

Quantum Spin-1/2: genesis of voodoo-Physics

[Theoretical Blunder Wrapped in Bogus Stern-Gerlach Experiment]

(From QM non-sense Back TO common-sense Reality)

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Abstract—Quantum Spin 1/2 that defies the reality replaced the common-sense with non-sense. Quantum Mechanics (QM) was founded upon the conjecture that particles behave as waves of deBroglie wavelength. DeBroglie wavelength is incorrect. No particle has the energy required to be at deBroglie wavelength. A particle only has 1/2 the required energy. Spin 1/2 is a direct manifestation of incorrect deBroglie wavelength. Abracadabra — meaningless and inexplicable Spin 1/2 simply disappears when the correct wavelength is used. Moving particles do not generate waves if they are electrically neutral and stable. Only the moving charges generate electromagnetic radiation waves when the charges are stopped, accelerated, or decelerated. Wavelength of radiation is inversely proportional to the motion of the charge, momentum, not to the motion of mass, momentum. Probability interpretation of Stern-Gerlach Experiment is simply bogus. Spin is not spatially quantized. Any quantity that has a specific belonging cannot be quantized due to unavailability of a mechanism to integrate the belonging information into the quanta. Unlike data quanta in the Internet where belonging information is carried in the header, any belonging information is lost if Angular Momentum is quantized. Angular Momentum is specific to an orbiting system, and that information, without which orbiting system has not existence, is lost if the angular momentum is quantized, and hence angular momentum and spin cannot come in quanta. Vectors cannot come in quanta. Only the electromagnetic energy, which has no belonging whatsoever once they are out of a source, can come in quanta, nothing else. There are no fractional or integer spins, and hence, Boson and Fermion categorizations are meaningless. Spin is an inherent characteristic of Orbiting Systems to counteract the Angular Momentum of an Orbiting System. Spin Magnetic Moment (SMM) of an Atom is not due to the Spin of electrons. SMM of an electron is proportional to the surface area of an electron, which is negligible. The net SMM of an Atom due to the spin of electrons is zero since the SMM of neighboring electrons are of opposite polarities. When Orbiting Systems such as Atoms spin, the spinning nucleus takes all the bound electrons on a Merry-Go-Round ride creating circular current loops that generate a SMM. Merry-Go-round SMM cancels out with the Orbit Magnetic Moment since they are equal and

opposite. SMM of an Atom is mainly due to the spin of the nucleus itself. Orientation of an Atom is its direction of SMM, the Spin. SMM of neighboring atoms are of opposite polarities due to magnetic coupling. What is responsible for splitting a beam of Atoms into two beams of equal number of Atoms in the Stern-Gerlach Magnetic Field (SGMF) is the magnetic coupling between Atoms, not probability. When the SGMF is rotated, split beams will also rotate in-phase. Spin of a particle set by SGMF is volatile; no permanent Spin setting is possible. Stern-Gerlach Device is not a Spin measuring instrument. Components of SMM along axes cannot be obtained using Stern-Gerlach Device. Spin does not have Up or Down signatures unto itself. When the first Atom in a beam of particles enters SGMF, it always aligns towards the SGMF and drifts Up, unless the Atom enters with the orientation against the SGMF, in which case, it drifts Down. Orientation of an Atom that follows is always against the orientation of the previous Atom due to magnetic coupling. If an Atom is deflected toward SGMF (Spin-Up), it only means that the actual orientation of SMM of an Atom or Spin was not against SGMF. SGMF is blind to the actual Spin of an Atom. Independent of the actual Spin of an Atom and the direction of the Stern-Gerlach Device, any Atom in the SGMF is either aligned with (Spin-Up) or against (Spin-Down) the SGMF. You are either with us or against us, the Bushism — if you are not against us, we will torque you Up; if you are against us, you will go Down. When Spin-Up and Spin-Down split beams are out of the SGMF, they are no longer Spin-Up, or Spin-Down since Atoms realign themselves in the absence of an external magnetic field due to the magnetic coupling of neighbors; they will be just like the original beam. If you send the Spin-Up beam through a second SGMF placed in series and in-phase with the first SGMF, beam will pass through without a split since it is equivalent to the extension of the length of the first SGMF; no collapsing wavefunction and Berlin-Hagen interpretation are taking place. If the second SGMF is in series but out of phase, the Spin-Up split beam will re-split into two beams of equal number of atoms. Spin-Up and Spin-Down are not states of a particle since they are observer dependent. Spin-Up for one observer can be Spin-Down for another. Any two neighboring electrons have opposite Spin due to the attraction and repulsion of magnetic polarities of SMM, not an exclusion

principle; there are no Pauli matrices. Spin Matrices cannot be operators since they are singular, non-invertible. Operators cannot be singular since they must be invertible. Angular momentum and Spin operators have no existence without Position and Momentum operators. Position and Momentum matrix operators cannot exist in QM since matrices do not satisfy non-commutative relationships. Matrices of infinite order cannot be in QM since they are not Hermitian. Quantization of Spin, and representation of Spin-Up and Spin-Down by orthogonal vectors cannot be done without magnetic monopoles. Spin-Up and Spin-Down are non-separable and hence they are not in a superposition. If your q-bit gismo is working, it has nothing to do with superposition; it has all to do with Atomic SMM, which is bi-polar. Entanglement is magnetic coupling and it is real. A probability distribution is static. Waves have no existence without propagation, and propagating waves cannot be normalized for the entire range and hence waves are not probability distributions. A wave normalized only for the range of the wavelength does not represent a probability distribution. Nature does not normalize, and QM has no existence without normalization. There is no measurement problem. One radar pulse is all that is required to obtain both position and momentum simultaneously. The precision of Momentum is directly proportional to the precision of Position, not inversely. Position of a particle cannot be a wave if the momentum is fixed, and Momentum of a particle has no existence without change of position at any time. Position and Momentum are mutually dependent and hence not a Fourier Transform pair. Uncertainty Principle is false. State of a charge particle must be unique since uncertainty leads to radiation loss. Spin of an Atom in an external magnetic field is volatile. An Atomic SMM can replace a Flip-Flop. Space lock of Atomic SMM can provide unlimited digital data storage and speedy processing toward Space Locked Atomic Memory (SLAM) and Atomic Computer (ATOC). Particle waves and wave particles are oxymorons. Electromagnetic radiation waves due to the change in chomentum of a charge particle is real, not an artificial probability distribution. Electron Microscopes have nothing to do with motion of mass, momentum, or QM; they have everything to do with motion of charge, chomentum. In Particle Microscopes, particles are just chauffeurs for charges since a charge has neither an existence nor a motion without a particle. Image resolution of Particle Microscopes decreases with the increase of particle mass due to the decrease in speed, increases with the increase of charge and speed, and no image is generated if particles are neutral and stable, which are direct contradictions to deBroglie wavelength and QM. What generates and image in Electron Microscopes is motion of charges, chomentum, not motion of mass, momentum, or particle waves. Electromagnetic radiation resulted from the collision of charge particles with a specimen generates an image of the specimen

in an Electron Microscope. Wavelength is inversely proportional to the chomentum, not to the momentum; proportionality factor or the radiation parameter can be determined both theoretically and experimentally. Quantum Spin 1/2 that spookified the nature is merely a result of a theoretical blunder wrapped in bogus interpretation of Stern-Gerlach Experiment. Quantum Mechanics mantra "Shut Up, Compute, publish (SUCp)" is no different from religious mantra "Shut Up, Donate, pray (SUDp)", both are equally non-sense. Reality does not depend on Observers. It is the Observer misinterpretation of experiments that have turned common-sense into non-sense, and physics into voodoo-physics. If it is non-sense, it is a religion, a life waster; it ain't science. Particle waves are fantasy waves of our ignorance. QM warrants the declaration, a pandemic; test, quarantine, keep social distance.

