in the process of oscillation since the static electric field exists relative to a charge. However, the oscillation of a charge particle generates a propagating electromagnetic field that propagates. Electromagnetic field has an oscillating conjugate field pair for its propagation. Electromagnetic field has an independent existence from the static electric field of an oscillating charge particle as well as the charge particle itself. Propagating electromagnetic field is not anchored to the charge of the source or the static field of the charge that it was generated. Static field has no independent existence. Propagating field pair must have an independent existence. There are no gravitational waves. There are no electric waves. There are no magnetic waves. What is there is the propagating electromagnetic conjugate field pairs or electromagnetic waves.

Light does not propagate on inertial frames. Light does not propagate in a medium. Light propagates in the vacuum space, the frame of light [7]. We move on the frame that light propagates. Inertial frames move on the frame that light propagates. Speed of light is determined by the vacuum space. In the presence of a medium, the speed of light in the empty space or in the vacuum is affected by the medium. The direction of light is affected by a medium. The path of light is affected by a medium. Light has a speed, direction, and a path that is fixed in the medium and can only be altered by a medium. The fixed speed of propagation, fixed direction, and the fixed path of light in the vacuum and in a medium are independent of observer motion [6]. When we are referring to the speed of light, we are referring to the speed of propagation of light, not the speed of light bursts. Speed of light bursts is observer dependent. What we see as light is the motion of light bursts. We do not see the propagation of light.

The gravitational attraction of masses and the electrostatic attraction and repulsion of charges are functionally similar in all aspects and must have the same underline structure. Any gravitational theory must and should explain the attraction and repulsion to the electric charges. Since a charge does not have an existence without a mass, it is reasonable to expect the same natural mechanism for the gravitation as well as for the electrostatic field. Nature works in a way to minimize the complexity and hence any gravitational theory must also be compatible with the electrostatic field of a charge. Newton's law of gravitation addresses both gravitation field of a mass as well as the electric field of a charge with a single equation that is compatible for both naturally as a logical theory of gravitation should. Since there is no charge without a mass, there is no static electric field without a mass. Einstein's General Relativity fails in this aspect as a theory of gravitation.

First, the warping of space has no physical meaning. Warping of space in General Relativity may be good for philosophical arguments, nothing else. It has no real meaning. The frequent claim that the Einstein's relativity is experimentally proven is false. It is the experimental misinterpretations that have been used to justify General Relativity. If gravitational field is a result of warping of the space due to a mass, then static electric field must also be a result of the warping of space due to a electric charge. There cannot be two separate warping of space. If only one warping of space is there, what is warping the space; is it the mass that warp the space or is it the charge that warp the space? Both mass and charge cannot warp the space. The basic mechanism of gravitational field of a mass and the electric field of a mass with a charge must be the same. We can expect the nature to never invent two separate mechanisms for gravitational field and static electric field. What is natural for nature is to achieve maximum outcome with least number of natural processes. There cannot be two separate mechanisms for gravitational field of a mass and the electric field of a mass with a charge.

General Relativity naturally fails as a natural mechanism of nature for gravitation. It is only the Newton's theory of gravity that remains as the only alternative that can address both gravitational field of a mass and the static electric field of a mass with a charge compatibly. For gravitational field $F_g=GM/r^2$ and for static electric field $F_e=\alpha Q/r^2$, where M is the mass of the object and Q is the charge on the mass M, r is the distance, G is the gravitational constant, and α is the Coulomb constant. If we have a theory for gravitation, we must also be able to obtain the electric field of a charge simply by replacing the mass with the charge of the mass together with the appropriate proportionality constant.

A field is not a wave. You cannot create a distortion in a static field by shaking the source since a static field only exists relative to the source. Since gravity is single, there is no gravitational waves. However, in the case of a mass with a charge, oscillating charge can generate a pair of conjugate

fields that propagates. Although oscillating mass cannot generate gravitational waves, an oscillating mass with a charge can generate propagating electromagnetic waves. These electromagnetic waves exist independent of the static electric field.

"*It is not the space that is warped by a gravitational object, it is the medium density that is warped by the presence of a gravitational object*."

"*There is no wave propagation without periodic mutual energy exchange between conjugating dual-fields. Gravity has no conjugating dual-fields for such energy exchange. Gravity is a single field. Gravitational field is a Uni-field. Uni-field cannot propagate.*"

"*There are no gravitational waves. Gravity has nothing to do with speed of light c. No two different wave phenomena can have constant speed relative to observers.*"

"*Light does not propagate in a medium or on an inertial frame. Light propagates in its own frame, in the empty space, the vacuum. It is the inertial frames that move on light's frame. All the objects are moving on light's frame.*"

"*There are no gravitational waves.*"

"*Any proper theory of gravitation must be able to explain both gravitational field of a mass and electrostatic field of a mass with a charge by the same mechanism. Inability to do that makes the theory unnatural and invalid. Theory of a gravitational field must have the same mechanism as the theory of an electric field. Any theory of gravitational field must be compatible with electrostatic field*."

XXIII **PROPAGATION OF LIGHT IS NOT RELATIVE, A BURST OF LIGHT IS RELATIVE**

We do not see propagation of electromagnetic waves. We cannot see light propagating. What we see as light is moving light bursts. It is what we see that is relative. It is the moving light bursts that is relative. Motion of light bursts is not governed by Maxwell equations and hence the speed of light bursts is not fixed in a medium. It is propagation of electromagnetic waves or light waves that is governed by the Maxwell equations. It is the speed of propagation of light is fixed in the vacuum and can only be altered by a medium. Relative to a stationary observer in the vacuum, the speed of light bursts is the same as the speed of propagation of light. The vacuum is the absolute frame where light propagates.

It is not just the speed of propagation that is fixed in the vacuum and in a medium. Although the path and the direction of propagation of light is determined by a source, they are fixed in the vacuum and can only be altered by a medium. The speed of propagation of light, the path, and the direction of propagation are fixed in the vacuum and can only be altered by a medium. The motion or propagation of any entity on a fixed path is observer independent just like the motion of a train on its track is observer independent. Relativity of any entity cannot be any different from a relative motion of mountain relative to a runner. No entity is given a special treatment in relativity. There is no Special Relativity. Observers cannot derail a train. Observers cannot derail light; it is naturally prohibited. You do not have to impose a constant speed of propagation of light as it was done in Special Relativity since the path of light is fixed in the vacuum and in a medium. When the path is fixed in the vacuum and in a medium, the motion and propagation of any entity on the fixed path is observer independent since it is the path that moves unaltered relative to a moving observer.

The motion of a train has no off the track existence. Propagation of light has no off the track existence. Whatever happens on a fixed track is unaltered relative to the moving observer. It is not the train that moves relative to an observer. It is the train track that moves unaltered relative to a moving observer. In the case of light, it is the path of light or the track that moves unaltered relative to a moving observer just like a motion of a mountain relative to a moving observer. The motion of light burst relative to an observer is not different from the motion of a train, the motion of a Bulldozer, a Caterpillar, or an Armored vehicle except that the light is massless. A train, Bulldozer, Caterpillar, Armored vehicle, and Light have one thing in common; they all have fixed tracks in the medium. When there is a fixed track, whatever happens to a moving or propagating entity on the fixed track is observer independent. Propagation of light on its fixed track is independent of observers. Propagation of light is not relative.

Light does not require a Special Relativity. The relativity should work equally for all the motions. What we see is the light bursts in motion on a fixed track. The track moves unaltered relative to the motion of observers irrespective of whether the observer is at constant speed or at an acceleration [6].

Property:

Speed of propagation of light waves c is calculated as $c=f\lambda$ using the measured frequency f and the wavelength λ. The speed of propagation of light c is not measured. Speed of propagation of light is not relative. It is the speed of light bursts c_r that is measured as $c_b=dr/dt$, where dr is the distance that a light burst travels at time dt. Speed of light bursts is relative.

Lemma:

Propagation of light is governed by the Maxwell equations and hence the speed of propagation of light is a constant in the vacuum and affected by a medium. The motion of light bursts is not governed by the Maxwell equation and hence the speed of motion of light bursts does not have to be a constant. Speed of motion of light bursts is relative and depends on the observer's frame of reference whereas the Speed of

propagation of light is not relative and independent of the observer's frame of reference.

Lemma:

The speed of the propagation of light wave $c=f\lambda$ is a constant. The speed of motion of a light burst is $c_r=dr/dt$, where dr is the distance that a light burst travels at time dt. Light waves propagate. A burst of light moves relative to an observer. Since light has no mass, the motion of light burst has no momentum. Motion dynamics do not apply to light, the massless.

Corollary:

One of the fallacies of Special Relativity and Lorentz Transform is the use of the speed of light bursts $c_r=dr/dt$ as the speed of propagation of light c; this is incorrect since $c=f\lambda$ and $c\neq c_r$ unless reference frame is stationary in the vacuum.

Lemma:

The speed of the propagation light c is not relative, independent of a frame of reference, independent of the motion of observers. The speed of motion of a light burst is relative, depends on the frame of reference, depends on the motion of observers. Relative to a stationary observer in the vacuum, the speed of light bursts is the same as the speed of propagation of light.

Light has no momentum. Special Relativity and General Relativity forced the light a momentum to make the light relative. There cannot be Special Relativity or General Relativity without forcing a false momentum on light. Any entity with a momentum is subjected to an acceleration if that entity takes a nonlinear path. If light has a momentum, light will undergo an acceleration if light must follow the geodesic, a nonlinear path in General Relativity. If light undergoes an acceleration, the speed cannot be a constant unless the acceleration is orthogonal to the direction of the light, which is not the case if light follows the geodesic.

"Light does not and cannot have a momentum."

Any entity with a momentum cannot have a constant speed in the presence of gravity. Light cannot have a momentum since the speed of light is constant determined by the free space or the vacuum and only affected by a medium. Special Relativity and General Relativity are contradictory in its foundation. Massless cannot have a momentum. Motion mechanics only applies for entities of mass where speed v can be defined by v=dx/dt, where dx is the distance travel in the time interval dt. Although the speed of motion of a light burst is given by $c_r=dx/dt$, a light burst has no mass and hence motion mechanics does not apply for light bursts.

Any entity of mass with speed v=dx/dt is also subjected to acceleration since acceleration $a=d^2x/dt^2$. Light cannot be accelerated. Any entity that has no acceleration or deceleration cannot have speed given by v=dx/dt. Light cannot have an acceleration or deceleration since speed of light is determined by the vacuum and only affected by a medium.

Speed of light is not given by dx/dt. Speed of light is given by $c=f\lambda$, $c\neq dx/dt$. Motion mechanics do not apply to propagation of light. Light does not travel on the geodesic. The path of light is determined by the density of the medium. In the absence of a medium or in the vacuum, light travels on a linear path irrespective of whether gravitational objects are presents or not. Gravity has no effect on light in the absence of a medium. What is warped by a gravitational object is the material medium surrounding a gravitational object, not the space. Gravitational object has no effect on the space. Gravitational object has no effect on the light in the absence of a medium [5].

Speed of propagation of light is a constant in the vacuum and can only be altered by a medium. Speed of propagation of light is independent of a frame of reference or observer motion. Propagation of light is independent of any frame of reference. Light has no existence without propagation. You cannot stop light from propagating. Light has no standstill existence and hence the propagation of light is not relative. When we refer to the speed of light, we are referring to the speed of propagation of light.

However, a burst of light is relative. The speed of a burst of light c_r is not given by frequency times the wavelength, $c_r\neq f\lambda$. The speed of a burst of light is given by $c_r=dr/dt$, where the dr is the distance travelled by the burst at time dt. With respect to a stationary frame or in the vacuum, the speed of light c is the same as the speed of the burst of light c_r.

"*The speed of propagation of light is a constant c and it is independent of the frame of reference. However, the speed of a burst of light c_r is relative and depends on the speed of the frame of reference v.*"

Light does not propagate relative to a frame of reference or relative to observers. It is the path that moves unaltered relative to observers just like a train track moves unaltered relative to observers. It is a burst of light that travels or move relative to a frame of reference or relative to observers. The speed of a burst of light does not have to be a constant since the motion of light bursts are not governed by Maxwell equations. If we fire a burst of light vertically from the bottom of a train, the burst takes an angular path and the speed of the burst is not a constant, it depends on the frame of reference. The light wave within the burst propagates vertically at constant speed c independent of the motion of the train [6].

Light does not propagate relative to an inertial frame. It is a burst of light that moves relative to a reference frame. As a result, Lorentz Transform is invalid. You cannot transform the Maxwell's equations onto a moving frame. Light does not propagate on inertial frames. A burst of light moves relative to an inertial frame. The motion of a burst of light is not determined by the Maxwell's equations. It is the

propagation of light that is determined by the Maxwell equations. As a result, the speed of motion of a light burst does not have to be fixed in the vacuum and in a medium. It is only the speed of propagation of light that is fixed in the medium and altered by a medium. The speed of propagation of light and the speed of the motion of a light burst are the same relative to a stationary observer in the vacuum. The vacuum is the absolute frame of reference where light propagates. Light does not propagate on inertial frames or in a medium. Light propagates in the space, the vacuum [7,6,2].

If you use the motion of light bursts to build a clock, that clock is not universal since the motion of a burst of light is relative. It is not the time that is relative, it is the motion of the burst of light that is relative. It is the device that is relative. A clock does not represent time until we define the time and engineer the clock to represent time. Clocks are observer independent if we design clocks to be observer independent. Time is not relative just because clocks are relative.

Our inability to engineer clocks to measure frame independent time does not make time relative. Time is not relative. Propagation of light is not relative. The motion of a burst of light is relative. It is only a clock that is designed as a counter of peaks or wavelength of a continuous electromagnetic wave that is not relative. A clock that is based on propagation of light is not relative. Such a clock is independent of a frame of reference. Such a clock is absolute. Such a clock is unaffected by gravity. Gravity has no effect on light. Gravity has no effect on time. It is the mechanism of a clock that is affected by gravity. Gravity affects masses, nothing else. A clock based on the motion of light bursts is relative. Clocks can be designed to operate frame independent manner.

Lemma:

The speed of propagation of light $c=f\lambda$, $c\neq dr/dt$. The speed of a light burst c_r relative to an observer is given as the distance dr travel per unit time, $c_r=dr/dt$. The speed of propagation of light is the same as the speed of light bursts or $c=c_r$ only when the observer is stationary in the vacuum.

Lemma:

Our inability to engineer clocks to measure frame independent time does not make time relative. Time is not relative.

Theorem: Relativity

The motion and the propagation of any entity on a fixed track in the vacuum or in a medium is observer independent.

The proof is straight forward and can be done by contradiction since a moving entity on a fixed track has no off the track existence. Let us claim for a moment that it is observer dependent. If the claim is true, the moving entity will be off the track relative to a moving observer, a contradiction. Our claim that it is observer dependent cannot be true. An entity with a fixed track has no off the track existence. As a result, a moving entity on a fixed track cannot be observer dependent. Any entity moving or propagating on a fixed rail is observer independent.

Corollary: Relativity of Light

Light propagates on a path that is fixed in the vacuum and can only be altered by a medium and hence the propagation of light is observer independent.

For an observer moving at speed v where $-\infty<v<\infty$, the speed of light c on its fixed track in the vacuum and in a medium is the constant $c=f\lambda$. However, the rail of light moves unaltered relative to an observer just as a mountain moves relative to a runner. As a result, a light burst, which is the light and its path as a single entity, is relative [6]. The speed of a light burst, $c_r=dr/dt$ depends on the observer. It is only relative to a stationary observer in the vacuum that $c=c_r$. For an observer on an inertial frame, $c_r>c$. In general, $c_r\geq c$.

"*Speed of propagation of light is calculated as* $c=f\lambda$. *Speed of light bursts is directly measured as the distance light bursts travel per unit time* $c_r=dr/dt$."

"Special Relativity made the mistake of treating c and c_r *as the same, they are not the same unless the observer is stationary in the vacuum [6].*"

XXIV. WHAT IS WRONG WITH BOHR ATOM

"*There are no forbidden regions in atoms that electrons cannot cross even though electrons are on stable energy levels. Electrons on any stable orbit can oscillate on that orbit in the presence of thermal energy or in the presence of electromagnetic waves.*"

Lemma:

Position and momentum of a particle cannot be mutually independent. There cannot be a momentum without change of position. There is no change of position without a momentum. Position and momentum are mutually dependent. Position and momentum of a particle are not a Fourier Transform pair.

Corollary:

Position and momentum of a particle cannot be probabilistic since no particle can disappear from one place and reappear in another place. For a particle to move from position A to position B, the particle must take a continuous path crossing all the points in between.

Neil Bohr claimed that electrons orbits are quantized so that $2\pi r=n\lambda$, where de Broglie wavelength $\lambda=h/p$, p is the momentum of the electron, h is the plank constant and r is the orbit radius. In other words, $rp=n\hbar$, $n=1,2,3,\ldots$, where $\hbar=h/2\pi$. Since rp is the angular momentum, Bohr assumes that the angular momentum is quantized. However, angular momentum is a vector and vectors cannot come in

quanta. The amplitude of a vector cannot come in quanta. This shows that there is a fundamental problem with Bohr atom.

According to Bohr, electron orbits are quantized, and electron can only occupy the radii that satisfy $r=n\lambda/2\pi$, n=1,2,3, ... In Bohr's atom electrons cannot even cross the in between space of the allowed radii. Radius cannot be quantized. Radius is continuous. Electron cannot move from one orbit to another orbit without passing all the r values in between on a continuous path. Electron in an atom can be at any radius, and at what radius an electron is determined by the energy of the electron or the orbiting frequency f_o of that electron.

De Broglie claimed that a particle of momentum p is a wave of wavelength $\lambda=h/p$, and Bohr claimed an electron can be on orbits that fit integer number of de Broglie wavelengths $n\lambda$, n=1,2,3, … Bohr further claimed that an electron cannot be in between allowed energy levels and for an electron to move to a different energy level, electron has to disappear from one energy level and reappear in another energy level since electron has no existence in between energy levels, which is mysterious. Disappearing and reappearing acts only take place in magic shows; they are not expected to take place in physics.

When somebody claims that something disappears from one place and reappear at another place, it does not sound very scientific. Things cannot disappear and reappear in other places without taking a physical path. Therefore, there is something that is not right with Bohr atom. There is something not right with de Broglie wavelength since particles cannot behave as waves, and these are no particle waves. Particle wave and wave particle are oxymorons. There is nothing physically waving in a particle. There is no particle without a mass. We can move a particle by applying a force. We cannot move a wave by applying a force. We can stop a particle by applying a force. We cannot stop a wave by applying a force since a wave has no standstill existence. However, there is a trace of hidden truth in both claims. It appears that the Bohr's claim as well as de Broglie's claim are simply the misinterpretation of the reality.

"*Any theory that claims for an electron to move to a new orbit, it has to disappear from the current orbit and mysteriously reappear in the new orbit is not just wrong, it is a mysterious creation in the human mind that has no reality.*"

a) **What Makes Atomic Orbit System Distinct from Planetary Orbit System**

In a planetary orbiting system, the orbit of a planet is determined by the kinetic energy of the planet. Planets are orbiting with kinetic energy under a gravitational potential. However, in the case of an atom, orbiting system is a mixed system consists of the motion of masses and charges since electrons as well as nucleus consist of both mass and charge. Unlike a planetary system, the gravitational potential is negligible in an orbiting system of an atom. So, the atomic orbiting system is an odd mixture of kinetic energy due to the motion of mass of an electron and an electric potential due to charges. In addition, in the presence of light or electromagnetic waves, the orbiting electrons will also undergo an oscillation at a frequency which is equal to the frequency of the electromagnetic waves due to its electric charge.

An electron on a circular orbit does not generate electromagnetic radiation since there is no acceleration in the direction of the motion of the electron. However, oscillation of an orbiting electron will generate electromagnetic waves. When an electric charge is subjected to oscillation, it will generate electromagnetic radiation waves.

The oscillation of orbiting electrons in the presence of light allows the current orbit to expand or contract while remaining on its current orbit. If the oscillation frequency is in resonance with the orbiting frequency, then, the electron moves to a new electric potential determined by the energy of the oscillation. Although the orbit of an electron is determined by the mass of the electron, the change of the orbit is determined by the oscillation of the charge. A new orbit has a different electric potential, and the electric potential energy difference is determined by the oscillation of an electron in resonance with the orbiting frequency.

In the presence electromagnetic wave of frequency f or thermal oscillation of frequency f, an orbiting electron of orbiting frequency f_o will oscillate at frequency f. If the frequency f is in resonance with the orbiting frequency f_o or in other words if $f=nf_o$, electron moves to a higher electric potential level n from the current orbit of orbiting frequency f_o, where n=1,2,3, … The orbiting frequency of the new orbit is determined by the electric potential the electron is at. The orbiting kinetic energy of the electron at the new electric potential will be smaller than the orbiting kinetic energy of the previous orbit since the new electric potential is higher.

b) **Orbit of an Electron**

For an electron in an atom orbiting at speed v on orbit of radius r, we have,

$$Z\alpha q^2/r^2=mv^2/r \quad (24.2.1)$$

$$r=Z\alpha q^2/mv^2 \quad (24.2.2)$$

where, α is the Coulomb constant, Z is the atomic number and m is the mass of the electron.