Keywords—Spin; Quantum-Mechanics; Spin-1/2; Entanglement; Stern-Gerlach; Orbit; Particles

I. INTRODUCTION

Special Relativity was conceptualized by firing hypothetical light pulses vertically from the bottom of a moving train and illustrating the path relative to the moving train as vertical, incorrectly [5]. In other words, Special Relativity starts by treating pulses of light as golf balls by assumption. It is this invalid representation [4] that gave a momentum and hence an equivalent mass to light. Although light can never be spatially random particles [8], Einstein stipulated [10] incorrectly that light consists of spatially random particles that later came to be known as photons of energy hf , where h is the Plank constant and the f is the frequency. Under these invalid assumptions, if light is relative and consists of photons, then, a photon constitutes momentum \mathbf{p} that travels at the speed of light c . Light cannot be a collection of particles or photons that are spatially random [8] since light is directional. Spatially random particles cannot produce coherent light. Without the assumption of spatial randomness, there are no photons or particles of light.

A. Wave-Particle (Photon) and Wavelength

It all started with the meaningless invalid description of the energy e of a photon incorrectly as,

$$e=pc \quad (1.1)$$

where, $p^2=\mathbf{p}\cdot\mathbf{p}$, and c is the speed of light.

This description is meaningless since light has no mass and hence no momentum. Light is not relative [4] and hence light has no equivalent mass.

The energy, e of a photon is also related to frequency f by Plank Constant h ,

$$e=hf \quad (1.2)$$

So, we have,

$$pc=hf \quad (1.3)$$

The speed of light c is given by,

$$c=f\lambda \quad (1.4)$$

where λ is the wavelength.

Substituting for c in eqn. (1.3), we have,

$$pf\lambda = hf \quad (1.5)$$

$$\lambda = h/p \quad (1.6)$$

Wavelength λ became to be known as the wavelength of a photon or light particle with momentum p . This is a man-made, artificial, and non-existent particle with equally non-existent and artificial momentum; totally imaginary, hypothetical. Propagation of light has no associated momentum. There are no massless particles. By definition, a particle is an entity with a mass. There are no particles without mass. Electromagnetic waves are not probabilities of finding photons. As we see later, propagating wave cannot be a probability distribution. Probability distribution is static.

Electromagnetic energy and Kinetic energy are not the same. If you divide electromagnetic energy by the propagation velocity of light, what you get is nonsense, not momentum. It is only if you divide twice the kinetic energy of an object or a particle by its speed, you will get the momentum of the particle or the object. It is only the kinetic energy that has an associated mass hence momentum. Kinetic energy has no existence without a mass. However, no such mass is required for the existence of electromagnetic energy. Electromagnetic energy has no associated mass and hence no momentum [5]. There is no momentum without a mass. The momentum p of a particle of mass m and velocity v is given by.

$$p = mv \quad (1.7)$$

When mass approaches zero, the momentum is zero. Light has no mass and hence no associated momentum. Light does not have an equivalent mass since light is not relative [4]. According to the relationship $\lambda = h/p$, the wavelength of a hypothetical light particle or photon is inversely proportional to the momentum of photon, a massless particle that is non-existent. Electromagnetic and Gravitational Forces are not a result of exchange of hypothetical particles that exist only in human psychic. Exchange of particles cost energy, not free. You do not need another particle for two particles to exert a gravitational force on each other.

You do not need an invisible massless particle for two charge particles to exert an invisible force on each other.

B. Particle Waves and deBroglie Wavelength

A hypothetical mass-less particle or photon behaving as a wave of wavelength inversely proportional to the momentum of the mass-less particle, $\lambda = h/p$, did not stop with the imaginary massless light particles or photons. DeBroglie, out of nowhere, conjectured that any matter particle of mass m with momentum p should also behave as a wave of wavelength λ given by,

$$\lambda = h/p \quad (1.8)$$

where $p^2 = p \cdot p$.

Since $p = mu$, where u is the speed of the particle, we have, $\lambda = h/mu$. In other words, the wavelength is

inversely proportional to the mass of the particle. The wavelength decreases with the increase of the mass of the particle. If this is the case, we should be using thicker wires on a guitar for high notes. This is counter intuitive. If this is true, we can increase the resolution of Particle Microscopes such as Electron Microscopes by using heavier particles. If deBroglie relationship holds, we should be able to increase the resolution of the Electron Microscope by using a beam of protons in place of a beam of electrons; of course, we have to call it Proton Microscope. If deBroglie wavelength holds true, a beam of protons travelling at speed u should provide a Microscope that has a higher resolution than a beam of electrons travelling at speed u . This shows that all is not right with the deBroglie wavelength conjecture.

According to deBroglie conjecture, the wavelength is inversely proportional to the speed of the particle. This is right for wavelength of the electromagnetic radiation waves generated when a charge particle is stopped since the frequency of the radiation is proportional to the speed of the charge particle. Higher the speed of the charge particle, higher the frequency of electromagnetic waves it will generate when the particle is suddenly stopped. Still, the wavelength of the radiation has no relation to the mass. However, deBroglie wavelength is not referred to electromagnetic waves generated by a charge particle when the particle suddenly stopped. DeBroglie wave is referred to hypothetical particle waves; that is the problem with deBroglie waves and the whole idea of particle waves and Quantum Mechanics.

This is the genesis of matter wave, particle waves or deBroglie waves. The strange thing here is that nobody knows what is waving here in a particle. The wavelength $\lambda = h/p$ is known as deBroglie wavelength of a matter particle of momentum p . Since the momentum p is not unique, the deBroglie wavelength is not unique. The wavelength of a particle is not unique to that particle since particles of different masses can have the same wavelength. DeBroglie wavelength is not a unique signature of a particle.

It is through this conjecture that the Plank constant h received the units of angular momentum; it is by assumption, not as a fact. Since the wavelength λ has the units of length, from the relationship, $\lambda = h/p$, the Plank constant h must have the dimension of angular momentum. As a result, any error or mistake in the wavelength will be reflected in the angular momentum or Spin. This is exactly how Spin-half came into being. Spin 1/2 was born through deBroglie wavelength error. Everybody talks about Spin 1/2 just like a religious prayer or religious chanting; in religious chanting, chanter is not required to know the meaning of what is chanted. Not surprisingly, as we will see, nobody can have a clue to what Spin 1/2 is, simply because it is meaningless, and no such thing exists.