For simplicity, we disregard the interaction between the electrons in an atom. Planetary orbits of an orbiting system under the interaction of the orbiting planets are given in [5] and it can be directly extended to orbiting system of electrons in Atoms.

The orbiting energy e is given by,

$$e=Z\alpha q^2/2r \quad (24.2.3)$$

The kinetic energy of an orbiting electron decreases with the radius.

The potential energy e_{PE} is given by,

$$e_{PE}=-Z\alpha q^2/r \quad (24.2.4)$$

The potential energy increases with the distance (the radius r) due to the minus sign.

The total energy $e_T=e+e_{PE}$ is given by,

$$e_T=-Z\alpha q^2/2r \quad (24.2.5)$$

The total energy increases with the radius r due to the minus sign.

For orbiting frequency f_o, we have $v=r\omega_o$, and $\omega_o=2\pi f_o$, we have,

$$Z\alpha q^2=mr(r2\pi f_o)^2 \quad (24.2.6)$$

For a given orbiting frequency f_o, the orbiting radius r is given by,

$$r=[Z\alpha q^2/m(2\pi f_o)^2]^{1/3} \quad (24.2.7)$$

For the Hydrogen Atom, Z=1 and hence, r is given by,

$$r=[\alpha q^2/m(2\pi f_o)^2]^{1/3} \quad (24.2.8)$$

Since α, q, Z, and m are constants, the orbiting radius r is determined by the orbiting frequency f_o.

c) **Change of Orbits Due to Oscillation**

Although the motion of mass keeps electron in orbit, it undergoes an oscillation about its orbit in the presence of light or electromagnetic waves due to its charge. It is this oscillation of charge that determines the change of orbits.

An electron with orbiting frequency f_o can also be in orbits with oscillating frequencies $(1/n)f_o$ or nf_o, where n=1, 2, 3, …, since $1/nf_o$ and nf_o resonate with f_o. The oscillation of electrons in resonance with the orbiting frequency determines the potential energy of the electron and hence the orbit change. If the orbiting frequency f_o resonates with an oscillating frequency f so that $f=nf_o$ such that n is an integer, electron moves to a higher potential energy orbit. Thermal energy of an object or the presence of electromagnetic burst makes electrons in atomic orbits to oscillate. An electron in orbit r with orbiting frequency f_o can oscillate at any frequency f, which is determined by the temperature of the object in the case of thermal oscillation at frequency f or the frequency f of an electromagnetic wave burst in the case of electromagnetic oscillation. It is this electron oscillations that can change the stable orbit of the electron to another stable orbit if the oscillation frequency f is in resonant with the orbiting frequency f_o.

If the oscillating frequency f of an electron resonates with the orbiting frequency f_o of the electron so that $f=nf_o$, then, electron will take to a new stable orbit with orbiting frequency $f_o=(1/n)f$, where n is an integer. The new stable orbiting radius r_n is given by,

$$r_n=[Z\alpha q^2/m(2\pi f/n)^2]^{1/3} \quad (24.3.1)$$

$$r_n=\beta n^{2/3} \quad (24.3.2)$$

$$\beta=[Z\alpha q^2/m(2\pi f)^2]^{1/3} \quad (24.3.3)$$

Substituting for r in eqn. (24.2.5), the total energy of the n^{th} level at orbit radius r_n, $e_T(n)$ is given by,

$$e_T(n)=-(1/2)(Z\alpha q^2/\beta)[1/n^{2/3}] \quad (24.3.4)$$

$$e_T(n)=e_T(1)[1/n^{2/3}] \quad (24.3.5)$$

where, $e_T(1)=-(1/2)(Z\alpha q^2/\beta)$.

If an electron in an orbit with orbiting frequency f_o oscillate with frequency f so that $f=nf_o$, then, the electron can move to a new orbit with orbiting radius r_n with energy $e_T(n)$.

Equation (24.3.2) is not an orbit quantization. It only indicates that an electron in an stable orbit with orbital frequency f_o can move away from that orbit only on to another stable orbit if the oscillation frequency f of that electron is in resonance with the current stable orbiting frequency f_o such that $f_o=(1/n)f$, where n is an integer. An electron on a stable orbit can oscillate in between stable orbits and hence can be at any radius without any natural prohibition. Electrons can cross space to get to a new orbit. Electrons do not have to perform disappearing acrobatics as suggested in Bohr model for them to change the orbits.

Note that the oscillating frequency f is not an orbiting frequency. It is the oscillation frequency due to thermal oscillation or the oscillation in the presence of a light burst of frequency f. It is this oscillation energy that determines the potential energy change of the electron. If oscillation frequency f is in resonance with the orbiting frequency f_o, then the electron moves to a new stable orbit with higher radius with higher potential energy and lower orbiting frequency. If an electron moves from higher energy level to a lower energy level, it emits an electromagnetic wave burst or a light burst with energy equivalent to the potential energy difference between the previous orbit and the new orbit. The frequency of the emitted wave is given by $f=nf_o$.

d) **Orbiting Frequency at New Orbit**

We have an electron initially at orbit radius r_o and orbiting frequency f_o. So, the electron is at the electric potential $E_{PE,o}$ given by,

$$E_{PE,o}=-Z\alpha q^2/r_o \quad (24.4.1)$$

If this electron is exposed to an electric field of frequency f, then, the electron will oscillate frequency f while orbiting at orbiting frequency f_o. If $f=nf_o$, then the electron moves to a new orbit with orbiting frequency $f_o=(1/n)f$, where n is an integer. New orbiting frequency f_n is determined by the potential energy of the new orbit. The electric potential $E_{PE,n}$ of orbit n is given by,

$$E_{PE,n}=-Z\alpha q^2/r_n \quad (24.4.2)$$

where, r_n is the radius of the orbit of the n^{th} energy level.

e) **Orbiting Kinetic Energy of an Electron**

The orbiting kinetic energy e of an electron with orbiting frequency f_o is given by,

$$e=Z\alpha q^2/2r \quad (24.5.1)$$

From eqn. (23.2.7), $r=[Z\alpha q^2/m(2\pi f_o)^2]^{1/3}$ and hence,

$$e=(1/2)(Z\alpha q^2)^{2/3}m^{1/3}(2\pi f_o)^{2/3} \quad (24.5.2)$$

$$e=hf_o^{2/3} \quad (23.5.3)$$

where,

$$h=(1/2)(Z\alpha q^2)^{2/3}m^{1/3}(2\pi)^{2/3} \quad (24.5.4)$$

From eqn. (24.5.1), the energy e is proportional to 1/r. If the orbiting period is τ, the orbiting frequency $f_o=1/\tau$. Substituting in eqn. (24.5.3), we have one of the Kepler's findings for an orbiting object,

$$r\propto\tau^{2/3} \quad (24.5.5)$$

Since α, q, and m are constants, h is a constant for an electron. However, h varies from atom to atom since the number of protons, Z, varies from atom to atom. The energy e here is the kinetic energy of the orbiting electron. If you have the energy e for hydrogen atom, for an atom with Z proton, simply replace α with αZ and hence, we have,

$$h=(1/2)(\alpha Zq^2)^{2/3}m^{1/3}(2\pi)^{2/3} \quad (24.5.6)$$

While orbiting, an electron can also undergo an oscillation in the presence of electromagnetic waves or due to the thermal oscillations. These oscillations determine the potential energy changes of the electron and hence the orbit changes from one stable orbit to another. When this oscillation frequency f is in resonance with the orbiting frequency f_o of the current orbit, in other words when $f=nf_o$, orbit changes to a higher potential energy level with orbiting frequency $f_o=f/n$. The kinetic energy due to the oscillation of an orbiting electron increases with the oscillation frequency f since $e_s=h_sf$. It is this energy that drives an electron to a higher potential energy level when the frequency of the oscillation is in synch with the orbiting frequency. This oscillation energy of an electron changes the potential energy of the electron when the oscillation frequency is in resonance with the orbiting frequency f_o. The resonance oscillation of an electron moves the electron to a higher potential energy level.

A light burst with frequency $f=nf_o$ can oscillate an electron in resonance with the orbiting frequency f_o of the current orbit and hence can change the orbit to a higher potential energy level. Similarly, the change of orbit from higher potential orbit to a lower potential orbit releases an electromagnetic wave burst of frequency $f=nf_o$.

When an object is heated, it radiates electromagnetic waves. Electromagnetic waves do not have a temperature, heat, or entropy. It is not heat that radiates. Heat cannot radiate. Heat is a property of particles of mass. There is no heat without particles of mass. When an object is heated, it is the heatless electromagnetic waves that radiates.

There is no disappearing of an electron from one level and reappearing it at another level here. There is no angular momentum quantization here. Angular momentum is a vector. Vectors cannot be quantized. Bohr's claim that the angular momentum is quantized is invalid. The angular momentum quantization inherent in Bohr's model based on de Broglie's particle wave conjecture is a clear indication that the Bohr's atomic model is invalid. There are no particle waves and $\lambda\neq h/p$. Plank spectrum is incorrect and hence quantized energy assumption no longer hold. When quantized energy assumption is invalid there is no Plank constant. When there is no Plank constant, there is no Bohr Atomic model ($2\pi r=n\lambda$) or de Broglie wavelength ($\lambda=h/p$).

There is no meaning to the particle waves. Since de Broglie wavelength λ does not exist, Bohr cannot represent the circumference of the orbit of radius r as integer number of λ, which is the foundation of Bohr's atom although it was founded before the particle waves were introduced. Originally, Bohr quantized the angular momentum, $rp=n\hbar$, n=1,2,3, … Since de Broglie claimed a particle with momentum p is a wave of wavelength $\lambda=h/p$, Bohr model is equivalent to representing the orbit of radius r as integer number of de Broglie wavelengths, $2\pi r=n\lambda$.

In Bohr atom, angular momentum rmv was represented as an integer multiplication n of ħ, or $rmv=n\hbar$, where $\hbar=h/2\pi$. In Bohr model, $(2\pi r)mv=nh$, or $2\pi r=n(h/p)$ n=1,2,3, …and it is the same as the representation of the orbit perimeter as integer multiples of de Broglie particle wavelength, $2\pi r=n\lambda$. Particle wavelength or de Broglie wavelength λ is not real; it is meaningless.

A moving particle does not have a wavelength unless the particle taking sinusoidal path in space. If a moving particle at speed v is vibrating at frequency f orthogonal to the direction of motion, then, the particle will be taking a spatially sinusoidal path of wavelength λ, where $\lambda=v/f$. This is not a propagating particle wave of wavelength λ. This is not a de Broglie wave. This is not a probability wave that describes the probability of finding a particle at certain position. In this case, particle passes through every position once. There is no probability here. There is no probability in the oscillation of an orbiting electron in an atom.

An orbiting particle can oscillate at a frequency f. When orbiting particle oscillate, the particle traces a path that represents a wave form around the orbit. However, particle oscillation is not a propagating wave. Electron oscillating at frequency f on its orbits generates radiating electromagnetic wave of frequency f. When orbiting particle oscillate, the path of the particle represents a sinusoidal (distorted) path of wavelength $\lambda=v/f$, where v is the orbiting speed and f is the frequency of oscillation. It is distorted sinusoidal path since oscillation is centered on a circular orbit. There is no distortion if the motion is linear. If the orbiting frequency is f_o and the orbiting radius is r, then, $v=r(2\pi f_o)$. If the oscillation is at resonance with the orbit frequency, we have,

$$f=nf_o \qquad (24.5.7)$$

Multiplying both sides by $2\pi r$, we have,

$$2\pi rf=nr(2\pi f_o) \qquad (24.5.8)$$

Since $v= r(2\pi f_o)$,

$$2\pi rf=nv \qquad (24.5.9)$$

$$2\pi r=nv/f \qquad (24.5.10)$$

Since $\lambda=v/f$, we have,

$$2\pi r=n\lambda \qquad (24.5.11)$$

Although this appears as Bohr's model represented in the form of de Broglie wavelength, equation (24.5.11) has nothing to do with the Bohr's Atomic model or de Broglie particle waves. The wavelength λ here is not a particle wave or de Broglie wave. The wavelength λ here is given by,

$$\lambda=v/f \qquad (24.5.12)$$

$$\lambda=(2\pi r)f_o/f \qquad (24.5.13)$$

where v is the orbiting speed and f is the oscillating frequency of the electron due to the thermal oscillation or due to the presence of an electromagnetic burst of frequency f.

When the oscillation frequency f is in resonance with the orbiting frequency f_o or when $f=nf_o$, we have,

$$\lambda=(2\pi r)/n \qquad (24.5.14)$$

$$2\pi r=n\lambda \qquad (24.5.15)$$

where n=1,2,3, …

Although this appears as same as the Bohr Atomic model, $2\pi r=n\lambda$ here has nothing to do with Bohr Atomic model. The wavelength λ here is not the de Broglie wavelength. There are no particle waves here. There is no propagating wave here. There is no wave

here to model using the plane wave equation as it was done by Schrodinger. Schrodinger equation has no place here. Schrodinger equation has no place in Atoms. Schrodinger equation is a conceptual disaster. Schrodinger equation has no existence since Plank spectrum is invalid.

Lemma:

Schrodinger equation, Bohr atom, and de Broglie wavelength have no existence since Plank spectrum is invalid.

What we have here is the oscillation of an orbiting electron on its orbit. Everything here is physical, not hypothetical. What we have here is an electron tracing a spatially sinusoidal orbit of wavelength λ. Nothing more. Here wavelength λ is given by λ=v/f, where v is the orbiting speed and f is the frequency of the oscillation of the electron about its circular orbit. There is no propagating wave here. There is no wave particle duality here. If you run tracing a sinusoidal path in space, you are not a wave. You are a mass tracing a spatially sinusoidal path with your motion. Spatially sinusoidal path has a wavelength. This wavelength is not a wavelength of a particle wave.

Lemma:

If an electron orbiting at orbiting frequency f_o oscillates at frequency f about its orbit, then, the electron will traces an orbiting path of a spatially sinusoidal wave of wavelength λ=v/f, which is the same as $\lambda=(2\pi r)f_o/f$. This is not a particle wave of wavelength λ.

Corollary:

When the oscillation frequency f of an electron orbiting at frequency f_o is in resonance, in other words when $f=nf_o$, the electron will take an orbit given by $2\pi r=n\lambda$, n=1,2,3, …, where λ=v/f, v is the orbiting speed of the current orbit and f is the oscillating frequency of the orbiting electron. This is not an orbit quantization. Orbits are not quantized.

Lemma:

Electron orbits in an atom are not quantized. Stable orbits an electron can move to from its current stable orbit are discrete.

When the thermal oscillation frequency f of an orbiting electron is in resonance with orbiting frequency f_o or when $f=nf_o$, it is equivalent to the representation of the perimeter of the orbit 2πr as an integer multiple of the wavelength λ so that λ=v/f, where v is the orbiting speed. Now, it is understandable why this wave motion of an electron on a circular orbit was erroneously interpreted as a particle wave. There are no particle waves. Electron orbits at speed v on orbit of radius r while oscillating at frequency f on the circular orbit in the presence of thermal energy or in the presence of electromagnetic bursts of frequency f.

An electron in an atom is on a stable orbit. Orbiting electron can undergo thermal oscillations on a stable orbit. Thermal oscillation changes the radius of an electron orbit around the stable orbit. These orbit changes due to thermal oscillation or due to the presence of electromagnetic wave bursts are discrete. Orbiting electron under thermal vibration makes the electron to take a spatially sinusoidal path of a wavelength λ=v/f on the circular orbit. The actual path of an electron on a circular orbit is a spatially sinusoidal path of frequency f.

There are no forbidden r values for an electron in an atom. There are no forbidden energies for an electron. Bohr's claims that an electron cannot be in between allowed energy levels is invalid and unrealistic since no electron physically move from one energy level to another without crossing region in between the energy levels. If the thermal or electromagnetic oscillating frequency f of an electron reaches the resonance with the orbiting frequency f_o, then the electron will be in a new stable orbit with orbiting frequency nf_o. Although electrons are on stable orbits, electrons can be at any radius in the presence of thermal or electromagnetic oscillations.

Electrons do not have ghostly characteristics of disappearing from one place and reappearing at another place as Bohr claimed. There are no voodoo acts. Particles cannot have mysterious behaviors. The concept of particle waves is not science; it even surpasses the voodoo practice bizarreness. Just because somebody misinterpret an experiment to justify particle waves does not mean particle waves exist. Misinterpretation of experiments cannot justify voodoo theories.

Electrons are not waves as De Broglie claimed. Electrons are not in rigid energy levels. If an electron leaves an energy level, there must be a physical path to get to another energy level. This is where Bohr's atom fails; it requires a disappearing and reappearing act of magic. Angular momentum is a vector. Angular momentum cannot be quantized. Angular momentum cannot come in quanta. Bohr's atom is a result of angular momentum quantization. The requirement of angular momentum quantization in Bohr's model is a clear indication that it is invalid.

Nothing can happen in nature that has no physical explanation. We cannot use mysterious to explain the unknown. There are no spooky behaviors in the motion of electrons in atmos. Although experiments are important part of science for validating the theoretical claims, an experiment can be an enemy of science that impedes the discovery and steers the science in wrong direction since experiment results are vulnerable to misinterpretations. Quantum Mechanics is a result of such experimental misinterpretations. Special Relativity and General Relativity are a result of such experimental misinterpretations. There are no particle waves λ≠h/p. De Broglie conjecture is invalid.

- Angular momentum $\boldsymbol{\ell}$ is not quantized, $\boldsymbol{\ell}\neq n\hbar$, where $\boldsymbol{\ell}=|\boldsymbol{\ell}|$.
- There are no forbidden regions electrons cannot

cross in an atom.

- Bohr's atomic model is incorrect, not realistic. Electrons in an atom do not have forbidden regions.
- There are no strict designated energy levels for an electron in an atom.
- There are stable orbits for electrons in an atom. Electrons on these orbits can oscillate about these stable orbits. Oscillation of an orbiting electron traces a wavy path about the orbit. The wavelength of the wavy path is given by $\lambda=v/f$, where v is the orbiting speed and f is the oscillation frequency on the orbit due to thermal energy or electromagnetic wave bursts.
- Oscillation of an electron due to the external thermal or electromagnetic energy can transfer the electron into a new orbit if the oscillation frequency f is in harmony with the orbiting frequency f_o of the current stable orbit. In other words, stable orbits are orbits with orbiting frequencies $f_o=f/n$, n=1,2,3, …

XXV. THERE ARE NO PARTICLE WAVES

Einstein made the false claim that light comes in particles or photons. De Broglie made the false conjecture that if light comes in photons or light quanta, then particles must also have a wave behavior. He used Einstein's hypothetical rest mass energy $e=mc^2$ and Plank's energy quanta $e=hf$ to come up with de Broglie wavelength $\lambda=h/p$, where p is the momentum of the particle mv, where v is the speed of the particle and m is the mass. He represented mc^2 as pc, where p=mc. The e=pc where p=mc only holds for a mass m moving with speed c from time t=0. Even though p=mc here, he attributed it to any momentum p=mv, which is indeed not true. He combined e=hf and e=pc and substituted $c=f\lambda$ to obtain the particle wavelength $\lambda=h/p$. The momentum p here is given by p=mc and cannot represent momentum of a mass at any speed p=mv. His derivation is simply invalid for any mass moving at any speed v or any momentum p.

That is not the only reason De Broglie wavelength is invalid. One simple reason is that a mass cannot propagate. A mass that cannot propagate cannot be a wave. It is only that any mass can travel on a wavy path just as a car can travel on a wavy path one can run on a sinusoidal path with wavelength λ. A moving mass at speed v can oscillate orthogonal to the direction of motion tracing a sinusoidal path of wavelength $\lambda=v/f$, where v is the orbiting speed and f is the frequency of oscillation about the orbit.

Another reason is that $e\neq mc^2$. Einstein's famous hypothetical relationship $e=mc^2$ is the kinetic energy of a rest mass relative to the light propagating at the constant speed of light c. If the light is assumed to be relative, then a rest mass m relative to light has speed c in opposite direction with kinetic energy $e=mc^2$. The problem is that no mass can have constant speed from the start even though light has the constant speed c form the start. This is an indication that the light is not relative, and it is not possible to consider motion of a rest mass with reference to the propagation of light. A mass at rest does not move at speed c relative to light. A rest mass does not have kinetic energy and $e\neq mc^2$.

To consider a stationary mass relative to the propagation of light, light must be relative. Massless cannot be relative. Massless cannot have a momentum. Light has no momentum. Yes, if light has a momentum, then, the light can be relative, and a rest mass relative to light will have speed c and hence the rest kinetic energy $e=mc^2$. The problem is light has no momentum. If light has a momentum light must be able to be brought complete stop by applying equal and opposite momentum. Light has no existence without propagation and hence light cannot be brought to a complete stop. Any entity that cannot be brought to a complete stop by applying an equal and opposite momentum cannot be relative. Light is not relative. Special Relativity does not hold true [2] and $e\neq mc^2$. So, one of the equations De Broglie relied on his derivation of particle wave, the $e=mc^2$ does not hold true since there no rest mass has kinetic energy.