It is also this deBroglie conjecture that makes an invalid connection between the mass of a particle and

the Plank constant. The fact is that the Plank constant has nothing to do with mass. Plank constant is related to electromagnetic energy, not to mechanical energy. Mass of a particle consists of mechanical energy, which is not the same as electromagnetic energy; not all the energies created equal. Electromagnetic energy and the mechanical energy are not the same; it is only that we can convert one to the other. Mechanical energy does not come in quanta. Mechanical energy is continuous. It is meaningless to write kinetic energy as hf . In fact, Plank constant has no connection to the mass of a particle. It is the invalid assumption of particles behaving as waves, together with the equally invalid treatment of mechanical energy as same as the electromagnetic energy that led to the Schrodinger equation. Schrodinger equation is nothing more than the time derivative of the planewave equation under the invalid and meaningless assumption that the mechanical energy is quantized and can be represented as hf .

Contradiction in deBroglie Conjecture:

According to the deBroglie conjecture, the wavelength is inversely proportional to the mass of the particle and hence higher is the mass lower is the wavelength. As a result, Proton Microscope should provide a higher resolution images than an Electron Microscope. This is counter intuitive and contradictory. You cannot increase the resolution of a Particle Microscope by increasing the mass of the particles. In fact, by increasing the mass, you are decreasing the resolution. The higher the mass of the particles, lower is the resolution in practice, a real contradiction to deBroglie conjecture. Reality is against deBroglie conjecture. DeBroglie conjecture is counter intuitive. Wavelength cannot be inversely proportional to the mass of the particle.

It makes sense to use the smallest mass as possible in a Particle Microscope for higher resolution. In fact, that is the reason for using a beam of electrons in a Particle Microscope. That is the reason why we have Electron Microscopes, not Proton Microscopes. It is the moving charges that are responsible for generating an image in a Particle Microscope such as Electron Microscopes. If a beam of neutral particles is used in a Particle Microscope, there will not be an image. This is a clear indication that it is not the particle waves that generate an image. The problem is you cannot accelerate a beam of neutral particles using an electric field.

It does not matter what the mass of the particles are, electrically neutral beam of particles does not produce an image in a Particle Microscope, or an interference pattern in the Double-Slit experiment. It is only when we use a beam of charge particles, we can obtain an interference pattern in the Double-Slit experiment or an image in a Particle Microscope such as Electron Microscope. If the particles of the beam used in the Microscope are electrically neutral, we would not have had an image in the Particle

Microscope.

C. Wave-Particles and Particle-Waves

The relationship $\lambda=h/p$ is simply meaningless for waves since waves are not particles and electromagnetic waves have neither mass nor a momentum. There cannot be a momentum in the absence of a mass. Electromagnetic waves carry electromagnetic energy, not the kinetic energy or mechanical energy. Electromagnetic energy is not kinetic energy. Not all the energies are equal. Kinetic energy can only exist in association with a mass. No such association of a mass exists or requires for the existence of electromagnetic energy. Equating mechanical energy or kinetic energy to electromagnetic energy is one of the biggest mistakes in the Special Relativity as well as in Quantum Mechanics. It is only the electromagnetic energy that is proportional to the frequency, $e=hf$. Mechanical energy is continuous. Mechanical energy, e_M or the energy associated with a mass does not come in quanta and hence it is not proportional to frequency, $e_M \neq hf$. Without invalid quantization of mechanical energy of a particle, and the invalid representation of the mechanical energy of a particle as hf , there would not be a Schrodinger equation or Wavefunction.

Mechanical energy has a belonging since mechanical energy cannot exist without associating object. Unlike electromagnetic energy, mechanical is not free flowing. Any quantity that has a specific attachment cannot be quantized since that attachment information is lost if that quantity is quantized. Mechanical energy is specific to an object, a mass. Quanta in nature have no mechanism to carry belonging information. As a result, mechanical energy cannot be quantized. Mechanical energy cannot come in quanta.

Lemma:

Any quantity that has a specific belonging cannot be quantized since nature has no mechanism to carry belonging information in quanta.

Natural Property:

Not all the energies are the same. Electromagnetic Energy and Mechanical Energy are not the same. Mechanical energy does not come in Quanta and cannot be represented as hf . It is only the Electromagnetic energy that comes in wave bursts or Quanta and can be represented as hf .

The relationship $\lambda=h/p$ is meaningless for light since light is not a collection of spatially random particles as it was hypothesized in the derivation of spatially random photons. Spatially random particles cannot be on a linear path that light takes. Light cannot take a coherent linear path if light consists of spatially random particles or photons. If light has an equivalent mass, light cannot travel at constant speed even in a vacuum in the presence of a gravitational force. Light is not relative [4]. If the light is not

relative, light does not have an equivalent mass. If the light is relative, speed of light cannot be a constant since the speed of the Shear Electromagnetic (SEM) waves generated by the relativity is dependent on the frame of reference. When light is not relative, a vertically oriented pulse of light from the bottom of a moving train does not have a vertical path relative to the moving train [5]. The relationship $\lambda=h/p$ does not hold true even for light or electromagnetic waves since light is not relative.

DeBroglie extension of $\lambda=h/p$ to any particle with mass is meaningless. As we will see later, the wavelength $\lambda=h/p$ derived for a hypothetical photon or a wave particle cannot be extended to a particle or a particle with mass directly since they do not have same energies. The energy of a so-called imaginary photon or wave particle is not the same as the energy of a mass or a particle. It is the deBroglie assumption that the hypothetical particle waves have the same wavelength as the equally hypothetical photons or wave particles that led to the mysterious Quantum Spin-1/2 and meaningless Boson and Fermion categorization.

Matter particles do not behave as waves. If a particle of mass m behaves as a wave, the wavelength must be unique to that particle, but it is not. The momentum, p is not unique. As a result, the wavelength $\lambda=h/p$ is not unique. Try to explain the working of a string musical instrument with deBroglie conjecture. You cannot. It is a contradiction.

Even if you want to assume particles behave as waves, deBroglie wavelength $\lambda=h/p$ of a particle is incorrect. We are going to see how we can obtain the correct wavelength for a matter particle of momentum p and see why deBroglie wavelength is incorrect and to what extent. If you still want to stick religiously to the invalid idea that particles behave as waves and also to its equally invalid extension Quantum Mechanics, the good news is that we can easily correct the mistake by associating a multiplication factor into the Plank constant in Quantum Mechanics; now, you can remain in the religious cult of particle-wave believers and keep practicing voodoo-physics. We are also going to show how Quantum Spin-1/2 and Quantized Spin disappear, in general, from existence with the use of the correct wavelength that the energy of a particle can support in place of incorrect deBroglie wavelength that no particle of mass can support. Quantum Spin 1/2 is what turned physics into voodoo-physics where reality tuned into anybody's guess, what one sees on 8th-Ball.