As we have shown, Plank blackbody spectrum is cavity dependent, charge independent, and nearly zero since it is proportional to $h/c^3 \cong 0$, where $h=6.626(10^{-34})$ Joules second and $c=3(10^8)$ meters/second. As we have seen, Plank's derivation of blackbody spectrum is invalid; it does not represent a spectrum. When Plank's derivation of blackbody spectrum is invalid, Plank's assumption of energy quanta $e=hf$ no longer hold true.

Energy cannot come in quanta. All the energies are not created equal. Any entity with different varieties cannot come in quanta. If energy comes in quanta, there is no way of distinguishing electromagnetic energy from kinetic energy or potential energy. In addition, the relationship $e=hf$ does not apply to potential energy since potential energy has no associated frequency. Hypothetical energy quantum $e=hf$ requires an associated frequency. The energy quantum $e=hf$ has no physical meaning for an entity that has no associated frequency. Similarly, the kinetic energy of a mass on linear motion at constant speed does not have an associated frequency and hence cannot be represented by the energy quantum $e=hf$.

Lemma:

Plank's energy quanta $e=hf$ is invalid. There is no universal energy quantum. Energy is not quantized. Energy cannot be quantized. Any entity that comes in multiple flavors cannot come in a universal quantum.

Energy does not come in quanta. Energy cannot come in quanta. Without Plank's relationship $e=hf$, de Broglie wavelength or particle wave has no existence. Since $e\neq mc^2$ and $e\neq hf$, de Broglie wavelength is DOA (Dead-On-Arrival). Quantum Mechanics has no existence without de Broglie wavelength. Bohr atomic model has no existence without de Broglie wavelength even though Bohr model preceded the de Broglie

wavelength. Bohr Atomic model has no existence without Plank energy quantum e=hf. Plank energy quantum e=hf does not exist. Schrodinger equation in Quantum Mechanics is based on both de Broglie wavelength λ=h/p and Plank's energy quantum e=hf. Schrodinger equation has no existence without Plank's energy quantum e=hf. Schrodinger equation has no existence since potential energy has no associated frequency and cannot be represented by e=hf. Quantum Mechanics cease to exist since Plank spectrum is false and energy is not quantized, e≠hf.

The recurrent claim that Quantum Mechanics is experimentally proven is incorrect since the paused-time Quantum Mechanics cannot be proven by run-time experiments [3], it is not possible. Quantum bit or Qbit is simply an optical processor where both reflected and transmitted light burst exist simultaneously. There is no magic in it. Reflected and transmitted waves always exist simultaneously, and it has nothing to do with quantum superposition; it is not a quantum superposition. Quantum Computer is nothing more than an optical processor under the disguise of Quantum Mechanics. The so-called Quantum Bit (Q-Bit) is nothing more than an Optical Bit (O-Bit) There is nothing quantum about what is underneath the hood of the Quantum Bit or Quantum Computer. The name "Quantum Computer" is probably a good marketing strategy to influence unsuspecting buyers since Optical Computer does not sound as majestic as Quantum Computer.

There is no Spin-1/2. Spin is not quantized. Every Spin has two directions. Looking one from one direction, it appears "Up". Looking from the opposite direction, it appears "Down". It is not a Spin quantization. Spin is simply bidirectional. There is no 'Up' without 'Down' and vice versa. Stern-Gerlach experiment used to justify the spin quantization is simply an experimental misinterpretation [4]. Interference pattern on the double slit experiment for a beam of electrons is not a result of particles colliding with the screen.

Wheeler's laser splitter used to justify Quantum Mechanics has nothing to do with light quanta. It is simply a data misinterpretation. The reason why one detector measure peak while other detector measures nothing is simply the result of 90 degrees phase difference between two paths, nothing more. There are no light quanta in Wheeler's laser splitter experiment. Experiments that have been used for the justification of quantum mechanics are false, they are simply the observation misinterpretations, they are blind to the obvious.

This observation misinterpretation in Modern Physics is not limited to Quantum Mechanics. It is the same for the experiments used to justify the Special Relativity and General Relativity. It is the misinterpretation of experiments that have been used again and again to falsely claim that the Quantum Mechanics, Special Relativity and General Relativity have been proven experimentally even though nothing is proven experimentally.

There is no gain for disproving. As a result, experiments have been misinterpreted to make false claims in Quantum Mechanics, Special Relativity and General Relativity. Quantum Mechanics, Special Relativity and General Relativity have never been proven and cannot be proven. Repeated claims that they are proven does not make them proven. People who claim that Quantum Mechanics is proven are blind to the facts. The need to be blind to the facts is a part of the job description.

XXVI. LIGHT HAS NO MOMENTUM

In Modern Physics Plank and Einstein forced a hypothetical momentum on light without any regard to its applicability, reality, or its adverse consequences. Generations after them, followed the false unsubstantiated claim that the light has a momentum religiously to this day even though massless cannot have a momentum. Forcing a nonexistent momentum on light is one of the biggest mistakes in physics. It does not matter how big a genius you are; you cannot force a momentum on any entity that cannot be stopped. It is not possible. If an entity has a momentum, you must be able to stop it by applying equal and opposite momentum and also it must be able to undergo a change in momentum. For an entity to be relative, that entity must have a stand still existence. Light has no standstill existence. Light cannot be relative.

Any entity with momentum must be able to be stopped. Any entity that can be stopped is relative. Relativity applies to masses. Motion of masses is relative. Relativity does not apply to massless. Light has no mass. Mass exists without momentum. Momentum is not necessary for the existence of mass. However, momentum has no existence without a mass. Although the generation of the electromagnetic waves requires a mass, once generated, electromagnetic energy has no association with a mass. Electromagnetic energy cannot define momentum or a mass since it has no association with a mass. If you divide electromagnetic energy by the speed of light what you get has no connection to any reality, simply meaningless.

If light has a momentum light must be able to be stopped by applying an equal and opposite momentum. Light has no standstill existence and hence cannot be stopped from propagating. There is no standstill light. Light has no mass. Massless light propagates. Propagating entities have no momentum. Any entity with momentum cannot propagate. On the contrary, Masses don't propagate, they move. Masses on motion have momentum. Propagating entity has neither a mass nor a momentum. Light has no momentum.

The claim that coherent directional light consists of spatially random particles or light quanta simply defy the logic. If light comes in light quanta, there must be a header associated with each light quantum telling them how to assemble themselves to one unique whole. Nothing can come in quanta unless each quanta contains a set of instructions indicating how

the quanta can be assembled into one unique whole. Nature has no mechanism to incorporate such instructions in light quantum or in any quantum. Assume what the internet would be if data quanta on the internet do not have headers; there will be no internet. It is the same with light. If light come in light quanta without headers, there will be no light as we know of. What is there would be a random glow in space.

Any entity with momentum will collide. Any collision of momentum will lose energy. If light has a momentum, it cannot act any differently than a momentum of a mass would. If there is a massless momentum, massless momentum cannot act any differently than a momentum of a mass. If the loss of energy leads to the loss of momentum and slowing down for a mass, there is no reason it to be any different for it to be for massless momentum. Momentum does not carry a sign that it is a massless momentum or a momentum of a mass. There is no reason for a special treatment for massless momentum. If we expect massless momentum to behave differently in an energy loss from a momentum of a mass, then, the assumption that the massless has a momentum must be wrong.

You cannot bring massless light into Newtonian mechanics by artificially redefining LaGrange. LaGrange does not apply to massless. Just by artificially medaling with LaGrange, you may be able to pretend to give light a momentum on paper, but not in reality. Einstein gave light a momentum by proclaiming that light is relative in Special Relativity. You cannot give massless a momentum by proclamation. Momentum is a property that only a mass can possess. Nothing can exert a force on light. It is the light that can exert a force on charge particles. Momentum is a property of mass in motion. Momentum is not a property of propagation of light. Propagation of light has no momentum. There is no motion in propagation of light. There is no motion or variation in propagation of light in the direction of propagation. It is a light burst that moves relative to us not the propagation of light [6].

If light has a momentum, light can accelerate. Any entity with momentum can accelerate and all that is required for that is a change of momentum. Momentum can be changed irrespective of what possesses it. Any entity with momentum is affected by a force. Any entity with a momentum on a linear path cannot remain at constant speed in the presence of a gravitational force. Light has no momentum. Light is not affected by gravity. Propagation of light is affected by medium. The density of a medium is affected by the presence of a gravitational object. It is the medium that is warped by a gravitational object, not the space. Space cannot be changed by any mean. There is no warped space. The term ‘warped space’ is meaningless. What is there is warped medium. Changing the density of the medium changes the path of light. The effect of gravity on light is a secondary effect due to the change of the density of the medium with distance in the presence of a gravitational object. It is the medium that mediates an interaction between the light and gravity. Gravity has no effect on light in a vacuum and vice versa. Gravity and light are mutually independent.

Light has electromagnetic energy. A mass with momentum has mechanical energy. Electromagnetic energy and mechanical energy are not the same. Electromagnetic energy is simply the measure of wave strength and has no association with momentum, kinetic energy, temperature, or entropy. If you have electromagnetic energy e, it is not equal to momentum times speed of light, $e \neq pc$. If you first convert the electromagnetic energy e into mechanical energy e_M, it is then that you can represent e_M as the product of momentum p times the speed v and hence $e_M=(1/2)pv$. The conversion of one type of energy into another type of energy is never a hundred percent. The ability to convert one type of energy into another type does not mean you can treat all the energies as the same and represent them by one universal energy quantum. There is no one universal quantum that can represent all different types of energies. Speed of a mass is not limited by the speed of light. A mass cannot start at the speed of light. As a result, $e \neq mc^2$. Light is not relative [2] and hence $e \neq mc^2$. When light is not relative, no rest mass can have kinetic energy or rest energy $e=mc^2$. A rest mass does not have speed c relative to light since light is not relative and hence $e \neq mc^2$.

Light has no mass. Light has no momentum. Light has no thermal energy. Light has no entropy. Modern Physics is a result of forcing an artificial momentum on light and the representation of light as hypothetical photon or light quanta. Light does not consist of spatially random light quanta or photons. If light comes in particles, light will be in a total disarray; there will be no coherent light. Light does not propagate in a medium or on a moving frame [7]. Light propagates in empty space. Speed of light is determined by the vacuum. It is only that the speed of light is affected by a medium, not determined by a medium. We cannot see the propagation of light waves. What we see is the motion of light bursts. It is the path of light that moves relative to a moving observer, not the light itself just as it is the train track that moves relative to a moving observer, not the train itself. The propagation or motion of an entity on a fixed path in the vacuum and in a medium is unaffected by the motion of an observer. It is a burst of light waves that is relative, not the propagation of light waves. Propagation of light is not relative. Relativity of light is no different from the relativity of a train or a bulldozer. The motion of a fixed path relative to a runner is no different from the motion of a mountain relative to a runner [6].

XXVII. **WHAT IS WRONG WITH** $e=mc^2$

When someone demonstrates that there is a problem with Special Relativity, experts retorts that they have those questions because they do not understand the Special Relativity, and they should study the Lorentz Transform if they want to

understand the Special Relativity. If someone demonstrates a problem with Lorentz Transform, they keep quiet. It appears that it is the experts who do not seem to understand the Lorentz Transform. If you consider Special Relativity is real, you must be able to show that the Lorentz Transform is unique. If Lorentz Transform is not unique, Special Relativity cannot be real. Lorentz Transform is not unique [2].

Lorentz Transform is not a mechanism of nature. Lorentz Transform maintains the propagation speed of the Transverse Electromagnetic (TEM) waves a constant c. However, in the process of making light to propagate at constant speed c on a moving frame, it generates Shear Electromagnetic (SEM) waves. The speed of the SEM waves c_s depends on the speed of the frame of reference. As a result, the speed of the light is not in fact a constant if Lorentz Transform holds. To make the speed of light to be a constant on a moving frame, in the hindsight, Lorentz Transform makes the speed of light dependent on the frame of reference. Modern Physics has been blind to this fact.

In special Relativity, there are two equations that Einstein pushed into the closet [2]. These two equations in the closet represent the Shear Electromagnetic (SEM) waves. It is not just the Lorentz Transform that can transform light onto a moving frame. There is a General Transform that transforms propagation of light from frame F(x,y,z,t) on to a moving frame F'(x', y',z',t',v) and it is given by,

$x'=\eta^n(x-vt)$

$t'=\eta^n(t-xv/c^2)$

where, $\eta=1/(1-v^2/c^2)^{1/2}$, n is any integer or any real number, v is the speed of the inertial frame F' relative to frame F.

Falsely assuming light is relative and applying the Lorentz Transform to the propagation of light, we also inherit two equations that had been pushed into closet and no one has paid any attention to,

$-\eta(v/c^2)\partial E_x/\partial t'+\eta\partial E_x/\partial x'+ E_y/\partial y'+ E_z/\partial z'=0$

$-\eta(v/c^2)\partial B_x/\partial t'+\eta\partial B_x/\partial x'+ B_y/\partial y'+ B_z/\partial z'=0$

where, $\mathbf{E}=(E_x,E_y,E_z)$ and $\mathbf{B}=(B_x,B_y,B_z)$ are the electric field and the magnetic flux density respectively.

These two equations are present in the Special Relativity. Einstein decided to hide them in the closet either because he was fully aware of their negative consequences to his Theory of Special Relativity that he was trying to introduce, or he did not foresee the consequences of those two equations and thought them as a useless byproduct of doing business.

These two equations are a contradiction to the Special Relativity. These two equations defeat the goal and the basic premise of Special Relativity at its very foundation. These two equations represent Shear Electromagnetic (SEM) waves that propagate at a speed that is dependent on the frame of reference, which is a clear indication that the light cannot be relative [2].

If light is relative, it generates Shear Electromagnetic (SEM) waves that propagates at a speed that is dependent of the frame of reference. The speed of SEM waves depends on the frame of reference. If one wants to see why Special Relativity and General Relativity fail, all one must do is just peak into Einstein's closet.

When n=1, the General Transform is equal to the Lorentz Transform. Since n can take any value, the transformation of electromagnetic waves or light from one frame to another inertial frame is not unique. As a result, the relative time t' is not unique. The spacetime is not unique. When spacetime is not unique, Special Relativity and General Relativity are not unique. In addition, if light propagates relative to a moving frame, relative time is directional. The relative time in Special Relativity and General Relativity are directional.

Since Lorentz Transform is not unique, light cannot be relative. When light is not relative, a rest mass m cannot have kinetic energy $e=mc^2$ relative to light and hence the relationship becomes meaningless. If light is relative, there are also Shear Electromagnetic (SEM) waves that is to be considered. In this case, a rest mass has a speed c relative to Transversal Electromagnetic (TEM) waves and the rest mass also has a frame dependent speed c_s relative to the Shear Electromagnetic (SEM) waves. As a result, even if light is falsely assumed to be relative, the rest energy of a mass relative to light is no longer a constant since the speed of SEM waves depends on the frame of reference.

Einstein's famous equation $e=mc^2$ simply the hypothetical kinetic energy of a stationary object of mass m relative to the propagation of light at the constant speed c. It assumes that relative to light, a mass is moving at speed c in the opposite direction to the direction of light giving the mass m the hypothetical kinetic energy $e=mc^2$. The kinetic energy of a mass relative to the propagation of light is $e=mc^2$. Usually, the kinetic energy of a mass moving at speed c should be $e=(1/2)mc^2$ not $e=mc^2$. However, since the speed of light is a constant c from the start, a rest mass m is moving at constant speed c relative to the propagation of light in the opposite direction from the start even though it is unthinkable for any rest mass to start at a nonzero speed. If I am stationary in the vacuum, I am not moving at speed c relative to the light and hence I do not have a rest kinetic energy e equal to mc^2. The rest kinetic energy of a mass is an oxymoron.

We cannot see the propagation of electromagnetic waves, and as a result propagation of light is not relative. What we see is the motion of light bursts. Motion of light bursts is relative. Propagation of light is no different than the motion of a train or the motion of a Bulldozer except light is massless. Light propagates on a track that is fixed in the vacuum and in a medium. The speed of propagation and the direction of propagation are fixed in the vacuum and in a medium. Any entity that travels on a track that is fixed in the vacuum and in a medium cannot be relative. The speed of a train on its fixed track is observer independent. The speed of light on its fixed track is observer independent. The speed of a Bulldozer on its fixed track is observer independent [6]. It is the track that moves unaltered relative to an observer, not the train. The unaltered motion of the fixed path of light

relative to a moving observer is no different from the motion of a mountain relative to a runner. Relativity applies to every entity equally. No Special Relativity is there in nature.

If an observer is riding the light, observer sees that the stationary mass m is moving at speed c from the start and hence kinetic energy of a stationary mass relative to the propagation of light is $e=mc^2$. This itself shows that there is something quite wrong in taking a speed of mass relative to a massless light wave. That mean, there is something inherently wrong in Special Relativity that assumes light to be relative. The assumption that it is possible to obtain the speed of a rest mass relative to light and that relative speed of the rest mass m is the constant c is false. So, $e=mc^2$ has the inherent assumption that light is relative. For the light to be relative, light must have a mass. However, any entity with a mass cannot propagate. Masses move. Masses cannot propagate. Speed of a mass cannot be obtained relative to light since light has no existence without propagation.

For an entity to be relative, that entity must be able to be brought to a holt by applying equal and opposite speed or a momentum. Light has no momentum and cannot be brought to a holt by any means and hence nothing can be observed relative to light. Light propagates on its fixed track in the vacuum and in a medium independent of the observers. For any observer, speed of light on its fixed track is a constant irrespective of whether the observer is moving at constant speed or at an acceleration.

Ubiquitous relationship $e=mc^2$ is not real, it is hypothetical. Relativity does not hold for massless. It is only the motion of masses that are relative. For $e=mc^2$ to hold true, the propagation of light must be relative. Propagation of light is not relative [2]. Light has no existence without propagating at the constant speed c. For any entity to be relative, that entity must be able to be stopped by applying equal and opposite momentum. Light has no momentum. If light has a momentum, light must be able to be brought to a complete stop by applying equal and opposite momentum. Light has no stand still existence and hence nothing can move relative to light. Momentum-less cannot be relative. Massless cannot have a momentum. You cannot make light to stop propagating even hypothetically since light has no existence without propagating. If you cannot stop light propagating even hypothetically, no mass can have a speed c relative to light. Without a mass having speed c relative to light, there will be no rest kinetic energy $e=mc^2$ for a rest mass m.

Any entity whose speed is determined by the vacuum and affected by the medium cannot be relative. The speed of light is determined by the vacuum and affected by the medium. Massless cannot be relative. Only the motion of masses is relative. Light is not relative. The Lorentz Transform that the Special Relativity based on is not unique [2]. You cannot transform propagation of light onto inertial frames. Light does not propagate on inertia frames or in a medium. Light propagates in the vacuum [7]. It is only that the propagation of light is affected by a medium. Special Relativity does not hold true. Spacetime is not unique [2]. Any entity that travels on a track that is fixed in the vacuum and in a medium cannot be relative.

Entities such as relative time and spacetime that are not unique are hypothetical and have no existence in nature, they are not real. Since light is not relative, the relationship $e=mc^2$ is meaningless. A rest mass cannot have kinetic energy that is determined by its speed relative to the light propagating at speed c, and hence $e\neq mc^2$. A mass cannot have a rest kinetic energy relative to light. You cannot ride the light since it is not possible to get on to light. To get on to light, light must be able to be stopped. Light does not have a standstill existence. There is no rest kinetic energy. Rest kinetic energy is an oxymoron. When $e\neq mc^2$, de Broglie's particle waves cannot even have a hypothetical existence; it fails at its inception. As we have seen, Plank spectrum is invalid, and Plank's quantized energy assumption no longer holds true, and hence de Broglie's particle waves have no existence.

Dark matter is a result of speed under estimation. In the case of a planetary orbiting system, masses of the planets are negligible with respect to the mass of the sun and hence the gravitational interaction due to masses of the planets can be disregarded. Kepler's laws apply for planetary orbiting systems. However, Kepler's laws do not apply for orbiting star systems and for orbiting galactic systems since the interactions between the orbiting stars and orbiting galaxies are not negligible. If the interactions between the orbiting stars in an orbiting star system and the interactions between orbiting galaxies in an orbiting galactic system are not accounted for, it will lead to speed underestimation. It is the speed underestimation that gave the need for dark matter [5] to explain the discrepancies between the estimated speeds and the observed speeds of stars. There is no need of Dark matter. There is no Dark matter. Universe cannot expand. Space cannot expand. Space expansion is result of experimental observation misinterpretation. There is no need for dark energy when universe cannot expand. Space cannot expand. It is the matter that can expand, not the space itself There is no Dark energy. We cannot make the space expand by the misinterpretation of observations.

a) **Universe is Solely 3D (No More, No Less)**

It is also noteworthy that 1-Dimension has no independent existence. 1D has no existence without 3-Dimensional space. Similarly, 2-Dimension has no independent existence. 2D has no existence without 3-Dimensional space. On the other hand, 3-Dimensional space does not require 4^{th} Dimension of higher n^{th} Dimension nD, where n>3, for its existence. 3-Dimensional space has solely independent existence. So, 3D is the optimal dimensions for the space. Any more is not needed. Any less has no existence.

Dimensions are mutually orthogonal. No dimension can curl up into a loop without trespassing into other dimension, which is prohibited since dimensions are mutually orthogonal. A dimension that is curled up itself into a loop cannot be a dimension. There are no curled-up dimensions. A dimension cannot be curled up. The curled-up dimensions in string theory cannot be real; it is a self-contradiction.

Time is a moment, a point, not a dimension. We should be able to move back and forth if it is a dimension. It cannot be a dimension if we cannot move back and forth on it. We cannot move back and forth on time. Time is not an axis. There is no 4^{th} dimension. There is 3-Dimensional Space. There is time that we have defined. Space and time are not interdependent. Space and time are mutually independent. There is no spacetime as such. There is 3D space. Then, there is the time we have defined.

Gravity cannot warp the space. It is the medium that is warped by gravity, not the space. It is this warped medium near a gravitational object that makes light bend. Bending of light near a gravitational object is not a direct action of the gravity on light, it is an indirect action of gravity on light through a medium. Gravity warps a medium. A warped medium bends light. Einstein's theoretical prediction about the bending of light near a gravitational object using General Relativity and Arthur Ellington's conclusions based on the observations of the bending of light near a gravitational object are incorrect. Gravity cannot bend light in a vacuum. Gravity cannot warp space. Gravity warps the medium around the gravitational object. Space cannot be altered. Space cannot be warped. Universe is 3D, Nothing more, Nothing less.

b) **General Relativity Cannot be a Gravitational Theory of Nature**

The principle of gravitational theory for an object of mass must also explain the electric field of a mass with a charge since there is no charge without a mass. They must have the same underline process since mass and charge are inseparable. So far, Newton's gravitational field theory is the only one that applies equally to both gravitational field of a mass and the electric field of a mass with a charge.

The gravitational field based on Einstein's General Relativity does not apply to the electric field of a mass with a charge. If mass warp the space independent of the charge, then space warping theory does not explain the electric field of the same mass with a charge since the presence of charge does not alter the warping of the space. Nature does not invent two different mechanisms for the gravitational field of a mass and the electric field of the same mass with a charge. General Relativity cannot be a viable option for the basis of gravity. In addition, the concept of matter warping the space meaningless. Matter can only affect other matter, not the space or propagation of light or electromagnetic waves in general. Light cannot propagate at constant speed on geodesic. Light propagates on a linear path in the vacuum. The concept of curved space is meaningless. Speed of light has no effect on gravity or the motion of any object. Any entity can travel faster than light.

c) **Light Cannot Propagate Under General Relativity**

In general Relativity, light must follow the curvature of the space, if such thing called curvature of the space exists. On the other hand, light also must follow the curvature or the density gradient of the medium. As a result, the density gradient, and the curvature of the spacetime must be the same for light to follow the same path. The so-called curvature of the space in General Relativity cannot be anything other than the curvature of the medium surrounding a gravitational object. The warping of spacetime is nothing more than the warping of the medium. In the absence of a medium, there would be no warping.

The diffraction of light near a gravitational object cannot be anything more than the diffraction of light by the density gradient of the medium in the presence of a gravitational object. If the space is curved, propagation of light is not possible. Electric and magnetic fields of an electromagnetic wave are present in space. Electromagnetic waves propagate by periodically exchanging the energies between the conjugate pair of electric field and magnetic field. The electric and magnetic fields must be linear in space for the propagation of conjugate field pairs. If the space is warped, the electric and magnetic field pair is no longer linear in space and hence do not represent conjugate pair of fields that can propagate. Light cannot propagate under General Relativity. General Relativity cannot be a mechanism of nature since the spacetime is not unique. Spacetime is not unique since Lorentz Transform that the spacetime is based on is not unique.

XXVIII. TIME IS NOT RELATIVE

The relative time is inherent in Lorentz Transform. Lorentz Transform is not unique [2]. There are infinite Lorentz Transforms that can transform maxwell equations on to a moving frame of constant speed. When the Lorentz Transform is not unique, the relative time is not unique. When Lorentz Transform is not unique, the spacetime is not unique. When spacetime is not unique, General Relativity is not unique. When relative time is not unique, Special Relativity is not unique. Any phenomenon that is not unique cannot be a phenomenon of nature.

Lemma:

Light cannot propagate relative to an inertial frame if light does not know what Lorentz Transform to use since there are infinitely many Lorentz Transform available.

Lemma:

Light cannot be transformed onto an inertial frame. Light propagates neither on an inertial frame nor in a medium. Light propagates in the vacuum. Propagation of light is affected by a medium. Propagation of light is not affected by an inertial frame.

A clock is an engineered device for measurement of time. The display on a clock depends on the environment the clock is operated on. Just as any other engineered device, a clock displays the correct time when the clock is in an environment that it is designed to give the correct time or when the clock is in an environment that it is calibrated for. If you want to use a clock in a different environment from the one that it is designed and calibrated for, then, the clock must be re-calibrated for the new environment for the correct display of time.

A clock is no different from a ruler. Ruler is an engineered device for the measurement of distance. A clock does not determine the passing of time just as a ruler does not determine the distance. We use the clock to measure the passing of time just as we use a ruler to determine the distance. It is not the entity that is being measured that varies with the environment it is being measured, it is the measuring instrument that varies with the environment that it is in. The distance itself does not vary with the temperature. It is the length of an object that varies with the temperature. It is not the time that varies with the speed and gravity. It is the clock itself that is affected by the speed and gravity. The ticking of a clock and time are synonymous only when the clock is calibrated for the environment the clock is in.

If the clock has been calibrated to give the correct value when the clock is at standstill and we want to use the clock to measure time on a moving train, then, we must re-calibrate the clock for the moving train environment. If we have calibrated a clock to measure the time on earth's gravity and we want to use the same clock on another planet with different gravity, then, we must re-calibrate the clock for the new planet's gravity. It is not the time that varies with the speed and gravity, it is the display of the clock that varies with speed and gravity. The display of a clock does not indicate time unless it is calibrated for a particular setting. It is we who gives a meaning to the display of a clock. Display of a clock itself has no meaning until we give a meaning by calibrating the clock to the environment the clock is in.

A clock is not a clock and has no meaning without the manual. A clock is not a clock and has no meaning for somebody who has not read the manual. A clock is not a clock and has no meaning for a baboon. How can a clock be anything other than a chunk of mass for a gravitational object? Gravity affects a clock as a chunk of mass, nothing more. If we calibrate a clock to represent correct time for the gravitational field the clock is in, it is then that the display of the clock has a meaning; it is then the display of the clock represents our definition of time. Without our calibration of the clock for a given environment, the display of a clock does not represent time.

If we have clock on a moving train on linear path at constant speed v, then, for the clock to represent correct time, we must first calibrate the clock for that environment. It is our fault if the clock gives the wrong time on a moving train because it is our duty to calibrate it before we use it. It is our fault if the clock gives the wrong reading on the Jupitar because it is our duty to calibrate it for the Jupitar's gravity before we use it there. We engineered the clock. We must calibrate it for the environment that the clock is operated on for it to indicate the correct time. Our use of a clock to measure the time is no different from our use of a ruler to measure the distance.

It is not the time that is relative, it is the measuring device that is relative. It is not the distance that is relative, it is the measuring device that is relative. It is not the time that is affected by gravity, it is the measuring device, the clock, that is affected by gravity. If we are going to use a clock in a different environment from the environment that it is calibrated for, then, the clock must be re-calibrated for the new environment before we use it for the clock to indicate the correct time.

The claim that the Global Positioning System (GPS) is not possible without Special Relativity is false. GPS has nothing to do with Special Relativity. Special Relativity only applies for an object moving at constant speed on a linear path. GPS satellites do not move on a constant speed on linear path. Special Relativity does not hold true since Lorentz Transform is not unique [2]. Lorentz Transform does not apply for orbits, it applies only for linear paths. Light is not relative. Massless cannot be relative. Time is a definition. Time has no real existence. Time is not relative. Mass is not relative. It is only a moving mass that is relative. Speed of light is not relative and that is the only statement that is correct in Lorentz Transform and Special Relativity.

Speed of light is not relative because light propagates on a path that is fixed in the medium and can only be altered by a medium. Any entity that travels on a fixed track in the vacuum and in a medium is independent of the motion of an observer. No Special Relativity is required for the propagation of light. Relativity of light is no different from the relativity of a train or the motion of a mountain relative to a runner. When there is a fixed path in the vacuum or in a medium, it is the fixed path that moves unaltered relative to a moving observer, not an entity travelling on the fixed path. State of an entity on a fixed path in the vacuum and in a medium is independent of any observer [6].

Time does not have to be relative for the speed of light to be observer independent [6]. Light does not propagate in a medium or on a moving frame. Light propagates in empty space [7]. It is only that the propagation of light is affected by a medium, not determined by a medium. The speed of light is affected by a medium. The path of light is affected by a medium, not determined by a medium. When light is propagating in a medium, if we pulled out the medium, the light does not move with the medium. Light remains in space it is propagating, even when we pulled out the medium, is an indication that the light does not propagate in a medium.

Massless cannot be relative. For an entity to be relative, that entity must have a standstill existence. If we can stop it, it is relative. If we cannot stop it, it is not relative. We can stop a moving mass and hence a mass is relative. We cannot bring light to a standstill since light has no existence without propagation. Light is not relative. If there is an entity that is not relative, no other entity can move relative to the entity that is not relative. Light is not relative and hence no other entity moves relative to light. No stationary mass has the speed -c relative to light propagating at speed c and hence a mass has no rest energy. Light does not propagate relative to a moving frame. Any entity with momentum must be brought to a standstill by applying equal and opposite momentum. Light cannot be brought to a standstill by any mean and hence light has no momentum. Propagation of light is not relative.

We cannot see the propagation of electromagnetic waves. What we see are the moving light bursts. Moving light bursts are relative. Moving light bursts are not governed by the Maxwell equations. It is the propagation of light waves, which we do not see, that is governed by the Maxwell equations. Although the speed of propagation of light waves must be a constant in the vacuum, the speed of motion of light bursts does not have to be a constant. Speed of motion of light bursts is relative. Light propagates on a fixed track in the vacuum and in a medium. Speed of light on its fixed track is a constant. Propagation of light cannot be relative. Motion of light bursts is relative [6].

Measuring instrument does not determine the measured. Time is not determined by a clock. Time is determined by how we defined it. A clock just measures the time. A ruler does not determine the distance. The distance itself is not affected by what affects the ruler. It is the display on the ruler that is affected by what affects the ruler, not the distance itself. Time itself is not affected by what affects the clock. It is the display on the clock that is affected by what affects the clock, not the time itself. A ruler just measures the distance. A clock just measures the time that we defined.

Moving frame does not slow down time, we just forgot to recalibrate clock for a moving frame. Gravity does not slow down time, we just forgot to recalibrate the clock for the new gravity. It is a clock that is affected by motion, not the time itself. It is a clock that is affected by gravity, not the time itself. It is a clock that is affected by battery, not the time itself. Two consecutive ticks on a clock determine a second if we calibrate it to be a second. It is we who defined a second as two consecutive ticks on a clock for a given environment. Two consecutive ticks on a clock do not determine a second until we define it for that environment. There is no time in an atomic clock unless we define certain number of atomic vibrations as a second. Atomic vibrations did not come with a definition of time attached. Display of a clock did not come with the definition of time attached. Ruler did not come with definition of distance attached.

A clock runs slow if the battery is weak. We do not go on claiming that the time is dependent on the battery. Instead, we just replace the battery to get the correct time. So, instead of going on claiming time depends on speed and gravity, if you want the clock to give the correct time on a moving train or on the Jupitar or on any other planet, you should recalibrate the clock for the new speed and the gravity for the clock to display the correct time. Our inability to synchronize clocks that we engineered to measure the time we have defined and the measuring instruments in general we engineered do not determine the laws of nature. Observers do not determine the laws of nature. That is the real mishap in Special Relativity.

"*Time is not determined by clocks just as distance is not determined by rulers. We use clocks to gauge time just as we use rulers to gauge distance*. *Clocks do not display the correct gauge unless the clocks are calibrated for the environment clocks are in*"

XXIX. **EPITOME**

If you just want to know convincingly why Plank spectrum is wrong, it is rather simple. All you must do is simply see what happens to the Plank spectrum when the temperature T is extremely high or approaches infinity. Plank spectrum becomes unbounded when the temperature is high. Correct blackbody spectrum must be bounded for any temperature and for any frequency for an infinite span. Plank spectrum is not a spectrum. When the Plank spectrum is invalid, the assumptions that had been made in the derivation of the spectrum no longer hold. There are no energy quanta without Plank Spectrum. There is no justification for Quantum Energy without Plank spectrum. There has never been a theoretical foundation for Quantum Energy.

That is not the only reason why Plank spectrum is incorrect. As we have seen, there are many other reasons why Plank spectrum is incorrect. We have shown why Plank spectrum is incorrect, why Einstein's light quanta is both mathematically and conceptually invalid, why Lenard's photoelectric experiment is incomplete, and conclusions are incorrect. We have shown how to derive the correct blackbody spectrum without the assumption of quantized energy.

Without any argument, we all can agree that some of the claims in physics in the twentieth century are mysterious and contradict the reality itself. Physics seem to have steered more and more away from the reality into the realm of mysterious in the dark ages, which only sorcerers and mystery writers appreciate, not anyone with logical mind set. If someone says particle can be at multiple places simultaneously, a decent question that arises is "are you OK?" Physics has turned into a mysterious religious cult living in the confine of the dark ages. This is indeed a contradiction to physics itself. Some of the such unrealistic mystical claims include but not limited to, particle waves, wave particles, light momentum, light

entropy, particle going through two slits simultaneously (surprisingly, some scientists have no hesitation or shame in saying that), cat being both alive and dead simultaneously (that is reaching the level of insanity), a particle being at multiple states simultaneously (they don't appear to have any shame in declaring that publicly), ability to change the state of a particle instantly by changing the state of another particle a half world away (this is really magic; what is even surprising is the misinterpretation of experiments to justify it; do they think anybody with a logical mind is going to believe that?), and relative mass. In the case of relative mass, nowadays, everybody reluctantly seems to accept the reality that there is no such thing called relative mass. Until this acceptance, it was considered that the relative mass was conserved. However, now, in the absence of a relative mass, mass must be conserved. The conservation of mass goes against Special Relativity. In Special Relativity, it is the relative mass that is conserved. In the absence of a relative mass, the mass must be conserved, and as a result, Special Relativity cannot hold true.

There are claims in textbooks that two entangled particles that are half-world away can interact with each other instantaneously. How mysterious? They use the spin of particles to justify that. For some unknown reason, most of the textbooks go so far as to claim that the Stern-Gerlach device can be used to set one of the x, y, z components of a spin of a particle to a desired direction. This is not possible. No component of a spin can be set to a desired direction by using an external magnetic field. The z component of a spin cannot be set to a desired direction by using an external magnetic field. It is the same for x component or y component of the spin. No difference. It is the total spin that is aligned with an external magnetic field, not a component of the spin. Setting of the total spin of a particle or atom with an external magnetic field is volatile, no permanent setting of the spin to a desired direction is possible [3].

Lemma:

It is the total spin that is aligned with an external magnetic field, not a component of the spin. Alignment of x, y, or z component of a spin with an external magnetic field is not possible.

There is no permanent entanglement of particle spins. Magnetic couplings of the spins are local. The spins of two particles can only be entangled when they are in the Stern-Gerlach device. Once they are taken out of the device and separated, the correlation of the spin or the entanglement is no longer retained. We need to revisit all the mysterious experimental claims and re-evaluate the results carefully, objectively, putting aside the mysterious explanations.

Unrealistic claims in physics also include relative time, gravity slowing time, gravity bending light, speed dependent aging, expanding space, expanding universe, accelerating universe, gravitational waves, LIGO's claim that real gravitational waves were detected (What is the direction of arrival of the presumed gravitational waves detected by LIGO in 2015? What is the direction of the simulated gravitational waves used as a test signal prior to the system being commissioned? Are they different? What is the chance of receiving a gravitational wave from the same direction as the direction of the simulated signal used to test the system prior to the system being commissioned? What does it say about the LIGO? Gravitational waves are fantasy waves, a single field cannot propagate, it needs two to tango), quantum fields (vectors cannot come in quanta), the claim that the position and momentum represent a Fourier Transform pair (position and momentum do not represent a Fourier Transform pair), many worlds, multiverse, and many more. These claims sound more like voodoo-physics than physics. These claims appear to many as science fiction than science. They appear as teaching of a religious cult rather than science. These are just religious beliefs. Modern physics is built around few religious beliefs. The foundation of Modern Physics, especially the quantum mechanics, cosmology, Special Relativity, and General Relativity lies in the Lorentz Transform and the Plank's quantum energy assumption in the derivation of blackbody spectrum. Although the energy quanta are everywhere in Modern Physics, there has never been a theoretical justification to the quantum energy assumption e=hf. As we have seen, Plank Spectrum is incorrect and hence energy is not quantized, e≠hf.

So, instead of arguing the validity of some of the unrealistic claims, the most appropriate thing to do is to revisit the early years or the genesis of Modern Physics and ask the question, what steered the twentieth century physics in such an unrealistic direction prompting such claims? The answer is clear. It started in two fronts. One is the Einstein's Special Relativity and General Relativity grounded on Lorentz Transform under the assumption of relative time and spacetime. The other is the Plank's introduction of energy quanta for his derivation of blackbody spectrum. So, if we want to get into the truth of those unrealistic claims, we must revisit the Lorentz Transform and Plank's derivation of blackbody spectrum for their validity. That is exactly what we did.

We have already explored what went wrong in Special Relativity in [2]. For the Special Relativity to hold, the Lorentz Transform must be unique. Lorentz Transform is not unique and hence the Special Relativity does not hold true. In addition, if Special Relativity holds true, speed of light will no longer be a constant since Special Relativity leads to Shear Electromagnetic (SEM) waves that depends on the frame of reference. Einstein either failed to realize this fact or he just avoided this dilemma by pushing it into the closet and keeping quiet about it. Special Relativity is simply a mathematical fantasy, not a reality. It sure has mathematical fancy and voodoo mystique that appeal to many. It has even become a new-gold mine for some physicists who have transformed themselves to mysterious physics-fiction

books writers (free of math) for the consumption of general-public. It surely is an acquired skill.

So, what is left to explore is the other front, Plank's derivation of blackbody spectrum and its associated assumptions that led to energy quanta. Max Plank, in his effort to find a matching function for the experimentally observed blackbody radiation through a hole on a blackbody cavity, introduced the energy quantum e=hf in 1901. We have seen how the mysterious energy quanta started and what has gone wrong with the Plank's derivation of blackbody radiation. The quantum energy is not necessary for the derivation of blackbody spectrum. Plank's approach to the derivation of blackbody spectrum is incorrect.

To begin with, it is also important to ask the question, is there a meaning to a universal energy quanta e=hf since energy comes in several completely different forms? After all electromagnetic energy is different from kinetic energy. Kinetic energy is different from potential energy. All the energies do not have associated frequency f to express them in the form of energy quanta e=hf. Potential energy has no associated frequency f. Kinetic energy of a mass moving at constant speed has no associated frequency f. Electromagnetic energy has no momentum, kinetic energy, or thermal energy. The energy e=hf cannot represent all the energies since all the energies are not created equal and not all energies have an associated frequency. The e=hf is meaningless for potential energy; for potential energy e≠hf. It is this meaningless representation of potential energy as e=hf with non-existing f that has led to Schrodinger equation.

"*Schrodinger equation does not exist since potential energy has no associated frequency and hence cannot be represented as e=hf*."

Here, we have answered some of the questions. If e=hf cannot represent an energy quantum, what does it represent? What type of energy does e=hf represent, if any? Can there be a meaning to e=hf after all, without it being an energy quantum? Can there be a meaning to e=hf without a specific time interval? What is the time interval that gives the energy e=hf a meaning? Did Lenard design and carried out his photoelectric experiment correctly? Where did Lenard's photoelectric experiment and its conclusions go wrong? Is the Einstein's photon derivation correct? Where did Einstein's light quanta or photons derivation go wrong? To answer these questions, we had to rewind back to where the conception or rather the misconception of the energy quantum e=hf started. It was traced back to the work of Kirchhoff, Rayleigh, Jeans, Wein, and Plank in the late nineteenth century and early twentieth century on blackbody radiation.

The concept of quantum energy was originated as an assumption in the Plank's blackbody spectrum. For the quantum energy assumption to hold, Plank spectrum must be correct. Although the frequency function of the Plank spectrum is correct, Plank spectrum itself and its derivation are incorrect. Plank spectrum and all the rest of the blackbody spectra are based on a common foundation that is invalid. Einstein's derivation of photons or light quanta as a direct extension of the Plank's energy quanta for light is invalid both mathematically and conceptually. Energy cannot come in quanta. Light cannot come in quanta. Propagating waves cannot come in quanta. Individual wave bursts in light are not light quanta since a burst must be further divided into reflected and transmitted parts at a semi-transparent boundary. When Plank spectrum is incorrect, there is no ground for energy quanta and light quanta or photons to hold. Derivation of blackbody spectrum does not require a quantum energy assumption. Energy and light are not quantized.