Voodooification:

Incorrect deBroglie assumption that the hypothetical Particle Waves are of the same wavelength as the hypothetical Photons or Wave Particles led to the mysterious, meaningless, and invalid Quantum Spin 1/2, which has no real existence. Quantum Spin 1/2 that is pretentiously supported by misinterpretation or bogus interpretation

of the Stern-Gerlach Experiment, is the origin of the proclaimed bizarreness of microscopic particles, voodooified physics.

Spin 1/2 is non-existent. There is no such thing called Spin 1/2. There are no integer Spins either. Spin is not quantized. Spin is a vector. Vectors cannot be quantized. As we will see later, the magnitude of the Spin is a constant for Atoms with a given atomic number. Stern-Gerlach Experimental Interpretation is wrong. Claim that a particle can be at multiple states simultaneously is wrong. Particles do not behave as waves. State of a particle unique and cannot be defined by a wave function. The derivation of the wavefunction depends on the invalid assumption that mechanical energy is quantized. Schrodinger equation is nothing more than the time derivative of the plane wave equation under energy constrain of a particle [7]. Mechanical energy is not Quantized. Parameters of a system cannot be represented by eigenvalues of operators since the eigenvalues are not unique.

Momentum has no existence without the change of position. Position cannot remain unchanged in the presence of a momentum. Position and Momentum are mutually dependent and hence cannot be a Fourier Transform pair. As a result, there is no Uncertainty Principle [7].

Precision of the momentum of a particle is not inversely related to the precision of the position of the particle. In fact, the precision of the momentum of a particle is directly proportional to the precision of the position of the particle and vice versa. Position and momentum of a particle must be unique at any time. As we are going to see, Spin 1/2 disappears when the correct wavelength is used and with that the voodoo behavior of particles and Quantum Mechanics cease to exist; the end of voodoo-Physics.

Reality:

If the momentum is fixed, Position is either linear or circular, not a wave. If the position is fixed, Momentum has no existence. Momentum has no existence without change of position and time. Position and Momentum are mutually dependent, and hence not a Fourier Transform pair. Major fallacy of QM.

II. CORRECT WAVELENGTH FOR HYPOTHETICAL PARTICLE-WAVES

Assumption Credibility:

Particles do not behave as waves. If you are going to assume particles to behave as waves of deBroglie wavelength, for that assumption to be credible, the energy of a particle must be sufficient for the particle to be at that wavelength. No particle has the energy required to be at deBroglie wavelength.

Theorem: Correct Wavelength

If particle is assumed to behave as wave, the correct wavelength of the particle that the energy of the particle can support is given by $\lambda=2h/p$, where p is

the momentum of the particle, h is the Plank constant.

The fact of the matter is that there are no particle-waves. A particle cannot be a wave. A wave cannot be a particle. Having said that, however, if you still want to continue along the Quantum Mechanics based on the hypothetical particle-waves, it is essential, at least, to use the correct wavelength of a particle-wave that the energy of a matter particle of mass can support. The use of the correct wavelength will eliminate those mysterious outgrowths such as Quantum Spin 1/2 and the Quantum Spin matrices in general. Let us see how to obtain the correct wavelength of a hypothetical particle-wave.

Let us consider a matter particle of mass m and momentum \mathbf{p} . The energy, e of the particle is given by,

$$e = (1/2m)p^2 \quad (2.1)$$

where $p^2 = \mathbf{p} \cdot \mathbf{p}$.

Now, as it is done in the Quantum Mechanics, if we incorrectly assume that the kinetic energy of a particle of mass m also quantized, we have,

$$e = hf \quad (2.2)$$

where, h is the Plank constant and f is the frequency of hypothetical particle-wave. Surprisingly, nobody seems to know what is waving here at frequency f in a mass.

Now, we have,

$$(1/2m)p^2 = hf \quad (2.3)$$

If the velocity of the particle is \mathbf{u} , Eqn. (2.3) can be written as,

$$(1/m)p(\mathbf{u}) = 2hf \quad (2.4)$$

$$p\mathbf{u} = 2hf \quad (2.5)$$

where, $u^2 = \mathbf{u} \cdot \mathbf{u}$.

For a particle-wave of frequency f and wavelength λ travelling at speed \mathbf{u} , we have,

$$u = f\lambda \quad (2.6)$$

Substituting for u in eqn. (2.5), we have,

$$\lambda = 2h/p \quad (2.7)$$

Since deBroglie wavelength is h/p , the actual particle wavelength is twice the deBroglie wavelength,

$$\lambda = 2(\text{deBroglie wavelength}). \quad (2.8)$$

In other words, deBroglie wavelength is one half of the correct wavelength. It is this wavelength error by a factor of one half that led to the mysterious Spin 1/2 that spookified the reality. If we have not made the mistake of getting the wavelength wrong in Quantum Mechanics, we would not be talking about or come across Spin 1/2.

If a particle behaves as a wave, the actual wavelength of the particle should be $\lambda = 2h/p$. DeBroglie wavelength of the particle should be the correct wavelength for hypothetical light particles or photons if such particles exist; no such particles exist. There are no photons or light particles. Light is always a wave never a particle [8].

Only a particle such as hypothetical photons that start and remain at constant speed can have deBroglie wavelength $\lambda = h/p$. Unlike hypothetical photons, a real particle with a mass does not start and remain at constant speed or momentum. A particle with a mass always starts at standstill or zero

momentum and gradually builds up the speed or momentum.

If a matter particle of mass m , velocity \mathbf{u} and momentum \mathbf{p} is to have deBroglie wavelength h/p , then, the particle must have kinetic energy $e = pu$ or $e = (1/m)p^2$; this is an amount of energy no real particle with mass can have. Any particle of mass m contains only one-half of that energy.

DeBroglie Wavelength of a matter particle is incorrect, $\lambda \neq h/p$. Only a Double-Slit Blunder [2] can validate deBroglie wavelength; no real genuine experiment can. The correct wavelength is,

$$\lambda = 2h/p.$$

It is the deBroglie wavelength, which is used in Quantum Mechanics, being off by one-half from the actual wavelength λ that has given the one-half 'the prominence it does not deserve in Quantum Mechanics. The so-called dreaded and mysterious Quantum Spin 1/2 that nobody is capable of explaining what it really is, yet only a few spin-doctors who enthusiastically talk about it as if only they have the intelligence to comprehend it even though they also have absolutely no clue to what it really is, disappears completely without a trace when the actual wavelength of a matter particle $\lambda = 2h/p$ is used in Quantum Mechanics. Not surprisingly, there is not a single book that explains it clearly, without any ambiguity, what Quantum Spin-1/2 is. Spin-doctors just go on babbling like politician answering a question from a journalist when they have no answer to the question; they just keep talking something to occupy time until the questioner back away in frustration. Nobody has a clue what Spin 1/2 is. They just repeat what is written in the textbooks like parrots without having any clue to what they are talking about; that is exactly what most Professors do in the class. One thing is clear though, anybody who has a real understanding of Spin 1/2 is not going to consider it as real, because it is total nonsense just like a religious dogma. For some unknown reason, religiously accepted doctrines, however inaccurate, happen to be protectively guarded while rejecting anything contrary, however accurate, as uncivilized. In some cases, it is done militarily by countries still run by such backward flat-earth and earth-centric era religious doctrines, while in other cases through censorship by various cults under disguise as journal editors and reviewers. Spin 1/2, Quantum Mechanics, and Relativity have taken stature of religious doctrines. No one is allowed to question their validity.