There is no doubt that the blackbody spectrum must be a function of both frequency and temperature. In addition, since there is no radiation without a charge and there is no charge without a mass, blackbody radiation must also be a function of the charge and the mass of the charge. The total radiation energy per cycle, which is the area of the blackbody spectrum, must increase with the temperature. The area of the correct blackbody spectrum must be bounded for all frequencies at any temperature for the temperature span of infinity. The correct blackbody spectrum must also be bounded for all the temperatures at any frequency for the frequency span of infinity.

"*There are no electromagnetic waves without charges. There are no charges without masses. Therefore, there are no electromagnetic waves without objects of mass. There cannot be light without a mass. Mass cannot be a product of electromagnetic waves."*

"There is no kinetic energy without a mass. There is no potential energy without a mass. There is no electromagnetic energy without a mass. Energy has no existence without a mass. The energy cannot be the origin of the universe."

The area of the Plank spectrum is bounded for all the frequencies only for a finite band of temperatures. The area of the Plank spectrum is not bounded for all temperatures and for all frequencies as the correct spectrum should. Plank spectrum is unbounded for all frequencies at very high temperatures. In fact, Plank spectrum is nearly frequency independent at very high temperatures. Plank spectrum goes on increasing linearly with temperature without a bound at low frequencies. Nothing in nature can go on increasing without a bound. And hence, Plank spectrum cannot represent a blackbody spectrum. The correct blackbody spectrum must be bounded for all temperatures and for all frequencies for infinite spans. Plank spectrum and all the other blackbody spectra are fundamentally flawed in their verry foundation.

Blackbody spectrum must be a function of electric charge. Although all the blackbody spectra are

functions of temperature as they must, their temperature functions are incorrect. Neither the Plank spectrum nor any other blackbody spectra are a function of electric charge and hence their derivations are incorrect. There is no blackbody radiation without electric charges and hence the correct blackbody spectrum must be a function of electric charge. There is no electric charge without a mass and hence blackbody radiation must also be a function of the mass of the charge.

Blackbody spectrum must be independent of a blackbody cavity. If a blackbody spectrum depends on a cavity, it is an indication that the derivation is invalid even if the frequency function of the spectrum agrees with the observations. In addition, it does not matter how high the temperature of a blackbody is, the emitted radiation in both Plank and Rayleigh-Jeans spectra are nearly zero since they are inversely proportional to the cubic speed of light and directly proportional to the Plank constant, which is a clear indication that their derivations are incorrect ($h/c^3 \cong 0$).

All the blackbody spectra, Plank, Rayleigh-Jeans, and Wein depend on a cavity, unbounded in temperature, independent of charge, independent of the mass of a charge, almost frequency insensitive since they are approximately zero, and hence their derivations are invalid. The generation of blackbody radiation has nothing to do with the speed of light and hence the blackbody frequency spectrum should not be a function of speed of light.

Mistakes in the derivations of blackbody spectra are in their mode density-based foundation. Only reason they passed as correct is that they all have the correct frequency function within their respective frequency bands. However, the knowledge of the frequency function does not give us the underline physical process of the blackbody radiation. If you need just the frequency function that fits the observation, you can find the frequency function that matches the observation by simple least square fit. What we need is not just the frequency function, but the underline physical process that describes the observation. For that, we must derive the blackbody spectrum that describes the observations based on a theoretical foundation. This is where Plank spectrum and the rest of the blackbody spectra have failed. They all have the correct frequency function for their respective frequency bands for the wrong reasons. Their derivations are invalid and hence they have no use in describing the physical process that is generating the blackbody radiation.

Although the agreement of frequency function with experimental observations is necessary for a spectrum to be correct but not sufficient for the derivation to be valid. For the validity of the derivation of blackbody spectrum, spectrum must be cavity independent, charge and temperature dependent, and should not be inversely proportional to the cubic speed of light making it nearly zero. Further, the magnitude of the spectrum must increase with the temperature while the area of the spectrum, the energy, remains finite. Plank, Rayleigh-Jeans, and Wein blackbody spectra fail in all these aspects of requirement.

The only thing that is correct in the Plank spectrum is its frequency function. Plank spectrum got its temperature function wrong since Plank spectrum diverges without a bound for large temperatures. In fact, the Plank spectrum approaches infinity when temperature approaches infinity, which should not be the case if it is the correct spectrum. Plank spectrum is unbounded at very high temperatures. Plank spectrum is frequency insensitive or nearly zero since it is proportional to h/c^3, where c is the speed of light and h is the Plank constant.

If the Plank spectrum represents the blackbody spectrum, it should not be a function of the speed of light since the generation of the radiation by a blackbody has nothing to do with the speed of light c. Plank spectrum is cavity dependent, which should not be the case if it is the correct spectrum. Plank spectrum is charge independent, which should not have been the case if it is the correct spectrum since there is no radiation without a charge. Plank spectrum is independent of the mass of a charge, which should not have been the case if it is the correct spectrum since there is no charge without a mass.

The correct blackbody spectrum,

1. must be cavity independent,
2. must be a function of frequency,
3. must be a function of temperature,
4. must be a function of charge,
5. must be a function of the mass of an electron,
6. must be bounded for all frequencies for the span of infinity,
7. must be bounded for all temperatures for the span of infinity,
8. must be independent of the speed of light.
9. Should not be proportional to h/c^3 since it is approximately zero,

"*Plank spectrum is not a blackbody spectrum*."

"Rayleigh-Jeans and Wein spectra are not blackbody spectra."

There is no theoretical basis to Plank spectrum. Plank amended the Raleigh-Jeans spectrum to fit the experimental data using no-assumption-barred approach. Although the Plank's claim that kinetic energy of an oscillator comes in quanta e=hf appears as fabricated, the claim does not sound insane at first glance since any oscillating mass has an associated frequency f. However, that claim is clearly insane and meaningless for potential energy and for the kinetic energy of a mass moving at constant speed since they both have no associated frequency. Plank's claim is also meaningless for electromagnetic waves since they have no associated mass, momentum, or kinetic energy. The frequency f in e=hf is exclusively for an oscillator of a mass, nothing else. Schrodinger equation is meaningless under Plank's energy quanta since e=hf does not apply for potential energy;

potential energy has no associated frequency f. Mechanical potential has no associated frequency.

It is not possible to make a general claim that all energies are quantized based on Plank's arbitrary assumption that the kinetic energies of oscillating masses of frequency f are quantized since all energies are not outcomes of oscillating masses. Plank's energy quanta do not have any meaning for energies that do not involve an oscillating mass of frequency f. Plank's energy quanta do not apply for massless. It does not apply for light.

Energy comes in different flavors and as a result, energy cannot come in quanta. Nothing in nature can come in quanta since there is no mechanism in nature to assemble individual quanta into a unique whole. Any entity with a belonging cannot come in quanta since there is no mechanism in nature for quanta to carry belonging information. Plank's ad hoc quantum energy assumption is neither required nor valid for the derivation of blackbody radiation. For kinetic energy of a mass to be quantized, the velocity of the mass, which is a vector, must be quantized. Vectors cannot come in quanta. Nothing in nature, except matter, can come in quanta. Energy cannot be quantized without associated vectors being quantized, which is not possible.

Mode density of a harmonic n in a cavity cannot be obtained by counting all the integer nodes in a linearly laid spherical grid of radius n in the phase space. Every integer nod in the phase space is not an allowed mode. Allowed modes for a harmonic in a cavity are the solutions to the Pythagoras integer quadruples or extended 3D Fermont problem of second order. The number of allowed modes for harmonic n in a cavity is not proportional to square n or square frequency f as it was claimed, and hence the derivations of all the blackbody spectra are flawed.

The maximum number of modes for a harmonic and the maximum number of harmonics that a cavity can provide a home for say nothing about the actual number of modes and harmonics present in a cavity. There was never a blackbody catastrophe.

If we have a hotel, where the capacity of a room increases with the room number in an unspecified manner, the capacity (modes) of a room and the number of rooms (harmonics) in a hotel says nothing about the number of guests in the hotel. The same applies for a blackbody cavity. What is present in a blackbody cavity is whatever the modes and harmonics that have been thrown into it by the blackbody itself, and it is unknown. Counting the maximum number of modes of a harmonic a cavity can support says nothing about the blackbody radiation. You cannot count what is in a cavity since it is unknown and not directly accessible. What is observed through a hole on a blackbody cavity is not what is in the cavity. It is not possible to observe what is in a blackbody cavity through a hole on the cavity.

Although the spectrum inside a closed cavity is discrete, the spectrum through a hole on a cavity is continuous. What is coming out of a hole is not limited to the discrete frequencies present in a closed cavity. All the frequencies that are generated by the oscillating electrons on the inner surface of a cavity can propagate through a hole without restriction. Frequency restrictions inside a cavity does not apply to the paths through a hole. Blackbody spectrum observed through a hole on a cavity is not the spectrum inside the cavity, it is simply the spectrum of the oscillating electrons on the blackbody itself. Blackbody spectrum has nothing to do with a blackbody cavity. Observation of the discrete spectrum of a blackbody cavity is not possible.

Continuous blackbody spectrum observed through a hole on a cavity cannot be derived by analyzing the maximum mode density of a closed cavity. There is no way to fill the gaps between discrete harmonics. The mode density-based derivations of all the blackbody spectra are fundamentally flawed and it is evident from their dependence on the cavity geometry. Plank, Rayleigh-Jeans, and Wein spectra are foundationally flawed and depend on cavity geometry.

If electromagnetic energy of an electromagnetic wave of frequency f, and the kinetic energy of an oscillating mass of frequency f come in integer number of energy quanta e=hf and h is a universal constant, then, it leads to conundrum of energy ambiguity. There is no way of distinguishing electromagnetic energy from the kinetic energy even though they are different. In the case of electromagnetic energy, although h(nf) may be sufficient to knock out an electron from an atom, n(hf) may not. There is no way of separating physically distinct h(nf) from n(hf) since they are quantitatively the same. Such ambiguities cannot exist in nature and hence energy cannot come in quanta. Electromagnetic, kinetic, and potential energies cannot consist of the same quanta; they cannot come in a universal quantum.

Contrary to the Plank's claim, e=hf does not represent an energy quantum. What e=hf represents physically is the kinetic energy per cycle of a mass oscillating at frequency f and it has nothing to do with the speed of light or a propagation of a wave. The parameter h depends on the mass and the square of the maximum displacement of the oscillator.

The energy e=hf per cycle does not apply to electromagnetic waves. Electromagnetic energy per cycle is $e=h_e/f$, where h_e is dependent on the square amplitude of the wave. The h_e for electromagnetic energy per cycle is different from the h for kinetic energy per cycle of an oscillating mass at frequency f. The parameter h in e=hf is not a universal constant.

The claim that the energy e=hf is meaningless without a specific time interval. Units of h must be Joule square second or kg square meters.

Light propagates. Propagation of light on its fixed path is independent of observer motion [6]. Light bursts move relative to observers. However, no object moves relative to light or light bursts since light or light bursts have no standstill existence. The relativity between light bursts and a moving object is not reciprocal; it is one sided.

Masses move. Motion and propagation are not the same. Momentum has no propagation. Propagation has no momentum. Light has no momentum. There is no massless momentum. Energy in general has no associated mass unless it is kinetic energy or gravitational potential energy. Newton's laws of motion do not apply for light, the massless. Light has no kinetic energy and hence no thermal energy. Without thermal energy light cannot have an entropy. Einstein photon derivation is invalid since light has no entropy.

Light has no heat. There is no temperature or thermal energy without matter. There is no transfer of thermal energy between distant object separated by a vacuum without electromagnetic waves. Thermodynamic laws do not apply for light, the massless. There is no thermodynamics without masses. There is no thermodynamics in light. There is no motion dynamics without masses. There is no motion dynamics in light. You cannot bring light under motion dynamics as Einstein did.

The widely used phrase "heat radiation" is meaningless since heat cannot radiate. Heat generates heatless electromagnetic waves that radiates. Radiation has no heat. Heatless electromagnetic waves can generate heat in the presence of electrons or charge particles.

Plank, Rayleigh-Jeans, and Wein spectra do not apply to light or electromagnetic radiation waves themselves; they apply to the generation of electromagnetic radiation. Boltzmann entropy and Maxwell-Boltzmann distribution do not apply for light since light has no entropy. The average kinetic energy kT of a particle at temperature T has no meaning for light, where k is the Boltzmann constant.

Einstein's derivation of light quanta is invalid in its very foundation. Coherent light waves cannot consist of spatially random particles at any frequency. The wave behavior of electromagnetic radiation must be independent of the frequency. There is no magical frequency that could determine if the light would come as particles or waves. There is no special magic frequency threshold above which light comes as particles and below which light comes as waves. Such a frequency threshold is hypothetical. Light comes in wave bursts, not particles. Einstein's hypothetical claim that Light comes in both particles and waves is meaningless.

Interaction of light with matter is only through charge particles. In the presence of electrons, light oscillates the electrons generating kinetic energy e=hf per unit cycle. The parameter h here is different from the parameter h for the oscillating source-electrons that generated the radiation and the h for the electromagnetic waves that carried the energy to a destination-electrons. Light has no interaction with electrically neutral fundamental particles. Light cannot heat up neutrinos if they exist. Light interacts with any object through electrons or charge particles it contains.

It does not matter how much light is present in a vacuum, there is no temperature in a vacuum. It is clear since the space is a cold place even with plenty of light. The small temperature present in the space is due to the small amount of matter present in space; space is not a total vacuum. The small temperature present in space is not a result of the cosmic background, which is falsely considered to be a remnant from a hypothetical big bang. Cosmic background Radiation is simply a result of the oscillation of charge particles in the presence of light. Cosmic background radiation itself has no temperature. Radiation has no temperature. There is no temperature without matter. Space has small temperature since space has small amount of charge particles. Light oscillates these charge particles generating heat. These oscillating charge particles in turn generates the Cosmic Background Radiation (CBR).

Transfer of electromagnetic energy onto particles of mass is not a momentum transfer through collision. Newton laws do not apply to light, the massless. Compton derivation is meaningless since it is not possible to obtain a momentum by dividing electromagnetic energy by the propagation speed of light, $p \neq e/c$. Light has no momentum or thermal energy to transfer. It is only by oscillating the electrons in an object of mass that light can transfer its electromagnetic energy onto matter as thermal energy. Light is an intermediary carrier of electromagnetic energy that transfers kinetic energy from one object to a distant object without a transmission loss in a vacuum. The efficiency of energy conversion and transfer is never hundred percent.

Cosmic background noise and the associated minute temperature in space has nothing to do with a big bang. Cosmic background noise is an indication that there are charge particles in space. Light oscillates these charge particles generating heat, a temperature, and in the process, frequency of the light is downshifted. It is these charge particles in space that are responsible for the red shift, not a space expansion. Space cannot expand. The false and meaningless claim that the universe is expanding is a result of observation misinterpretations. Universe is not expanding. Space cannot expand. It is the matter that expands. Frequency of light is downshifted or redshifted in the presence of a medium containing charge particles. It is the misinterpretation of thin frequency downshift of light in the presence of charge particles in space that led to the most preposterous concept of expanding universe turning physics into a practical joke. Universe cannot expand. Universe is not expanding.

Gravity has no effect on light, the massless. A gravitational object generates density gradient in a medium, which in turn diffracts light. In other words, a gravitational object warps a medium, not the space. Nothing can warp the space. The phrase 'warped space' is meaningless. Light is not diffracted near a gravitational object in a vacuum. It is a medium that mediates an interaction between gravity and light. The diffraction of light near the sun has nothing to do with

General Relativity. Gravity and light are mutually independent.

Space cannot be warped, and the General Relativity based on warped space is meaningless. Gravity has no effect on time. Gravity only affects the mechanism of a clock, which in turn affect the display.

Time is not determined by a clock; time is measured by a clock. A clock is an engineered device to measure time. A clock does not determine the time just as a ruler does not determine the distance. If one can make the false claim that time depends on speed and gravity because a clock slows down on a moving vehicle and on a gravitational object, then, one can also make the claim that time depends on the battery too since time slows down when the battery is weak. Time is absolute, not relative. It is only a display of a clock that is relative, not time. The display of a clock represents the time only when the engineering specifications are met.

Lenard's Photoelectric experiment is half-complete and hence the conclusions are incorrect. Amplitude of light cannot be changed by varying the intensity of a light source or by dimming a light source. A burst of light is released when an electron in an atom moves from higher energy level to a lower energy level. As we have seen, the energy level change of an electron in an atom is neither an act of disappearing and reappearing act as suggested in Bohr Atomic model nor a result of an equally mysterious probability model in Quantum Mechanics. By varying the intensity or the brightness of a light source, we are only varying the rate of light bursts released from the source, not the amplitude of light.

Only way to change the amplitude of light is using a semi-transparent reflector along the path of propagation to reflect off a part of light so that only a smaller amplitude is transmitted. Lenard failed to do that. We cannot change the amplitude of light at the source since we have no access to the amplitude at the source. It is only after the light is released from a source that we can access the amplitude of light. It is only along the path of the propagation of light that we can change the amplitude.

By reducing the intensity or brightness of a light source, we can reduce the rate of light bursts to a level where we can separate the individual light bursts. At a semi-transparent reflector, each individual burst is further divided into reflected and transmitted waves and hence these individual light bursts are not light quanta or photons as they are claimed to be. If these individual light bursts are light quanta, then, they will be in limbo at a boundary. No light burst can be undecisive at a boundary.

The claim that these individual light bursts are light quanta or photons is incorrect. By using these individual light bursts in experiments, what is studied is not the light quanta or photons; what is studied is the behavior of light wave bursts. Logic gates base on these light bursts are not Quantum Bits (Q-Bits); they are Optical Bits (O-Bits). Computing devices based on these individual light bursts are not quantum computers, they are optical processors.

The ability of light to eject electrons from an atom depends on both the amplitude and the frequency of the light since frequency has no existence without amplitude. There must be a frequency cut-off and an amplitude cut-off for photoelectricity. Photoelectric current as well as the speed of ejected electrons must depend on both the amplitude and the frequency of light. Einstein's light quanta or photons can only explain Lenard's half-complete experiment that does not include amplitude variation. Einstein's photons cannot explain the observed photoelectric effect of a complete experiment that includes amplitude variation.

The concept of light quanta or photons fails since a photon cannot split into a reflected part and a transmitted part at a semi-transparent boundary as light must. Irrespective of the amplitude and frequency of light, light must be able to divide into reflected and transmitted parts at a boundary. Only waves can achieve such a division at a boundary, photons or light quanta cannot. Probability cannot determine whether a photon is reflected or transmitted at a semi-transparent reflector since there is no demon flipping a coin at a medium boundary. The concept of photons or light quanta is a result of theoretical and conceptual mistakes wrongfully justified by experimental misinterpretations, a mishap.

The derivation of blackbody spectrum does not require energy to be quantized. Continuous blackbody spectrum observed cannot be obtained by analyzing the discrete spectrum of a cavity. A blackbody cavity has nothing to do with blackbody radiation. Blackbody spectrum is not determined by a cavity. Blackbody spectrum must be cavity independent. Plank, Rayleigh-Jeans, and Wein spectra are cavity dependent. Spectrum through a hole on a cavity is continuous and hence cannot be determined by the analysis of the discrete modes inside a closed cavity. Discrete spectrum in a cavity is not observable experimentally.

Number of modes in a cavity for any discrete harmonic is given by the solutions to the Pythagoras integer quadruples for that harmonic and it is not proportional to the square frequency of the harmonic. Analysis of discrete harmonics in a cavity says nothing about the frequencies in between the harmonics observed through a hole. It is not possible to observe what is inside a blackbody cavity through a hole on the cavity. Characteristic of a hole on a cavity is completely different from that of a cavity. What is observed through a hole on a cavity is much more than what is inside a cavity. There are restrictions to what can be present in a cavity. However, there are no such restrictions to what can be present through a hole on a cavity.

The energy e=hf is meaningless for potential energy and for the kinetic energy of a moving mass at constant speed since they both have no associated frequency f. If kinetic energy of an oscillating mass of frequency f and electromagnetic energy of a wave of frequency f come in quanta e=hf, there is no way to differentiate kinetic energy from electromagnetic

energy. If energy comes in quanta e=hf, it leads to an unresolvable ambiguity since all the energies are not created equal.

Light cannot come in energy quanta e=hf or photons since a photon is not further divisible into reflected and transmitted parts at a semi-transparent boundary as it is required. Light must come in a form that it is splitable into reflected and transmitted parts at a boundary at any amplitude, frequency, and intensity. Waves are the only form of light that is splitable at a medium boundary into reflected and transmitted parts. Energy cannot come in quanta. Light quanta or photons do not exist. Photons are hypothetical. The derivation of photon is incorrect in its foundation. Lenard's photoelectric experiment is incomplete and does not tell the whole truth, nothing but the truth, about the photoelectricity. Plank Spectrum is incorrect and as a result its assumption of energy quanta do not hold true.