With the correct wavelength in place, not only the Quantum Spin 1/2 disappears, Spin Matrices disappear completely. Even if one chooses to take the wrong path of pretending particles to be waves, it is important to use the correct wavelength. If the correct wavelength had been used in Quantum Mechanics, we would not have heard of some strange thing called Quantum Spin 1/2 and Quantum Spin in general, or even the most bizarre 2-Dimensional Quantum Spin Operators. How can non-invertible matrices be Operators? How can there be 2-Dimensional Spin Operators when a particle cannot even exist in 2-

Dimensional Space? Spin operators of Particles cannot be two dimensional. No Particle Spin can take place in 2-Dimensional space. No non-invertible matrix be an Operator of an Observable. Operators must be Invertible.

All we must do to correct the deBroglie wavelength error is to replace Plank constant h by $2h$ everywhere except the time progression operator or the energy operator. Wavelength error has no direct effect on the time progression operator; the effect is indirect through Hamiltonian.

Corollary:

If particle is assumed to behave as a wave, the correct wavelength is twice the deBroglie wavelength.

III. QUANTUM MECHANICS OPERATORS UNDER CORRECT WAVELENGTH

Theorem: Quantum Operators

Momentum operator \mathcal{P} is the differential of the plane wave equation $\psi(\mathbf{r},t)$ with respect to the position \mathbf{x} . The time-evolution operator or the Hamiltonian \mathcal{E} is the differential of the plane wave equation with respect to time t under the invalid assumption that the mechanical energy is quantized, where,

$$\psi(\mathbf{r},t) = A \exp(j\mathbf{k} \cdot \mathbf{r}) \exp(-j\omega t),$$

$E = \hbar\omega$ is an invalid assumption, which is meaningless for a particle, E is the mechanical energy of the particle.

Schrodinger equation is nothing more than the time derivative of $\psi(\mathbf{r},t)$ under the boundary conditions.

Lemma: No Probability Wave Functions

Wave equation $\psi(\mathbf{r},t)$ cannot represent probability distribution since area against neither \mathbf{r} nor t can be unity. Function of run time or run position cannot be normalized for the area to be unity. Wave propagation is not a probability of finding a particle.

Corollary:

Wave function that is normalized only for a duration of wavelength. $\psi(\mathbf{p},\mathbf{r}) = (1/2\pi)^{1/2} \exp[(j/2\hbar)\mathbf{p} \cdot \mathbf{r}]$ does not represent a probability distribution. For a function to be a probability distribution area under the curve must be unity for the entire range, not just for a duration of a wavelength.

Particles cannot be waves. Waves cannot be particles. However, if you still want to consider particles as waves, for a particle of mass m and the momentum \mathbf{p} , we have the actual wavelength λ that is consistent with the energy of the particle,

$$\lambda = 2h/p \quad (3.1)$$

The wave number k or angular frequency, which is the frequency in spatial domain, is given by,

$$k = 2\pi/\lambda \quad (3.2)$$

Now, we have,

$$k = p/2\hbar \quad (3.3)$$

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

At any time t , the plane wave $\psi(\mathbf{r},t)$ of wavenumber k

and angular frequency ω is given by,

$$\psi(\mathbf{r},t) = A \exp(j\mathbf{k} \cdot \mathbf{r}) \exp(-j\omega t). \quad (3.4)$$

Substituting for k in eqn. (3.4) from eqn. (3.3), the hypothetical wave equation, $\psi(\mathbf{r},t)$ for a particle of momentum \mathbf{p} at position \mathbf{r} is given by,

$$\psi(\mathbf{r},t) = A \exp[(j/2\hbar)\mathbf{p} \cdot \mathbf{r}] \exp(-j\omega t) \quad (3.5)$$

where, $\mathbf{r} = (x, y, z)$, $\mathbf{p} = (p_x, p_y, p_z)$,

If we incorrectly assume a particle to behave as a wave, this $\psi(\mathbf{r},t)$ is the particle wave under correct wavelength that the energy of a particle can support. Now, we can obtain the operators for this hypothetical particle wave. It is only the momentum operator that is affected by the change of wavelength. The rest remains the same except the Hamiltonian. Hamiltonian is affected by the change of wavelength.

1) Momentum Operator:

By differentiating $\psi(\mathbf{r},t)$ with respect to \mathbf{r} , the Momentum operator \mathcal{P} is given by,

$$\mathcal{P} = (2\hbar/j) \partial/\partial \mathbf{r} \quad (3.6)$$

It is twice the operator under deBroglie wavelength.

2) Position Operator:

Position operator \mathcal{r} is given by,

$$\mathcal{r} = \mathbf{r} \mathbf{I} \quad (3.7)$$

where \mathbf{I} is the identity operator, and $\mathbf{r} = (x, y, z)$.

Since the position operator is position itself, there is no change of the position operator with the change of the wavelength from deBroglie wavelength to the correct wavelength that the energy of a particle can support. It is unaffected by the change of wavelength.

3) Energy Operator:

By differentiating $\psi(\mathbf{r},t)$ with respect to t , we have,

$$\partial[\psi(\mathbf{r},t)]/\partial t = -j\omega \psi(\mathbf{r},t) \quad (3.8)$$

Using operators, we have,

$$\partial/\partial t = -j\omega \mathbf{I} \quad (3.9)$$

where, \mathbf{I} is an Identity Operator.

Under the invalid assumption that the mechanical energy E is quantized, we have,

$$E = \hbar\omega \quad (3.10)$$

where, E = energy of the particle, i.e. the kinetic energy and the potential energy of the particle.

Substituting for ω in eqn. (3.9), we have,

$$\partial/\partial t = -j(E/\hbar) \mathbf{I} \quad (3.11)$$

If the Hamiltonian or the energy operator of the particle is \mathcal{E} , we have,

$$\mathcal{E} \psi(\mathbf{r},t) = E \psi(\mathbf{r},t) \quad (3.12)$$

The energy E of the particle is an eigenvalue of the Hamiltonian or the energy Operator \mathcal{E} .

From eqns. (3.11) and (3.12), we have the time evolution operator of the particle, \mathcal{E} given by,

$$\mathcal{E} = (-\hbar/j) \partial/\partial t \quad (3.13)$$

This is the Schrodinger Equation. There is nothing more to Schrodinger Equation. It is the differentiation of the plane wave equation with respect to time under the invalid assumption that Mechanical Energy is Quantized. Mechanical Energy is continuous. Mechanical Energy does not come in Quanta and as a result, Schrodinger Equation is invalid. There is

nothing waving in the Schrodinger Equation or the wave equation of a particle.

The time evolution operator has no direct effect by the change of the wavelength. However, it is indirectly affected by the wavelength since the Hamiltonian is affected by the change of wavelength through Momentum Operator.

Lemma: Hypothetical Schrodinger Equation [7]

If a particle of Momentum \mathbf{p} at Position \mathbf{r} is incorrectly assumed to behave as a wave, $\psi(\mathbf{r},t)$, under the equally invalid assumption that the mechanical energy E of a particle is quantized, the Schrodinger equation,

$$E\psi(\mathbf{r},t) = (-\hbar^2/2m)\nabla^2\psi(\mathbf{r},t) + V(\mathbf{r})\psi(\mathbf{r},t) \quad (3.14)$$

is nothing more than the time derivative of the plane wave $\psi(\mathbf{r},t)$ given by,

$$\psi(\mathbf{r},t) = A \exp[(i/2\hbar)\mathbf{p}\cdot\mathbf{r}] \exp[(-iE/\hbar)t] \quad (3.15)$$

If \mathcal{E} is the energy Operator or the Hamiltonian of the particle, then,

$$\mathcal{E}\psi(\mathbf{r},t) = E\psi(\mathbf{r},t). \quad (3.16)$$

where, $\mathcal{E} = (1/2m)\mathcal{P}^2 + V(\mathbf{r})$ and $\mathcal{P} = (\hbar/i)\nabla$, $V(\mathbf{r})$ is the potential energy and \mathbf{I} is an Identity operator.

Plane wave equation $\psi(\mathbf{r},t)$ under the energy constraints and the boundary condition of a particle is the Schrodinger equation.

Proof is straight forward since the Schrodinger equation is simply the time derivative of $\psi(\mathbf{r},t)$ under the invalid assumption that $\psi(\mathbf{r},\mathbf{p}) = A \exp[(i/2\hbar)\mathbf{p}\cdot\mathbf{r}]$ is time independent. There is nothing more to Schrodinger Equation.

Lemma: Non-Separability

For a particle of Momentum \mathbf{p} and Position \mathbf{r} , wavefunction $\psi(\mathbf{r},\mathbf{p})$ is time dependent since momentum \mathbf{p} is time dependent. The wavefunction $\psi(\mathbf{r},t)$ cannot be separated into time dependent $\psi(E,t)$ and time independent $\psi(\mathbf{r},\mathbf{p})$ component functions. Quantum Mechanics has no existence without this separation.

Momentum \mathbf{p} is time dependent. Position of a particle depends on momentum, and hence the position \mathbf{r} of a particle also becomes time dependent. As a result, wavefunction $\psi(\mathbf{r},\mathbf{p})$ is not time independent. Although the wavefunction $\psi(\mathbf{r},\mathbf{p})$ is time dependent, the derivation of Schrodinger equation makes the invalid assumption that $\psi(\mathbf{r},\mathbf{p})$ is time independent. The derivation of Schrodinger equation assumes incorrectly that the particle wavefunction $\psi(\mathbf{r},t)$ can be decomposed into time dependent $\psi(E,t)$ and time independent $\psi(\mathbf{r},\mathbf{p})$ component functions. We can write $\psi(\mathbf{r},t)$ as,

$$\psi(\mathbf{r},t) = A^2 \psi(\mathbf{r},\mathbf{p})\psi(E,t)$$

where, $\psi(\mathbf{r},\mathbf{p}) = A \exp[(i/2\hbar)\mathbf{p}\cdot\mathbf{r}]$ and

$$\psi(E,t) = A \exp[(-i/\hbar)Et].$$

It is this separation allowed Schrodinger to represent the energy of a particle E as the eigenvalues of Hamiltonian \mathcal{E} ,

$$\mathcal{E}\psi(\mathbf{r},\mathbf{p}) = E\psi(\mathbf{r},\mathbf{p}).$$

Since $\psi(\mathbf{r},\mathbf{p})$ is time dependent, this relationship does not hold in reality.

However, it is important to note that $\psi(\mathbf{r},\mathbf{p}) = A \exp[(i/2\hbar)\mathbf{p}\cdot\mathbf{r}]$ is not time independent since the momentum is time dependent. Momentum cannot be time independent. Momentum cannot change without change of time. Momentum cannot change without change of position of a particle. Position of a particle cannot change without change of time.

Position of a particle cannot remain unchanged in the presence of a momentum. Position of a particle depends on momentum, and the momentum depends on time, and hence the position of a particle is also dependent on time. At any given instant of time, $\psi(\mathbf{r},\mathbf{p})$ is a constant. As a result, Schrodinger equation is incorrect and invalid. You cannot assume $\psi(\mathbf{r},\mathbf{p}) = A \exp[(i/2\hbar)\mathbf{p}\cdot\mathbf{r}]$ to be time independent when it is not. For $\psi(\mathbf{r},\mathbf{p})$ to be a wave function of a particle, the position \mathbf{r} of a particle has to be able to change for a fixed momentum \mathbf{p} , and the momentum \mathbf{p} has to be able to change for a fixed position \mathbf{r} of a particle at any fixed time t ; this is impossible for a particle. You cannot just assume them to be when they are not in reality. That is a major mistake in Quantum Mechanics.

Corollary:

Schrodinger equation is nothing more than the time derivative of the plane wave equation under the assumption mechanical energy is quantized.

Lemma:

Eigenvalues are not unique and hence state of a particle cannot be represented by eigenvalues.

Lemma:

Since the state of a particle is unique, parameters representing state of a particle must be unique.

Corollary:

Mechanical Energy E of a particle is not quantized and hence $E \neq hf$. As a result, Schrodinger equation does not hold true.

Corollary:

Irrespective of size, a particle of mass does not behave as a wave. There is nothing waving in a mass. As a result, Schrodinger equation does not hold true.

Corollary:

Schrodinger equation is not a probability distribution since no wave equation can satisfy the nature of probability. Propagating wave cannot be normalized for the entire range and hence cannot represent a probability distribution. Wave normalized for the range of wavelength cannot represent a probability distribution. Nature does not do probability. Nature does not normalize. Particle waves are meaningless.