Blackbody spectrum must be obtained by analyzing the oscillating electrons in an atom on the blackbody itself. The derivations of Plank, Rayleigh-Jeans, Wein spectra are flawed. Arbitrary and unrealistic quantum trickery suggested by Plank is not required for the derivation of blackbody spectrum that agrees with the observations. There never was a quantum catastrophe. The agreement with observed data is necessary but not sufficient for a function to be a spectrum.

The derivation of blackbody spectrum should not be based on counting the discrete modes in a cavity since the actual number of modes present in a cavity is unknown, and the spectrum through a hole is continuous and not limited to discrete frequencies in a closed cavity. Allowed modes in a cavity are the Pythagoras integer quadruples. Energy is not quantized. Bohr Atom, Heisenberg uncertainty principle, Schrödinger equation, and Quantum Mechanics in general cease to exist since Plank spectrum is invalid and energy is not quantized.

Bohr's claim that electron orbits are quantized and an electron in one energy level in an atom moves to another energy level by disappearing from one energy level and reappearing in another energy level without ever crossing in between space is magic, not physics. Electron orbits in an atom are not quantized. The orbit radius of any electron is determined by the orbiting kinetic energy of the electron. In the presence of electromagnetic wave, an orbiting electron oscillates at the frequency of the electromagnetic wave. If the oscillation frequency is in resonance with the orbiting frequency, then the electron will move to an orbit with higher electric potential energy level. There are no disappearing and reappearing acts in atoms.

Motion of a mass determines the orbit while the oscillation of the mass about the orbit determines the change of orbits. There are no forbidden radii or forbidden space for an electron orbiting at any speed in an atom. Although an electron can be at any radius depending on the orbiting kinetic energy of its mass, the change of orbit from the current orbit takes place in steps since orbit change takes place when the oscillation of the electron about its orbit is in resonance with the orbiting frequency. Atoms have no quantum Orbits.

De Broglie's particle wave is a fantasy, not a reality. Particle waves and wave particles are meaningless. Einstein's photon, Special Relativity, and General Relativity are mental constructs, not natural phenomena. Time is not relative. Time is a definition. Mass is not relative. Light is not relative. Energy is not quantized. Mass is not energy; energy is not mass. Space does not bend. It is only the matter that bends. A rest mass cannot travel at the speed of light relative to light since light has no existence without propagating. Light is not relative. There is no rest kinetic energy of a mass relative to light since light is not relative.

A particle cannot be in multiple places simultaneously irrespective of its size. The false claim that a particle goes through two slits simultaneously when nobody is watching is voodoo physics, not physics. Nonlocality is a mirage, not a reality. Nonlocality is a fancy term for a hypothetical action at a distance for no apparent reason, which is not possible. Every action must have a cause. Probability is our ignorance, not a cause.

Special Relativity, General Relativity are invalid since Lorentz Transform is not unique; they are not mechanisms of nature. Lorentz Transform is invalid; it is not a transform of nature. It is the medium that is warped in the presence of a gravitational object, not the space itself. Spacetime in Lorentz Transform is not unique. There is no spacetime. Spacetime warping is magic, not science. Space does not move. Contrary to Einstein's claim in 1952, it is not possible to FedEx space in a box. Although light itself has no entropy and light cannot generate an entropy in a vacuum, light can increase the entropy of a system that contains charge particles. Light is useless in the absence of charge particles. There will be no light without charge particles. Since charge has no existence without mass, there will be no light without mass.

Lemma:

There is no light without mass and light is useless without charges.

Red shift of light from distant galaxies is caused by the path energy loss due to the interaction of light with the charge particles present in space; it is not a result of space expansion. Moving space cannot increase the wavelength of electromagnetic waves and the distance between gravitational objects. Space cannot move. It is the interaction of light with charge particles present in space that generates red shift in the light from distant galaxies. Universe is not expanding. Dark matter is a result of speed underestimation [5]. Dark energy is a result of observation misinterpretation. There are no Dark matter or Dark energy. Universe is not expanding. Laws of nature are not determined by observers. Observers discover them in an observer independent manner. Quantum Computer is simply an

Optical Processor in disguise. Time is not determined by clocks as much as distance is not determined by rulers. It is only that we measure time using clocks just as we measure distance using rulers.

The speed of the propagation of light is a constant determined by the vacuum and it is only affected by a medium. Speed of propagation of light is independent of any reference frame irrespective of whether the frame is an inertial frame or an accelerating frame. Light does not propagate on moving frames or in a medium [7]. Light propagates in the vacuum and the propagation of light is affected by a medium, not determined by a medium.

Maxwell's equations cannot be transformed to an inertial frame. Lorentz Transform is hypothetical and does not exist. Time is not relative. Propagation of light is not relative. The speed of propagation of light is not relative. However, the speed of motion of a light burst is relative and depends on the frame of reference. Motion of the light bursts is not governed by Maxwell equations and hence the speed of light bursts do not have to be a constant in the vacuum or in a medium. It is only the propagation of light waves that is governed by Maxwell equations and hence it is only the speed of propagation of light waves that is a constant in a vacuum and must be independent of observers.

Although light propagates, a light burst moves. Although the speed of light is given by the product of frequency and the wavelength, the speed of motion of a light burst is given by the distance the light burst travelled per unit time. It is only relative to a stationary frame, which is the vacuum, that the speed of propagation of light is same as the speed of motion of a light burst. Light is not relative. A burst of light moves relative to observers. What we see is the motion of light bursts, not the propagation of light waves. We cannot see the propagation of electromagnetic waves. Even though the speed of propagation of light is a constant c in the vacuum, the speed of a light burst c_v can be of any value and it depends on the speed of observer v, where $-\infty<v<\infty$. There is no speed limit in the universe. Anything can travel faster than light. There is no limit to the speed a mass can travel [6]. Light has no momentum.

"*Moving space cannot increase the wavelength and the distance between gravitational objects. Space cannot move*."

"*Speed of propagation of light c is calculated as $c=f\lambda$ using measured f and λ. What we directly measure using experiments is the speed of light bursts $c_v=dr/dt$ or the distance light bursts travel per unit time, not the speed of propagation of light waves*. They are not the same unless the observer is stationary in the vacuum. Special Relativity is a result of a mishap of mixing these two as the same on moving frames."

"*There is no speed limit in the universe Anything can travel faster than light*."

XXX. **CONCLUSIONS**

Three equations reign supreme in Modern Physics, Plank's hypothetical $e=hf$, Einstein's strange $e=mc^2$, and de Broglie's bizarre particle wavelength $\lambda=hf$. In hindsight, these three equations are meaningless and false. The derivations are mathematically incorrect and illogical. Plank's $e=hf$ is an assumption in an incorrect blackbody spectrum. It has no theoretical basis. It is simply meaningless to say energy is proportional to frequency. Einstein's $e=mc^2$ is simply the kinetic energy of a rest mass relative to light. Light cannot be relative. Nothing can move relative to light and hence $e=mc^2$ is meaningless. A ret mass does not have speed -c relative to light since light has no standstill existence. No mass can have a constant speed c from the start. Einstein's $e=mc^2$ has nothing to do with atomic energy. Mass of an object cannot be relative. Mass of an object does not depend on observers. When the mass is not relative, there is no relative mass and hence the mass must be conserved. Kinetic energy of a mass cannot be represented as the product of momentum times the speed of light and hence $e\neq pc$. Electromagnetic energy cannot be represented as the product of speed of light and momentum and hence $e\neq pc$. Energy cannot be represented as the product of momentum and speed of light since not all the energies are associated with a momentum and speed of light.

Wavelength of a particle is meaningless. It is only an oscillating particle has a frequency. Oscillating particle is not a propagating wave. Wavelength is associated with a propagating wave. Oscillating mass is not a wave, and it does not have a wavelength. It is only that a moving oscillating mass traces a spatially sinusoidal path, and that spatially sinusoidal path has a wavelength. An oscillating mass has a period of oscillation, not a wavelength. There is no wavelength in the absence of a propagating wave or an oscillating mass moving orthogonal to the oscillation. When an orbiting electron oscillates, it takes a spatially sinusoidal path of wavelength $\lambda=v/f$, where v is the orbiting speed and f is the oscillating frequency. This wavelength $\lambda=v/f$ is not a wavelength of a particle wave. There are no particle waves.

A particle cannot have a wavelength. Momentum of a particle cannot generate a wave or a wavelength. Electrons oscillate. Electrons do not propagate. Electrons do not have a wavelength. De Broglie wavelength λ is simply meaningless and $\lambda\neq h/p$. De Broglie substituted momentum p for mc in $e=mc^2$ in obtaining the wavelength λ and hence p here is mc not mv. De Broglie wavelength λ is mathematically incoherent and illogical. How can you change pc to mv for no reason when you start with $p=mc$? The mc is a constant, which is the momentum if the mass m is moving at speed c, whereas $p=mv$ is not a constant. The concept of particle waves and wave particles is simply meaningless. The claim that they are proven experimentally is false since they are based on experimental misinterpretations. The use of Double-slit experiment for the confirmation of de Broglie

wavelength is an experimental misinterpretation. The use of Wheeler's laser beam splitter is an experimental misinterpretation.

$e \neq hf$, $e \neq mc^2$, $\lambda \neq h/p$

The correct blackbody spectrum must satisfy certain characteristics. The area of the blackbody spectrum represents the energy per cycle. The area of the Blackbody spectrum must increase with the temperature while being bounded. Blackbody spectrum must be bounded at any frequency at any temperature for all frequencies up to infinity and for all temperatures up to infinity. Any spectrum that is not bounded for all frequencies up to infinity and for all temperatures up to infinity cannot be a legitimate blackbody spectrum.

"*Plank spectrum is not bounded at very high temperatures and hence Plank spectrum cannot represent a blackbody spectrum*."

Plank's blackbody spectrum derivation is incorrect. Plank spectrum is proportional to h/c^3, which is nearly zero, and hence the Plank spectrum $\mathcal{E}(f) \cong 0$ irrespective of the frequency f. Rayleigh-Jeans spectrum is also proportional to $1/c^3$, which is nearly zero, and hence the Rayleigh-Jeans spectrum $\mathcal{E}(f) \cong 0$ irrespective of the frequency f. This is a clear indication that their derivations are incorrect. Blackbody spectrum has nothing to do with the speed of light. The speed of light only comess into place if you want energy per cycle wavelength spectrum $\mathcal{E}(\lambda)$ in place of the energy per cycle frequency spectrum $\mathcal{E}(f)$.

"*Blackbody spectrum has nothing to do with speed of light c. Blackbody spectrum deals with the generation of radiation.* The generation of radiation by a hot body has nothing to do with speed of light c."

In fact, the Derivations of all the blackbody spectra, Plank, Rayleigh-Jeans, and Wein, are incorrect. A blackbody spectrum has nothing to do with the spectrum of a blackbody cavity. Spectrum through a hole on a blackbody cavity is not the same as the spectrum in a cavity. Spectrum inside a cavity is discrete, not continuous. Spectrum through a hole on a cavity is continuous, not discrete. You cannot derive the continuous spectrum through a hole on a blackbody cavity by analyzing the discrete spectrum of a cavity. It is not possible to observe the spectrum inside a cavity through a hole on the cavity.

"Electromagnetic w*aves coming out of a hole on a blackbody cavity are determined by what is generated by the oscillating electrons on the inner walls of the cavity, not by the waves that is allowed inside the cavity.*"

Blackbody spectrum must be independent of any cavity. Plank spectrum depends on the cavity. All the blackbody spectra depend on the cavity. The only reason for the Plank spectrum to be appeared as correct is that it has the correct frequency function even though the derivation is fundamentally wrong. In fact, all the blackbody spectra have the correct frequency functions withing their respective frequency bands.

Although the agreement of the frequency function of a blackbody spectrum with the observation is necessary for blackbody spectrum to be correct, it is not sufficient for the derivation of the blackbody spectrum to be correct. For the derivation of the blackbody spectrum to be correct, it is necessary that the derivation of the blackbody spectrum is independent of the cavity and dependent on the electric charge. Plank, Rayleigh-Jeans, Wein blackbody spectra are dependent of the cavity and independent of charge. This is a clear indication that the derivations of all the blackbody spectra are incorrect. Plank's blackbody spectrum is not just incorrect, it is also based on a flawed assumption since energy cannot come in quanta.

"*Plank Spectrum depends on the geometry of the cavity*."

Kinetic energy of a mass cannot come in quanta since the velocity cannot be quantized and kinetic energy of a mass moving at speed v has no association with a frequency. Gravitational potential cannot come in quanta $e=hf$ since it has no association with frequency. Mechanical energy cannot come in quanta.

Electromagnetic waves and light cannot come in quanta. Potential energy has no associated frequency and hence energy quantum $e=hf$ has no meaning for potential energy. Kinetic energy of a moving mass at constant speed has no association with a frequency and hence energy quantum $e=hf$ is meaningless for kinetic energy of a mass moving at constant speed. In the case of a mass oscillating at frequency f, the energy $e=hf$ is not an energy quantum; it has a different meaning.

The energy $e=hf$ is the kinetic energy per cycle of an oscillating mass of frequency f. The h is not a universal constant. The parameter h depends on the mass of the oscillating object and the square of the maximum displacement of the oscillator. The energy $e=hf$ is meaningless for electromagnetic waves of frequency f.

Blackbody spectrum through a cavity is no different from the spectrum of the blackbody itself. You do not need an analysis of a cavity to derive the spectrum of a blackbody. You cannot derive the spectrum of a blackbody by analyzing the modes density in a cavity. What is in a blackbody cavity is only a small part of what is generated by a blackbody. What is inside a blackbody cavity does not say everything about what is coming out of a hole on a blackbody cavity. Blackbody spectrum has nothing to do with a

blackbody cavity. There was never a blackbody catastrophe. You cannot observe what is in a blackbody cavity through a hole on the cavity. It is simply impossible.

A blackbody cavity can provide a home for an infinite number of harmonics and many modes for each harmonic does not mean that a blackbody cavity has all the harmonics and all the modes for each harmonic. What a cavity can hold says nothing about what is in the cavity. What a truck can hold says nothing about what is in the ruck. The actual number of harmonics and the actual number of modes for each harmonic is unknown and cannot be obtained by observing the cavity through a hole on the cavity since the spectrum through a hole is continuous while the spectrum of the cavity itself is discrete. Unlike the waves in a cavity where the frequencies are restricted by the geometry of the cavity, there is nothing that limits the frequencies that can propagate through a hole on a cavity.

The assumption of quantized energy is not required for the derivation of a blackbody spectrum. The ubiquitous equation e=hf does not represent an energy quantum. The energy e=hf is the actual kinetic energy of a harmonic oscillator of mass m oscillating at frequency f per unit cycle. The parameter h is not a universal constant. The h depends on the mass of the oscillator and the maximum displacement of the oscillator. The energy comes in different flavors and cannot be represented by a universal quantum. Not all energies have an associated frequency for the representation using the energy quantum e=hf.

"*The energy e=hf is the actual kinetic energy of a harmonic oscillator of mass m oscillating at frequency f per unit cycle, nothing else.*"

The energy e=hf is not valid for electromagnetic waves. For both kinetic energy as well as electromagnetic energy to come in the same energy quanta e=hf, the kinetic energy must be the same as the electromagnetic energy. Kinetic energy is not the same as the electromagnetic energy. Kinetic energy has no existence without a mass. Kinetic energy has a temperature. Electromagnetic energy does not have a temperature. It is only in the presence of charge particles that electromagnetic waves can generate kinetic energy, a temperature. Electromagnetic energy does not require a mass for its existence. Mechanical energy has no existence in the absence of a mass. Energy cannot come in a universal energy quantum e=hf.

If objects are made of charge free particles, there would be no increase of the temperature of the objects in the presence of light. It is not the light itself that burns the body. It is the oscillation of electrons in the body in the presence of light that burns the body. Higher the frequency of light, higher the frequency electrons are oscillating at and hence higher the temperature.

Light has no mass, no momentum, no kinetic energy, no temperature, no entropy. A vacuum has no temperature irrespective of how much light is propagating in the vacuum. Light propagates in a vacuum without loss of electromagnetic energy. That is the reason why light can travel long distances in space. There will be some energy loss since space is not an ideal vacuum. As a result, our observable universe is limited. Our observable universe is a bubble that moves with us.

Light has no effect on neutral fundamental particles. The transfer of electromagnetic energy from electromagnetic waves to a mass as kinetic energy of the mass is not a momentum transfer in a collision since light has no momentum. Compton's analysis of Compton experiment is incorrect, meaningless. The transfer of electromagnetic energy onto a mass is totally through the interaction of electric field of an electromagnetic wave with charge particles in the mass, especially the electrons in mass. Electromagnetic waves can oscillate charge particles generating kinetic energy or thermal energy and hence increasing the temperature of the mass. Since light itself has no temperature, Einstein's derivation of light quantum or photon is invalid. Einstein's photon derivation is fundamentally invalid. Light does not consist of particles or light quanta. Light is a wave at any frequency. The claim that light behaves as particles beyond certain frequency threshold is false.

If energy comes in quanta e=hf, although E=n(hf) is the same as the E=h(nf), they are two distinct physical realities since E=h(nf) may be sufficient to knock out an electron from an atom, whereas E=n(hf) may not. Such ambiguities cannot exist and hence the energy cannot come in quanta.

If energy is quantized, in the case of kinetic energy, velocity must be quantized, while in the case of electromagnetic energy, electric field and magnetic field must be quantized. Velocity of an object and electromagnetic fields are vectors. Vectors cannot come in quanta. Vectors cannot be quantized. Amplitude of a wave cannot come in quanta. Neither the kinetic energy nor electromagnetic energy can come in quanta.

The energy e=hf is not an energy quantum. The energy e=hf is the kinetic energy per unit cycle of a mass oscillating at frequency f. The energy e=hf does not apply to electromagnetic energy per unit cycle. A source-electron oscillating at frequency f has kinetic energy $e_s=h_sf$ per cycle, and it generates electromagnetic radiation burst of energy $e_{es}=h_{es}f^3$ per cycle. This light burst propagates without a loss in a vacuum until it reaches a destination charge particle or an electron, in which case a light burst oscillates the destination-electron generating kinetic energy $e_d=h_df$. That is the energy transformation from a source to a destination via electromagnetic waves in the vacuum. In the presence of a medium, there will be a frequency down shift on the path of propagation, a path loss, which is known as redshift. Redshift is not a doppler effect; it is a result of path energy loss. Redshift is not a result of universe expansion. Universe expansion cannot move galaxies. Space cannot expand. The claim of expanding Universe is

meaningless; it is not physics, not science, just voodoo physics.

Kinetic energy and electromagnetic energy are not the same. The kinetic energy e=hf is not an energy quantum. The energy e=hf is the kinetic energy per unit cycle of a mass oscillating at frequency f. The e=hf does not apply to electromagnetic waves and hence Einstein's photon does not exist. Light does not come in energy quanta or particles. There are no light quanta or photons. Particles cannot propagate. Propagating waves are not particles. There is no wave particle duality.

An oscillation of a mass is not a propagating wave. It is only that an oscillation of an electron makes the orbit a waveform. A waveform is not a propagating wave. The wavey orbit of an electron has nothing to do with probability. An electron goes through each point on the wave exactly once per cycle. There is no wave particle duality. Frequency cannot be determined by energy. It is only the energy that can be determined by frequency. Frequency is the independent variable in e=hf. You cannot substitute frequency in wave equation by e/h since all the energies do not have an associated frequency. As a result, Schrodinger equation is invalid.

Schrodinger equation is just a result of replacing the frequency in wave equation by e/h and substituting mechanical energy of a particle for e. Schrodinger equation is a result of illegal mixing up of mechanical energy and electromagnetic energy. There are no particle waves. There are oscillations of charge particles. Oscillating charge particles generate electromagnetic radiation. These electromagnetic radiations propagate until they meet other charge particles along the path. When electromagnetic waves encounter charge particles along the path of propagation, electromagnetic waves oscillate the charge particles generating thermal energy.

Electromagnetic energy is not the same as the kinetic energy and hence they cannot be put under one equation e=hf. For electromagnetic energy e≠hf. Electromagnetic energy cannot be written as momentum p times the speed of light c, p≠e/c. When p≠e/c, Quantum Mechanics has no existence. There is no momentum in light or in electromagnetic waves. In the absence of a momentum, light cannot be relative. When light cannot be relative Special Relativity cannot exist. In the absence of Special Relativity, there is no relative mass, there is no relative time. In the absence of relative mass, mass is absolute and hence mass is conserved. Mass and energy are conserved. Mass and energy are not one and the same as Special Relativity claims to be. Not all energies are created the same.

Philip Lenard's experiment on photoelectric effect is not complete. The magnitude of light cannot be changed by changing the intensity of a light source. By changing the intensity or the brightness of a source, what you are changing is the number of light bursts released from a source, the rate of bursts, not the amplitude of light. As a result, the conclusions drawn from Lenard's photoelectric experiment are incorrect.