Nature of Probability:

- Probability is a human creation, not a nature's creation. It was invented to resolve gambler's dilemma; how to divide a betting between betters when the match had to be stopped before completion due to bad weather?
- Run time function cannot be normalized for the area to be unity.
- Run position function cannot be normalized for the area to be unity.
- Wave of position and time cannot be normalized for the area to be unity.
- Wave function normalized for the duration of a wavelength cannot represent a probability distribution.
- Waves have no existence without propagation. Wave equation is a run time function. A run time function cannot be normalized for the area to be unity for the entire range since the range is progressively increasing.
- Probability distribution is not a wave. Wave is not a probability distribution.
- The area under probability distribution must be unity. Area under propagating wave cannot be unity. Propagating wave cannot be normalized for the area to be unity.
- Nature does not normalize. As a result, probability cannot exist outside human touch.
- Probability is not a science, and science is not probability. A chance of event's happening says nothing about the actual happening of that event. A chance of particle being at certain location says nothing about the actual position of the particle. Location of the particle must be certain for the particle itself even though it is unknown to us.
- Probability is human decision-making tool. Not a nature's decision-making tool.

Lemma: Hypothetical Uncertainty Principle [7]

If the Momentum \mathbf{p} and the Position \mathbf{r} of a particle at any time instant is incorrectly assumed to be a Fourier Transform pair, then,

$$\Delta p \Delta r \geq 2\hbar \quad (3.17)$$

where Δp is the bandwidth or the precision of Momentum p , and Δr is the bandwidth or the precision of the position r .

Proof is straightforward. Under the incorrect and invalid assumption that a particle behaves as a wave, for a particle of momentum \mathbf{p} and position \mathbf{r} , the wave function at any time t is given by,

$$\psi(\mathbf{r}, \mathbf{p}) = A \exp[(j/2\hbar)\mathbf{p} \cdot \mathbf{r}] \quad (3.18)$$

If $\psi(\mathbf{r}, \mathbf{p})$ is a Fourier function of variables $(1/2\hbar)\mathbf{p}$ and \mathbf{r} , then from Fourier Transform theory, we have,

$$(1/2\hbar)\Delta p \Delta r \geq 1 \quad (3.19)$$

$$\Delta p \Delta r \geq 2\hbar \quad (3.20)$$

We know that if we have a time domain signal, both time and frequency cannot be band limited. Similarly, if we have position domain momentum signal, then, the position and the momentum cannot

be both band limited. In other words, both precision of position and the precision of momentum cannot be achieved at the same time if and only if the assumption that the position and momentum pair of a particle is a Fourier Transform pair does hold true.

Real Physics:

If you want to consider the reality or real physics, then, the Position and the Momentum pair of a particle is unique. No object can be in different places at the same time except in voodoo-physics. The position and momentum pair cannot be a Fourier Transform pair [7]. Further, the precision of momentum is directly proportional to the precision of position since the momentum is a derived quantity from the rate of change of the position irrespective of the size of the particle, $\mathbf{p} = m \partial \mathbf{r} / \partial t$, where m is the mass of the particle. As a result, there is no uncertainty of position and the momentum of a particle. Position and Momentum are not independent variables. Momentum has no existence without change in position and time. If the momentum is fixed, the position must be on a linear path or on a circular path, not a wave. Position and Momentum of a particle are mutually dependent. Position and Momentum of a particle cannot change without change of time. The wave function $\psi(\mathbf{r}, \mathbf{p}) = A \exp[(j/2\hbar)\mathbf{p} \cdot \mathbf{r}]$ is not time independent since \mathbf{p} and \mathbf{r} cannot change without change of time. In fact, at any given time, $\psi(\mathbf{r}, \mathbf{p})$ is a constant since neither \mathbf{r} nor \mathbf{p} can change without change of time. All it takes is just a single radar pulse in determining the Position and the Momentum of a particle simultaneously; they do not have to be measured separately. There is nothing preventing obtaining position and momentum of a particle separately.

Reality Theorem:

In the case of a particle, Momentum has no existence without change of position, and no change of position without change of time. Position of a particle cannot remain fixed in the presence of momentum. If the momentum is fixed, the position is on either a linear path or a circular path, not a wave. Position and Momentum are mutually dependent. Position and Momentum cannot be a Fourier Transform pair; simply impossible. You cannot assume impossible.

In the case of electromagnetic wave, the wave number k is independent of time. However, momentum of a particle is not independent of time. This is where the representation of the behavior of a particle as a wave fails, $p \neq \hbar k$. Just because we do not know the momentum of a particle at any given time, we may assume the momentum of the particle to be at any value if we want. However, that does not mean particle itself is at all the momentums at any given time. A particle at any given time has a unique momentum as far as particle itself concerned. Similarly, since we do not know the position of a particle, we may assume that a particle can be at any position at any given time. However, that does not

mean particle is at all the positions at any given time. The position and the momentum of a particle at any given time are unique.

Defendant Cannot be Both Innocent and Guilty:

Consider a defendant in a trial. Defendant is either innocent or guilty; though unknown to us, that is the reality. Since we do not know what exactly it is, we assume that the defendant is innocent until proven guilty. So, we remain unbiased to the position of the defendant, we do not take side. We consider in our mind, only in our mind, the defendant to be both innocent and guilty until we make observation to support one or the other. Our assumption has no effect on the reality of the defendant. That does not mean defendant is both innocent and guilty for the same event. Our assumption does not change the physical reality of the defendant. Whether we aware or not, dependent is either innocent or guilty, not both at any given event. Our assumption does not change the reality. Reality has taken place without our knowing. Our ignorance about the reality does not change the reality.

As far as natural reality concerned, state of the defendant is certain, no probability here. Probability only appear in human decision making far removed from reality. Reality has no association with probability. Probability only comes into play relative to a human observer. There is no probability in the absence of a human observer.

Particle is Either Here or There, Not Both:

It does not matter what the size of the particle is, there cannot be a Momentum without change of the Position. There cannot be a Momentum if the Position is fixed. The Position of a particle must change with Momentum irrespective of the size of the particle whether you like or not; you have no control over it. If the Momentum is fixed, then, the particle takes either a linear or circular path, not a wave. If the Momentum is fixed, no particle can behave as a wavefunction. For the Position and the Momentum to be a Fourier Transform pair, we must have:

1. For a fixed position, particle should be able to have infinite values of momentum at the same time, which is not possible for a particle.
2. For a fixed momentum, a particle must be able to have infinite values of positions at the same time, which is also impossible for a particle.

As a result, Position and Momentum pair cannot be a Fourier Transform pair [7]. Without Position and Momentum pair of a particle being a Fourier Transform pair, there would not be an Uncertainty Principle. As a result, Uncertainty Principle does not hold true. Irrespective of size, the state of a particle cannot be uncertain. You can only talk about Uncertainty Principle hypothetically in voodoo-physics that is outside the bounds of physical reality. Anything and everything are allowed in voodoo-physics since it is a human Crafted Prophecy (hCRAP) that has nothing to do with physical reality, just like a religion.

Losing your Quantum Mechanics religion is the only way to comprehend the reality. Losing my religion...

Corollary:

Particle cannot have a Momentum if the position is fixed. Particle takes either linear or circular path If the Momentum is fixed. Position and the Momentum of a particle are mutually dependent, and hence they cannot be a Fourier Transform Pair. Heisenberg Uncertainty Principle is Invalid; it does not hold true.