The claim that it is the frequency alone that decides the ejection of an electron from an atom is incorrect since frequency has no existence without amplitude. For a photoelectric experiment to be complete, it must be carried out under varying frequency at constant amplitude as well as under varying amplitude of light at constant frequency. We cannot change the amplitude of light at the source since we have no access to the amplitude until light is out of the source. We cannot change the amplitude of light by dimming or enhancing the intensity of a source.

The amplitude of light can only be changed along the path of propagation of light or at a destination using a semi-transparent reflector. Using a semi-transparent reflector, we can reflect away part of the wave so that only a reduce amplitude is transmitted through the reflector into the photodetector. Just as there is a frequency cut-off for the frequency for photoelectric effect, there should also be an amplitude cut-off below which there is no photoelectric current.

The ability to eject electrons from atoms should depend on both the frequency of light as well as the amplitude of light. The speed of ejected electrons should depend on both amplitude of light as well as the frequency. The explanation of photoelectric effect does not require light quanta or photons. It is only if the amplitude of light is kept constant, just as in the Lenard photoelectric experiment, that the ability to eject electrons depends on frequency alone. Lenard experiment does not involve different amplitudes of light, a major experimental oversight. Lenard experiment only involves different rates of light bursts emitted from a source and different frequencies. The conclusions of the Lenard experiment are incorrect.

Photoelectric effect is completely explainable using the classical physics based on wave theory of light. No light quanta or photons are required to explain the results of a properly design complete photoelectric experiment that is run under different frequencies, different amplitudes, and the different burst rates of a source. A photoelectric experiment must be done for different source intensities as well as for different intensities at a destination or along the path of propagation of the light before the light enters the photoelectric device. Einstein's light quanta or photons can only explain the results of a partially complete photoelectric experiment like Lenard's photoelectric experiment. Einstein's light quanta or photons cannot explain the result of a complete photoelectric experiment that is run under different frequencies, different amplitudes, and different burst rates. Einstein photon has no place for complete well designed photoelectric experiment.

Energy e=hf is not an energy quantum. Energy e=hf is the kinetic energy per cycle of a mass oscillating at frequency f. The e=hf does not apply to electromagnetic energy. The electromagnetic energy per unit cycle is given by $e=h_e f^3$, where $h \neq h_e$. Electromagnetic energy is not the same as the kinetic

energy and hence energy in general cannot come in energy quanta e=hf. If energy comes in energy quanta e=hf, it makes kinetic energy, potential energy, and electromagnetic energy to be the same, which are not. There is no e=hf representation for potential energy and kinetic energy of a mass moving at constant speed on a linear path since they have no associated frequency f.

There is a frequency cut-off as well as an amplitude cut-off for photoelectric effect. Light has no entropy. Electromagnetic field vectors cannot come in quanta. Velocity vectors cannot come in quanta. Vectors cannot come in quanta. Energy cannot come in quanta. Plank constant is not a constant. Quantized energy is not required for the derivation of blackbody radiation.

When light reaches a semi-transparent surface, part of light is reflected and the rest transmitted. It does not matter how small the energy light is carrying, light must be able to divide into reflected and transmitted parts at a boundary. This is not possible if light comes in quanta or photons. This is only possible if light is a wave. Light has no mechanism to make probability-based decisions at a boundary. Probability based decision are not made in nature. Nature has no need for probability since the nature possesses the knowledge of all mechanisms it requires. It is we who invented probability for gambling at the beginning and later extended for decision making in the absence of complete knowledge of the true mechanisms of nature that it operates on. Probabilities are not fundamental properties of particles or in the nature. It is only that due to our lack of understanding of the basic operating mechanisms of nature, we employ probability to explain and make decisions on unknown phenomena.

Thermal energy has no existence without mass. There is no temperature without mass. Electromagnetic waves cannot do anything without charges. There will be no electromagnetic waves without mass. Charges have no existence without masses. Hence, electromagnetic waves are useless without masses. There is no thermal energy without masses. There is no thermal equilibrium without masses. Light has no thermal energy. There cannot be a thermal equilibrium in a space that consists of light itself. Bose-Einstein's statistics based on thermal equilibrium of massless are meaningless, unreal; no such thermal equilibrium can exist without particles of mass. Electromagnetic radiation is not a quantum gas. Radiation is electromagnetic wave bursts that is incapable of doing anything without charge particles.

Blackbody cavity does not have infinite number of modes. It is only that theoretically blackbody cavity can provides a home for infinite harmonics. Blackbody only can occupy whatever it is allowed to hold out of whatever thrown into it. If you do not know what modes the oscillators on the inner surface of the blackbody generates, you have no way of knowing what is inside a blackbody cavity. A blackbody cavity can accommodate infinite modes does not mean that all the modes it can accommodate are in the cavity. A guitar string can vibrate at infinite number of modes. That does not mean there are infinite modes when we pluck the guitar string. When we pluck a guitar string, it will oscillate in modes that corresponds to where we pluck. What blackbody cavity can hold says nothing about what is in the blackbody cavity.

The modes counting in a blackbody cavity used in blackbody radiation only says the maximum number modes a blackbody cavity can hold for a discrete harmonic. It says nothing about the actual number of modes present in a cavity for a harmonic. It does not provide the actual blackbody spectrum.

"*The number modes present in a cavity is an unknown, and hence the determination of blackbody radiation using modes density is not possible.*"

If we consider the allowed modes of n^{th} harmonic, they must satisfy the relationship,

$n^2=n_x^2+n_y^2+n_z^2$

where, n, n_x, n_y, n_z are all integers.

Only the integer quadruples that satisfy this condition can be an allowed node in phase space. The frequency f of the n^{th} harmonic for spherical cavity is given by,

f=nc/2(2r) for all inter n.

where r is the radius of the cavity.

We cannot find the mode density of a cavity by considering a linearly laid out grid in x, y, z axes. Not all the nodes in a sphere of radius n satisfy the relationship $n^2=n_x^2+n_y^2+n_z^2$. Finding the modes that satisfy the relationship $n^2=n_x^2+n_y^2+n_z^2$ is solutions to the Pythagoras integer quadruples or solutions to 3D Fermont problem of second order. The number of solutions to the Pythagoras integer quadruples is not proportional to n^2 or f^2. Plank spectrum, in fact all the blackbody spectra, are based on the incorrect idea that the modes density of a cavity is proportional to n^2 or f^2. Mode density used in deriving the black body spectra is incorrect.

Plank's spectrum is incorrect in its very foundation. In fact, all the blackbody spectra are incorrect in their very foundation since they are all based on the incorrect mode density. What you are expected to find in a cavity is whatever allowed that is thrown into it. If a cavity can hold apples, bananas, and oranges, you cannot find any of them there unless somebody thrown them into it. If somebody put 5 apples and 2 bananas into the cavity that has 20 rooms to hold 10 apples and 10 bananas, you cannot expect to find 7 apples and 8 bananas in the cavity. You cannot expect the cavity to have any more than what you put in even though it has the capacity to hold more. You cannot expect pieces of apples and bananas occupying all the rooms in the cavity. You cannot find any oranges in the cavity either if you haven't put oranges into the cavity even though cavity can hold oranges. What modes a cavity can hold says nothing about what is present in a cavity.

Blackbody spectra based on mode density are dependent on the geometry of a cavity. Both Rayleigh-Jeans and Plank spectra are dependent on

the geometry of the cavity. The factor π present in the Plank and Rayleigh-Jeans spectra disappears if a spherical cavity had been considered. True spectrum of a blackbody cavity must be independent of the geometry of the cavity. The dependance of Plan and Rayleigh-Jeans spectra on cavity geometry is an indication that the derivations of Plan and Rayleigh-Jeans spectra are incorrect.

"*Mode density in a blackbody cavity cannot be used in the derivation of blackbody spectra since the actual modes present in a cavity are unknown*"

Energy spectrum observed through a hole on a cavity is continuous. It is only the spectrum inside a closed cavity that is discrete. When there is a hole on the surface of the cavity, any electromagnetic wave of any frequency that is generated by the oscillating electrons on the inner surface of the blackbody can propagate out of the hole. So, modes counting has no use in determining the continuous spectrum through a hole on a cavity. The spectrum observed through a hole on a blackbody cavity is the same as the spectrum of a blackbody itself. Analysis of modes in a cavity has no use for the blackbody spectrum derivation.

No energy quantization is required for the derivation of blackbody spectrum. Analysis of a cavity under the assumption of quantized light is useless for the determination of blackbody spectrum. The concept of light particle, light quanta, or photon has no use in blackbody spectrum or photoelectricity. Light does not come in quanta. Einstein's light quanta assumption is simply wrong and meaningless. Einstein's photon derivation is invalid. Plank' s energy quantum e=hf is unnecessary; it is a mathematical trickery to justify flawed foundation used in the derivation of blackbody spectrum, not a physical reality. You cannot manhandle an equation to match the observed data and call it the physical reality. Energy cannot come in quanta since all the energies are not created equal. Quite simply energy e=hf is meaningless. It has no physical significance. There is no energy without a mass. When we refer to energy, we are referring to the energy that is associated with temperature and entropy. Electromagnetic waves have no energy. Electromagnetic waves do not have energy associated with temperature and entropy. Electromagnetic energy is not real energy; it is simply an expression of wave strength.

Bose and Einstein treated E=h(nf) as same as E=n(hf) and came up with Bose-Einstein statistics claiming that particles are more likely be together than they are to be remained independent, which led to the concept of entanglement. The fact is that E=n(hf) is not the same as E=n(hf). They are two distinct physical realities. If quantum representation of energy cannot identify E=n(hf) from E=h(nf), then, energy cannot be represented using energy quanta. If energy come in quanta, nature has a dilemma that is unresolvable. Nature cannot distinguish E=h(nf) from E=n(hf). Nature has a problem in identifying kinetic energy from electromagnetic energy; if they had been the same, we wouldn't have an electric energy crisis. Energy cannot come in quanta. Kinetic energy cannot come in quanta. Electromagnetic energy cannot come in quanta.

The e=hf is simply the kinetic energy per unit cycle of a harmonic oscillator of frequency f. Parameter h is not a universal constant. The h depends on the mass and the maximum displacement of the oscillator. Plank's derivation blackbody spectrum and Einstein derivation of light quanta are incorrect and invalid. There is no such thing as photons. There are no energy quanta.

You cannot find the number of guests in a hotel by counting the capacity (modes) of a room (harmonic) and the number of rooms. If you have five guests in a hotel, you cannot spread them equally to fill all the rooms to full capacity of each room. What is in a cavity is whatever put into it, not what it can hold. If you put apples into a bucket, you cannot expect to find oranges just because bucket can hold oranges too; you can only find apples. The same is true for a blackbody cavity.

The derivation of blackbody spectrum based on mode density is fundamentally incorrect. Quantum energy assumption used in the derivation of blackbody spectrum based on mode counting is not required for the derivation of blackbody spectrum since blackbody spectrum is and must be cavity independent. The dependent of Plank's blackbody spectrum on the geometry of a cavity itself is sufficient to invalidate Plank's energy quanta and Einstein's light quanta. Blackbody spectrum must be independent of a cavity.

"*Plank Spectrum is cavity dependent. In fact, all the blackbody spectra are cavity dependent. Correct blackbody spectrum must be cavity independent.*"

Philip Lenard's photoelectric experiment is incomplete. Conclusions of an incomplete experiment cannot be conclusive, not the final word on photoelectric effect. The fact that frequency has no existence without amplitude is sufficient to question Lenard's findings and Einstein's photon-based explanations. The inability of light quantum or photon to divide into a reflected and transmitted parts at a semi-transparent boundary is sufficient to discredit and abandon the light quanta or photons. Einstein's light quanta or photon derivation is invalid since light has no entropy. The energy e=hf is meaningless for electromagnetic energy. The energy e=hf is not a universal energy quantum. The energy e=hf is simply the kinetic energy per unit cycle of a mass oscillating at frequency f.

"*Plank constant h is not a universal constant. Energy cannot come in universal quanta since energy comes in different flavors.*"

Irrespective of whether it is an oscillating mass at frequency f or propagating electromagnetic wave of

frequency f, Plank assumed that the energy of frequency f comes in ne, where e=hf and n=1,2,3, … If energy comes in quanta e=hf, energy loses their identities since kinetic energy quantum cannot be distinguished from an electromagnetic energy quantum, without which nature cannot function. If energy of frequency f comes in quanta e=hf, energy must have an associated frequency. Potential energy of a mass, potential energy of a charge, and the kinetic energy of a moving mass at constant speed do not have an associated frequency and hence energy quanta e=hf do not apply to them. If kinetic energy of a mass oscillating at frequency f comes in quanta e=hf, there must be a natural mechanism in nature to assemble them to a one unique whole of oscillating mass of frequency f. If electromagnetic energy of an electromagnetic wave of frequency f comes in quanta, there must be a mechanism in nature to assemble them into a one whole unique coherent propagating wave. There are no mechanisms in nature to assemble energy quanta into a one unique whole of frequency f. You cannot quantize an entity unless you know how to put the quanta into the one unique coherent whole without losing identity. That is a major problem with the assumption of energy quanta. Energy cannot come in quanta e=hf and hence e≠hf. Light is not relative [2,6] and hence time and mass are not relative and $e \neq mc^2$.

The speed of a motion of an object of mass has nothing to do with the speed of light in the vacuum. The speed of light cannot limit the speed of other entities. The ubiquitous claim in physics that “nothing can travel faster than light is incorrect”. Anything and everything can travel faster than the speed of light. The speed of light is the speed of light is the speed of light, nothing more. There is no speed limit in the universe [6]. Modern Physics appears to be on a crossroad. Modern Physics requires a complete overhaul. Here are some of the blind spots in Modern Physics that needs special attention:

1. Plank’s derivation of blackbody radiation is incorrect. Plank spectrum depends on the geometry of a cavity. It is not just the Plank spectrum that depends on a cavity, all the available black body spectra depend on the geometry of a cavity. Blackbody radiation must be cavity independent. Blackbody spectrum must be independent of the geometry of a cavity.

2. All the blackbody spectra, Plank, Rayleigh-Jeans, and Wein spectra are function of the temperature of the blackbody as they should. However, the dependence of the blackbody spectrum on temperature is not sufficient since the temperature itself cannot generate radiation.

3. Plank, Rayleigh-Jeans, and Wein spectra are all independent of electric charge. There is no radiation without an electric charge. Blackbody radiation must be a function of electric charge. In fact, blackbody radiation must be proportional to square charge. There is a serious problem with the derivation of Plank, Rayleigh-Jeans, and Wein spectra since they are charge independent.

4. A perfect match of a spectrum with the observation is not an indication that the derivation of a spectrum is correct. A perfect match of a spectrum with the observed data only indicates that the spectrum has the correct frequency function; it says nothing about the correctness of the derivation since a wrong derivation with wrong assumptions can also produce the right frequency function as it is the case with all the current blackbody spectra. Having the correct frequency function does not make the derivation of the spectrum correct. The derivations of Plank, Rayleigh-Jeans, Wein spectra are fundamentally wrong even though they all have the correct frequency function within their respective frequency bands.

5. Lenard’s photoelectric experimental is incomplete (in fact, it is half-complete) and conclusions are incorrect. You cannot draw conclusions from an incomplete or half-complete experiment. Photoelectric experiment must be run for varying amplitudes, not just for varying frequencies and varying source intensities or burst rates. We cannot change the amplitude of light by varying the intensity of a light source. We have no access to amplitude of light inside a source. By varying the intensity or the brightness of a light source, we are only changing the rate of light bursts emitted by the source. We can only change the amplitude of light along the path of propagation after the light is emitted by the source. This was not done in Lenard’s experiment. Changing intensity of a source by dimming the light is different from the changing the intensity along the path of propagation or at a destination by using a semi-transparent reflector.

6. Einstein’s light quanta (photons) derivation is invalid since light has no entropy. Einstein’s Special Relativity and General Relativity are invalid since Lorentz Transform is not unique and light is no relative. If light is relative, speed of light is not a constant since it generates Shear Electromagnetic (SEM) waves whose speed depends on the frame of reference. Time and mass are not relative. Mass and energy are not one and the same, $e \neq mc^2$. All the energies are not created equal. Special Relativity is not required since the path of light in the vacuum is fixed and it can only be altered by a medium. Any entity travelling on a fixed path in the vacuum or in a medium is observer independent. Light is observer independent.

7. The speed of an object has nothing to do with the speed of light. The speed of light cannot limit the speed of other objects. There is no speed limit in the universe. Anything and everything can travel faster than light [6]. Nothing can prevent an entity travelling faster than light.

8. Light does not propagate either in a medium or on a moving frame [7]. Light propagates in empty space. Speed of light and the direction of propagation are dependent on a medium, not determined. Speed of light is determined by the vacuum and can only be altered by a medium. Although the direction of light is determined by a source, the direction and the path of light is fixed in the vacuum.

9. Time and mass are not relative. Time and mass are independent of speed. Speed of light is the speed of light is the speed of light, nothing more. Time and mass have nothing to do with speed. Mass is conserved. Time, mass, and speed of light are independent of observers. Relativity of light is no different from the relativity of a train or relativity of a Bulldozer except that light is massless. They all have fixed tracks. Speed of an entity on its track is independent of observers. In the case of a moving entity on a fixed track, it is the track that moves unaltered relative to moving observers just as mountain moves relative to a runner. There is no physical alteration in relativity. Relativity is a perception, not an actual physical alteration. Observers cannot change the mass and the dimension of an object and time.

10. A single universal energy quanta cannot represent all the different energies and hence Plank's claim that energy comes in a universal quantum e=hf is invalid. Electromagnetic energy has no association with a mass. There is no massless momentum. Potential energy cannot be represented as e=hf since it has no association with a frequency f. The kinetic energy of a mass moving at constant speed cannot be represented as e=hf since it has no association with a frequency f. Schrodinger equation is invalid.

11. Light has no momentum. Motion dynamics and thermodynamics do not apply for light, massless.

12. Laws of nature are not determined by observers. Time is not a dimension. Gravity cannot be a wave. Gravity does not bend light in a vacuum. It is a medium that mediates an interaction between light and gravity. Gravity and light are mutually independent. Gravity and time are mutually independent.

13. De Broglie's particle waves do not exist. Particles are not waves. Oscillations of electrons are not propagating waves. It is only that an orbiting electron takes a spatially sinusoidal path under oscillation. The wavelength of the spatially sinusoidal path is given by $\lambda=v/f$, where v is the orbiting speed and f is the frequency of the oscillation. There is no Plank constant involvement here. If a vibrating particle moves or moving particle vibrates, it takes a sinusoidal path. There is no propagating wave here. There is no wave-particle duality. Light has no momentum, $e \neq pc$, Massless has no momentum. You cannot give light a momentum by manipulating the LaGrange. LaGrange does not apply for light, massless.

The claim that a particle of momentum p acts as a wave of de Broglie wavelength $\lambda=h/p$ is meaningless. It has no logical explanation. No mathematical or theoretical foundation. It is simply non-sensical. Particle moving on a sinusoidal path is not a wave. Standing wave is not a particle. Waves have nothing to do with particle and particles have nothing to do with waves. It is only that moving charge particles generate electromagnetic waves.

Lemma:

If a vibrating particle of frequency f moves at constant speed v or moving particle at constant speed v vibrates at frequency f, the particle will take a spatially sinusoidal path of wavelength λ given by $\lambda=v/f$. This is not a particle wave.

14. Position and momentum are not a Fourier Transform pair and hence Heisenberg's uncertainty principle is invalid. No mass can be at multiple places at the same time irrespective its size. Position, and momentum of a particle of mass must be unique. In Special Relativity, relative mass is conserved. Since Special Relativity does not hold true, mass must be conserved. In a closed system, mass is conserved, charge is conserved, and the total energy is conserved.

15. Since the Lorentz Transform is not unique, Special Relativity does not hold and hence time and mass are not relative. Mass of an object cannot be relative. Energy has no associated mass. Electromagnetic energy has no associated mass. It is only the mechanical energy that has an associated mass since mechanical energy has no existence without a mass. Energy has no existence without a mass. Electromagnetic energy is not real energy since it has no association with temperature. There is no energy without a mass. When we say energy, we are referring to the energy associated with temperature and entropy. Only the kinetic energy of a mass is associated with temperature and entropy. Real energy is kinetic energy; there is no any other energy.

16. The generation of electromagnetic energy requires a mass since a charge that requires for the generation of electromagnetic energy has no existence without a mass. However, once generated, the existence of electromagnetic energy does not require a mass. Electromagnetic energy does not have an associated mass. Electromagnetic waves or light has no momentum. Electromagnetic energy is not real energy; it is simply the measure of wave strength. Energy is not energy unless it is associated with temperature and entropy. Electromagnetic energy has no such association.

17. Particle oscillations are not propagating waves. It is only that the oscillation of an orbiting electron makes an electron to take a wavy orbit; this wavy orbit

is not a wave. An electron passes through all the points in the wavy path once per orbit. This wavy orbit does not represent a probability of finding an electron. Not all the energies have an associated frequency. And hence Schrodinger wave equation is invalid. Frequency of an oscillating mass generates kinetic energy; kinetic energy does not have a frequency.

18. Frequency of an electromagnetic wave generates kinetic energy in the presence of an electric charge. Energy does not have an associated frequency.

19. Frequency per se has no energy. The claim that energy e=hf is meaningless. Plank's energy quantum e=hf is meaningless. It is only that the frequency of an electromagnetic wave can generate kinetic energy in the presence of a charge of mass. Electromagnetic waves are useless without mass. Electromagnetic waves have no temperature, energy, or entropy in the absence of charges. We can say electromagnetic waves are useless in the absence of mass since charge has no existence without mass.

20. Oscillating mass of frequency f has kinetic energy. Potential energy has no associated frequency. The energy e=hf is meaningless for potential energy. A universal energy quantum e=hf has no meaning since all the energies are not created equal. Frequency has no energy; in itself.

21. The energy e=hf has no meaning for an oscillator without specified time interval. Frequency of a wave is an independent variable and cannot be substituted by mechanical energy as Schrodinger did. Mechanical energy has no frequency. Potential energy of a particle has no associated frequency. A particle of momentum p has no associated frequency. A particle moving at constant speed has no associated frequency. You cannot generate a frequency from energy simply dividing it by h. Electromagnetic frequency has no energy. Electromagnetic waves have no energy that has an association with temperature and entropy. Schrodinger equation is invalid. Particles are not waves.

22. Eigenvalues of operators cannot represent system parameters since eigenvalues are not unique. A probability distribution does not propagate. Waves are not probabilities. Schrodinger equation is invalid. When an orbiting electron oscillate, each position on the wavey path has equal probability that the electron passes that position. If orbiting electron oscillates, then, electron takes a spatially sinusoidal orbit of wavelength $\lambda=v/f$, where v is the orbiting speed and f is the oscillating frequency. Electron passes every point on its orbit exactly once per cycle. The probability of finding electron at each point on the orbit is the same. There is no probability here. Nothing is random in an orbiting electron irrespective of the path of the orbit.

Momentum cannot vary randomly independent of position. Momentum cannot change without the change of position. Position cannot change independent of momentum. Position and momentum of a particle are not mutually orthogonal. Changing momentum requires energy and that energy must come from the change of potential energy from a position change. Particle cannot change from position A to position B without going through all the points in between A and B continuously. Particle cannot disappear from A and reappear on B without passing through in between points.

23. In Bohr atom, the electrons in an atom are in motion in discrete energy levels, $2\pi r=n\lambda$, n=1,2,3, ..., λ is the de Broglie wavelength $\lambda=h/p$, h is the Plank constant, r is the orbit radius, and p is the momentum. Bohr claimed that when an electron moves from one energy level to another, electron disappears from one energy level and miraculously reappear in another energy level without crossing the in between space. A mass disappearing and reappearing somewhere else is magic, not physics.

A mass cannot move to another place without crossing in between space. There is no magic. An electron in an atom must pass in between space when it moves from one stable orbit or energy level to another stable orbit or energy level, there is no other way around. There is no mystery. Anything else is voodoo physics, not physics. Bohr's discrete energy level description of an atom is voodoo physics. An atomic model that claims a disappearing act such as Bohr's atomic model cannot be correct; it is invalid.

24. Any atomic model that claims an electron can be at multiple places at the same time is not physics, it is voodoo physics. An electron cannot disappear from one location and randomly reappear in another location. If a particle has a momentum, momentum has a direction and particle must move in the direction of the momentum. If particle cannot move in the direction of the momentum, there is no meaning to a particle having a momentum. If a particle has a momentum, it is because the particle is moving in a definite direction. If a particle has changed the position, it is because it has a momentum. If the change of position is non-linear, it is because the momentum of the particle has changed. Position and momentum of a particle are mutually dependent; a momentum cannot exist without a position; momentum cannot change without change of position.

25. Einstein's claim in 1952 that when the thickness of a moving empty box approaches zero, the space inside is still moving at the same speed is incorrect and meaningless. When the thickness of the walls of a box approaches zero, there is no box moving. A moving box does not move the space inside the box. You cannot FedEx space. Space does not move. Space cannot be moved by any mean. You cannot pack the space in a box. It is only the matter that can be packed in a box and can be moved.

26. Eigen space representation of a state of a particle is no different from the representation of the state of a particle in 3D space using trivial Identity Operator '**I**' and its eigen vectors, x, y, and z axes. In 3D representation, if a particle is at $\mathbf{r}=(r_x, r_y, r_z)$, then, the coordinates r_x, r_y, and r_z are the eigenvalues or the projection of **r** on corresponding trivial eigenvectors **x**=(1,0,0), **y**=(0,1,0), and **z**=(0,0,1). We do not say particle is at position r_x with probability $|\mathbf{x}|^2$, at position r_y with probability $|\mathbf{y}|^2$, and at position r_z with probability $|\mathbf{z}|^2$. Particle is not on any of the axes or basis vectors.

Similarly, in any eigen representation, basis vectors or functions do not represent probabilities. The eigenvalues or the projections of the state vector on to the basis eigenvectors or functions do not represent the state of a particle. Particle is never on x-axis, y-axis, or on z-axis simultaneously. Particle is at a unique place, at **r**. Eigen vectors or eigen functions do not represent probabilities. Irrespective of the representation that is used, single coordinate is not a state. All the coordinates collectively represent the state of a particle. Basis vectors are not probabilities. Basis vectors are possible states of a particle. The state of a particle is unique.

The two representations,
$\Psi=\lambda_1\psi_1+\lambda_2\psi_2+\lambda_3\psi_3+\ldots$ (Schrodinger's n-dimensional eigen basis)
$\mathbf{r}=r_x\mathbf{x}+r_y\mathbf{y}+r_z\mathbf{z}$ (3-dimension trivial eigen basis)
are equivalent. They tell the same story. They cannot tell two different stories. There is no superposition here. There is no probability here.

Clock has no meaning for a cave man. Clock has no meaning for a baboon. Clock has no meaning for someone who has not read the manual. How can a clock be a clock for a gravitational object? Clock is nothing more than a chunk of mass for a gravitational object. Gravity has no effect on time. Gravity and time are mutually exclusive. A clock has no meaning until the design engineers give it a meaning. An Atomic clock has no meaning until the design engineers define a certain number of oscillations as a second.

Gravity cannot slow down time. Gravity affects the mechanism of the clock, not the time. Drain-out battery also slows down the time, yet we do not say battery affects time. Time has nothing to do with the speed of an observer. Time has nothing to do with the speed of light unless the clocks are designed based on light pulses. Time is a definition. We defined the time. Universe does not run on the clock we engineered. It is only the computers that run on clocks we engineered. Gravitational objects do not know clocks measure time. Laws of physics are not determined by our inability to synchronize the clocks that we have designed to display the time that we have defined. Nature does not know clocks measure the time. Gravity does not know clocks measure time. If you are closer to an event, you will hear/see it earlier than somebody at distance does; there is nothing peculiar about it. There is nothing to write home about it.

Gravity cannot bend light. Light has no effect on gravity. Gravity has no effect on massless. Light and gravity are mutually independent. It is a material medium that mediates an interaction between the gravity and light. The diffraction of light near a gravitational object is due to the density variation of the medium around a gravitational object. Gravity cannot diffract light in a vacuum. Time is an instant, not an axis. There is no spacetime. There is space. We can travel on space. Then, we define time. We cannot travel on time. Time is not an axis. Time is just a moment. Our inability to synchronous clocks has nothing to do with time. Time and mass are absolute. There is nothing peculiar about two simultaneous events being heard/seen by observers as not simultaneous. Any observer closer to one event see/hear it earlier than the other event; there is nothing strange about it.

"*A Few careless missteps by a few (Plank, Einstein, de Broglie, Schrodinger, Bohr, Heisenberg), one colossal disaster for all the sciences.*"

We hear claims that particle can go through two slits at the same time, a change made to a particle here is claimed to change the state of another particle on the other side of the planet instantly (well-known spooky action at distance), one of the twins on a space craft is younger than the other twin staying at home, cat can be both dead and alive at the same time, gravity can bend light, light can affect gravity, particles are waves and waves are particles (yet nobody can say what is waving). These claims sound like voodoo-physics, not physics. They claim that they are experimentally proven. You can prove whatever you want using experiments because experiments give observations. We can interpret the observations to prove whatever we want to prove. They claim that LIGO has detected gravitational wave. Is the direction of this detected gravitational wave different from the simulated signal used to test the system? What is the chance of receiving a gravitational wave from the same direction as the simulated test signal? Gravitation is a single static field. A single field cannot propagate. You cannot create a disturbance in a gravitational field by any mean. So, there is no gravitational disturbances. A wave is a conjugate pair of fields. Gravity has no conjugate partner to tango.

One person cannot tango. A single field cannot propagate. Propagation requires conjugate dual fields. A gravitational field is a single field. Gravitational field exists relative to a mass. You cannot disturb a gravitational field. You can blow up the gravitational object into pieces, but it does not generate a disturbance in the field. The gravitational field of any of the pieces is the same as the gravitational field of the piece in the integrated object before the object was blown up into pieces. You cannot generate a disturbance in a gravitational field by oscillating the

gravitational object since gravitational field exists relative to the gravitational object. Gravitational field does not have an independent existence.

Although oscillating electric charge can generate a propagating conjugate field pair, an oscillating gravitational object cannot generate conjugate dual field. Gravitational field has no conjugate partner. An oscillating mass at frequency f does not generate a conjugate pair of fields. Jumping porcupine does not leave its spiky jacket behind. An oscillating mass does not leave its field behind when it oscillates. A field is not a wave. A field does not propagate. Gravitational field is not a wave. Gravitational field at point in space exist relative to the gravitational object. There is nothing flowing from the mass as gravity.

There is no wave propagation without an oscillating conjugate pair of fields that is independent of the source. The cyclic transfer of energy between the conjugate pair such as electric field and magnetic field makes conjugate field pair propagate. There is no such conjugate pair of fields in gravitation to mutually transfer energy between, and to generate a propagating gravitational wave. A single field such as gravitational field cannot propagate. There are no gravitational waves. Gravitational field is a uni-field. A uni-field cannot propagate. A single cannot tango.

Electric field exists relative to a charge. Oscillating electric charge does not disturb the electric field. Electric field is a uni-field. Electric field does not propagate. There are no sovereign electric waves. Magnetic field is uni-field. Magnetic field does not propagate. Uni-fields do not propagate. There are no sovereign magnetic waves. However, the oscillating charge generate a conjugate field pair, an electromagnetic field that propagates. It propagates because it is an oscillating conjugate field pair that is independent of the source. The cyclic transfer of energy between the electric and magnetic field makes electromagnetic waves propagate. Electromagnetic waves propagate in a vacuum and affected by a medium. Electromagnetic waves do not propagate in a medium or a moving frame or an inertial frame. Electromagnetic waves do not propagate relative to observers. The direction, the speed, and the path of electromagnetic waves are fixed in the vacuum and can only be altered by a medium. The speed of any entity on a fixed path is independent of observers. The speed of light is independent of observers. Propagation of electromagnetic waves is independent of observers [6].

The speed of the electromagnetic waves is determined by the vacuum. Electromagnetic waves do not propagate in a medium. If you pull out the medium, electromagnetic waves do not move with the medium and it is an indication that electromagnetic waves propagate in the vacuum, not in the medium itself. It is only that the speed and the direction of the electromagnetic waves are affected by a medium, not determined by a medium [7].

People with any common sense are laughing at the people in Modern Physics who are making those mysterious, out of reality, voodoo claims. Any voodoo claim only exists in the mind of believers just as God exists in the mind of the believers, not in realty, not far, far away. Any entity can be a God in the mind of believers. Aether exists in the mind of believers as Aether-God, not in reality. There are Aether believers. Modern Physics is in a tightly guarded bubble; nobody seems to see or hear in the bubble, in isolation. Propaganda Journals are cheering every voodoo claim with fanfare. These journals reject any paper that questions the voodoo doctrine of physics. Modern Physics is in real need of some serious house cleaning. Modern Physics, the Grinch who stole the common sense and given us a voodoo-sense, keep giving; propaganda press is enjoying it.

I bought a lottery ticket yesterday. I am both winner and loser simultaneously until the lottery is drawn. I am well aware that I am a loser with much higher probability and a winner with negligible probability. Of course, I bought the ticket because I do not know the actual outcome. If I knew the outcome, I would not have bought it. Now that I have a ticket, all the possible outcomes are simultaneously possible with their respective probabilities until one outcome is chosen in the draw. There is no winner or loser until lottery is drawn. A person who holds a ticket is a winner and a loser simultaneously until lottery is drawn. That is possible since winner and loser are not physical entities. I am the winner and a loser simultaneously until the lottery is drawn. The same does not apply to a particle. A particle is either here or there, not both here and there simultaneously. Is this science? It is certainly good for keeping the paper mill running in academia, not much else. By the way, the lottery was drawn today, and I am not the winner. I am no longer at the state of both winner and loser simultaneously as I was yesterday. It wasn't the physical I, who was in the state of both winner and the loser simultaneously; it was a non-physical unknown outcome that was in multiple state. No physical entity can be multiple states simultaneously. No particle can be at multiple speed simultaneously. No particle can be at multiple positions simultaneously. No particle has a momentum without unique position.

"*No particle has an existence without unique position and momentum at any time*."

"*Plank's Blackbody spectrum is incorrect. Energy is not quantized. Einstein's derivation of photons or light quanta is invalid. There are no photons or light quanta. Light is not particles. Particles are not waves.* $e \neq mc^2$, $e \neq pc$, $p \neq e/c$, $\lambda \neq h/p$. *If e is the kinetic energy of a mass m moving at speed v,* $e=(1/2)mv^2$, $e=(1/2)pv$, $p=mv$, $p=e/(1/2)v$, *and if the mas is vibrating at frequency f orthogonal to the direction of motion at speed v, we also have,* $\lambda=v/f$, *where λ is the wavelength of the sinusoidal path taken by the mass m under the vibration at frequency f. A mass m has kinetic energy* $e=mc^2$ *if and only if the mass is traveling at speed* $(2)^{1/2}c$. *No rest mass has a motion relative to light, and hence a mass at rest cannot have energy* mc^2; *no mass has speed -c relative to light. A*

mass at rest has no kinetic energy. Lenard's photoelectric experiment is half-complete and hence conclusions are incorrect. Bohr atom is invalid. Heisenberg uncertainty principle is invalid. Lorentz Transform does not exist. Lorentz Transform is not unique. Special Relativity and General Relativity are not mechanisms of nature. Universe is not expanding. There is no Dark matter. There is no Dark Energy. Gravity cannot bend light in a vacuum. Time is not relative. Gravity does not affect time. Schrödinger equation is an invalid mental construct that has no physical existence. Quantum Mechanics have no existence. State of a particle is unique. No mass can be multiple states at the same time. Fields cannot come in quanta. Vectors cannot come in quanta. Gravity is not a wave. A single field cannot propagate. Propagation requires a conjugate pair of fields. Gravitational field does not have a conjugate partner for propagation. Quantum Computer is an optical processor where both transmitted wave-burst and reflected wave-burst exist simultaneously. Any object can travel faster than light. Speed of light is observer independent just as the speed of a train is observer independent. There is no speed limit in the universe. The speed of light is the speed of light is the speed of light, nothing more. Time, mass, and speed of light are not relative. Laws of physics are observer independent."

Light is not relative. The speed of the propagation of light is a constant $c=f\lambda$ in the vacuum and affected by a medium. The speed of the propagation of light is not observer dependent. The speed of the propagation of light is a constant in every inertial or accelerating frame. Light does not move. Light propagates. However, a burst of light moves relative to an observer. The motion of a burst of light is relative. The speed of motion of a light burst v relative to an inertial frame is not a constant c. The speed of motion of a light burst $c_r=dr/dt$, where dr is the distance travelled by a light burst at time dt relative to a reference frame. It is only relative to a stationary frame that we have $c_r=c$. The experimentally measured speed is c_r, not c. The speed of propagation of light c is very close to the experimentally measured speed c_r, but not equal.

Any object can travel faster than light. There is nothing special about speed of light except that the speed of light is determined by the vacuum and travels on a fixed path in the vacuum, and they can only be altered by a medium. Any entity travelling on a fixed path is observer independent. Speed of light cannot limit the speed of other objects. Speed of light has no effect on the speed of other objects. Any mass can travel faster than light. So, any analysis based on the invalid concept that "nothing can travel faster than light" is invalid and archaic.

The $e=mc^2$ is not a rest energy of a mass m. For historical reasons, one may be inclined to interpret $e=mc^2$ as the kinetic energy of mass m relative to the propagation of light as Einstein did in Special Relativity. But that interpretation is indeed incorrect. Relativity does not apply to massless. Massless are not relative. Light is not relative. Entities that have no standstill existence cannot be relative. Light has no standstill existence. A mass does not have a rest kinetic energy, and hence $e=mc^2$ is not the rest energy of a mass m. A mass does not have a rest kinetic energy and $e\neq mc^2$.

The claim that $e=mc^2$ is the rest energy of a mass is meaningless. A mass cannot have rest kinetic energy. Special Relativity assumes that the light is relative and hence in Special Relativity, $e=mc^2$ is the kinetic energy of a rest mass relative to the propagation of light. If you assume light to be relative, relative to light any stationary mass m is moving in opposite direction at speed c. Since the light is propagating at constant speed c from the start, relative to light, mass is also moving at constant speed c from the start, which is impossible. If mass m is moving at speed c from the start relative to light, then, it has kinetic energy $e=mc^2$; this is the genesis of $e=mc^2$, which is non-sensical, incorrect.

No mass can start at constant speed c and remain at constant speed c, and hence $e\neq mc^2$. Further, you cannot obtain the speed of a mass relative to light since light has no standstill existence. Light has no existence without propagating at the speed c. You can only obtain relative speed of a mass with respect to another moving mass, not a massless wave. A mass cannot have kinetic energy $e=mc^2$ unless the mass is travelling at the speed $v=(2)^{1/2}c$. A mass can only have kinetic energy $e=mc^2$ if and only if mass is moving at speed c from the start, which is impossible. Since mass cannot have speed c from the start, the kinetic energy of a mass moving at speed c is given by $e=(1/2)mc^2$. If the energy of a mass m is $e=mc^2$, then, the mass m must be moving at speed $v=(2)^{1/2}c$, a speed greater than the speed of light, which is indeed possible. Light has no momentum. Massless has no momentum. Travelling faster than light is possible. Speed of light cannot limit the speed of other objects. The claim that "nothing can travel faster than light" is false.

Light is not relative since light has no existence without propagation. Light cannot be brought to standstill. Any entity that cannot be brought to stand still cannot be relative. Any entity that travels on a fixed path in the vacuum or in a medium cannot be relative. Light is not relative. Lorentz Transform had been used to show that the light is relative in Special Relativity. Lorentz Transform is not unique [2] and hence Special Relativity is invalid. Light travels on a fixed path in the vacuum that can only be altered by a medium and hence light is observer independent. Light is not relative. The ubiquitous relationship that claims to be the rest energy of a mass $e=mc^2$ is meaningless. Rest mass has no kinetic energy. Anything can travel faster than light.

We cannot see the propagation of light waves. We cannot directly measure the speed of propagation of light. Speed of propagation of light c is not measured, it is calculated as the product of frequency f and the wavelength λ, where $c=f\lambda$. The speed c_r we measure

relative to the reference frame we are in as the distance travel per unit time, where $c_r=dr/dt$, is the speed of light bursts we see. When we are stationary in a vacuum, the measured speed of light bursts c_r is the same as the speed of propagation of light waves c. Treating these two speeds as the same is one of the mistakes in Special Relativity. The measured speed c_r of light burst will always be greater than the speed of propagation of light $c_r \geq c$.

We do not need a Special Relativity for light. Light travels on a fixed path in the vacuum and in a medium. The speed of any entity that travels on a fixed path in the vacuum and in a medium is observer independent. Observers cannot derail a train since a moving train has no existence off its track. Light has no existence of its fixed path in the vacuum and in a medium. Relativity of light is no different from a relativity of a train, a Bulldozer, an Armored vehicle, or a Caterpillar; It is the track that moves unaltered relative to observers. The motion of a fixed track relative to an observer is no different from the motion of a mountain relative to a runner. Relativity of Light does not require a Special Relativity.

We do not see the propagation of light. Propagation of light is governed by Maxwell equations and the speed of propagation light is independent of observers. What we see and measure are the motion of light bursts. Motion of light bursts is not governed by the Maxwell equations and hence the speed of motion of light burst is observer dependent. Speed of light cannot limit the speed of other objects. There is no speed limit in the universe. Laws of physics are the same on every inertial frame without Special Relativity or General Relativity. Laws of physics are observer independent.

Energy is not quantized. Energy of different flavors cannot come in a universal quantum, $e \neq hf$. Any entity can travel faster than light. A mass cannot be multiple places simultaneously. Position and momentum are not mutually independent. Position and momentum of a mass cannot be probabilistic. The motion or propagation of any entity on a fixed path in the vacuum or in a medium is observer independent. Light propagates in the vacuum on a path that is fixed in the vacuum and in a medium and hence propagation of light is observer independent. No Special Relativity is required. Quantum Mechanics has no existence since Plank spectrum is invalid.

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