Lemma:

The precision of Momentum is directly proportional to the precision of the Position since the Momentum per unit mass is the rate of change of position.

Proof is straight forward since the Momentum of a particle is a derived quantity from the rate of change of the position of a particle. It is the misinterpretation of the Stern-Gerlach experiment that lead to the Uncertainty Principle. As we are going to show, there is no probability involved in the outcome of the Stern-Gerlach Experiment.

The result of Stern-Gerlach Experiment is deterministic. Heisenberg derivation rely on the matrices of infinite dimensions. The claim that the matrices of infinite dimensions can be in Quantum Mechanics is incorrect and invalid. Matrices of neither finite nor infinite dimensions can be in Quantum Mechanics.

Matrices of infinite dimensions cannot be square matrices and hence cannot be Hermitian. The matrices that are not Hermitian cannot be in Quantum Mechanics. The matrices that are of finite dimension cannot be in Quantum Mechanics since they cannot satisfy the non-commutative relationship that is so fundamental to Quantum Mechanics. In fact, irrespective of whether matrices are finite or infinite, Matrices cannot be in Quantum Mechanics.

Corollary:

The Momentum is a derived quantity from the Position, and hence the precision of the Momentum is as good as the precision of the position is.

Corollary:

There is no probability in the absence of a human observer.

Corollary:

Matrices cannot be in Quantum Mechanics irrespective of whether they are finite or infinite. Matrix operators do not satisfy the non-commutative relationship between Position and Momentum of operators that is fundamental for Quantum Mechanics.

4) Angular Momentum Operator:

Angular momentum operator \mathbf{l} is given by,

$$\mathbf{l} = \mathbf{r} \times \mathbf{p} \quad (3.21)$$

Substituting for \mathbf{r} and \mathbf{p} , we get,

$$\mathbf{l} = \mathbf{r} \times (2\hbar/j) \partial/\partial \mathbf{r} \quad (3.22)$$

$$\mathbf{l} = (2\hbar/j) \mathbf{r} \times \nabla \quad (3.23)$$

where, $\mathbf{r} = (x, y, z)$, and

$$\nabla = (\partial/\partial x, \partial/\partial y, \partial/\partial z) \quad (3.24)$$

$$\mathbf{l} = (l_x, l_y, l_z) \quad (3.25)$$

Now, we have,

$$l_x = (2\hbar/j)(y\partial/\partial z - z\partial/\partial y) \quad (3.26)$$

$$l_y = (2\hbar/j)(z\partial/\partial x - x\partial/\partial z) \quad (3.27)$$

$$l_z = (2\hbar/j)(x\partial/\partial y - y\partial/\partial x) \quad (3.28)$$

5) Square angular momentum operator:

Square angular momentum operator \mathcal{L}^2 is given by,

$$\mathcal{L}^2 = l_x^2 + l_y^2 + l_z^2 \quad (3.29)$$

Note that in l_x , l_y , and l_z , \hbar has been replaced $2\hbar$ when the correct wavelength used. That is the only difference.

All the operators except the time evolution operator for the correct wavelength $\lambda = 2\hbar/p$ can be obtained simply by replacing \hbar in the operators under deBroglie wavelength by $2\hbar$.

6) Angular momentum:

Angular momentum is a vector. The direction of a vector is observer dependent. Observer dependent entities do not come in quanta. Angular momentum cannot be quantized. Under the invalid assumption that the angular momentum is quantized, the Eigenvalues of \mathcal{L}^2 is given by [1],

$$\mathcal{L}^2 \varphi = (\ell + 1)\hbar^2 \varphi \quad (3.30)$$

$$l_z \varphi = (-\ell + n)\hbar \varphi, \quad \forall n, n=0, 1, 2, \dots \quad (3.31)$$

where, $(-\ell + n) \leq \ell$, n is a positive integer, φ is the Eigen function.

Angular Momentum is Bi-Polar, and hence cannot be Quantized. There are no Angular Momentum Monopoles. There are no Spin Monopoles. There are no Magnetic Monopoles. As a result, these Quantized representations are invalid. Angular momentum cannot be Quantized without Spin Monopoles and Magnetic Moment Monopoles.

Angular momentum belongs to an orbiting object. Angular momentum cannot exist without ownership. If angular momentum is quantized, an angular momentum quantum has no way of identifying which orbiting object it belongs to. Angular momentum quanta do not carry belonging information unlike a data packet on the Internet. In a jumble of Angular momentum soup, no angular momentum quantum has any idea where it is or which object it belongs to. In other words, angular momentum quantum has no way of finding out its parents, orbiting object and the orbiting system.

No quantity that has a belonging can come in quanta. A quantity that belong to a specific entity cannot be quantized. As soon as a quantity is quantized, its belonging or owner information is lost. Angular momentum and Spin have no existence without ownership. If angular momentum and Spin are quantized, orbiting system cannot exist. Angular momentum and Spin cannot come in quanta.

Corollary:

Angular Momentum is Bo-Polar. Spin is Bi-Polar. Magnetic Moment is B-Polar. Bi-Polar quantities cannot be Quantized without Monopoles.

Corollary:

Angular Momentum and Spin belong to a specific orbiting object. If they are quantized, the ownership information will be lost and hence cannot be quantized.

IV. THERE IS NO QUANTUM SPIN-1/2

Definition: Orientation of a Particle

The direction of the Spin Magnetic Moment (SMM) is defined as the Orientation of a Particle. Spin of a particle is the direction of its Spin Magnetic Moment.

Property of the Orientation of Spin:

The direction of SMM or the orientation of an Atom, which is orthogonal to the plane of spin, can either be positive or negative relative to an observer. Orientation of an Atom is observer dependent.

Lemma:

Orientation of a Particle is determined by the population the Particle is a part of, as well as any magnetic field of the environment particle is in. Orientation of a particle is observer dependent. Nature has no say about observer dependent entities.

The proof comes alive in later sections.

The self-cross-product of the angular momentum operator under the correct wavelength $\lambda = 2\hbar/p$ is given by,

$$\mathbf{l} \times \mathbf{l} = j(2\hbar)\mathbf{l} \quad (4.1)$$

where, $\mathbf{l} = (l_x, l_y, l_z)$.

Note the factor 2 here when the actual wavelength of a particle is used. There is no factor 2 when the deBroglie wavelength is used [1].

Any orbiting mass at position \mathbf{r} with momentum \mathbf{p} in 3-Dimensional space generate an angular momentum described by the angular momentum operator \mathbf{l} , where,

$$\mathbf{l} = \mathbf{r} \times \mathbf{p} \quad (4.2)$$

Since $\mathbf{r} = \mathbf{r}\mathbf{l}$, we have,

$$\mathbf{l} = \mathbf{r} \times \mathbf{p} \quad (4.3)$$

The angular momentum operator \mathbf{l} also satisfies the self-cross-product relationship,

$$\mathbf{l} \times \mathbf{l} = j(2\hbar)\mathbf{l} \quad (4.4)$$

However, the reverse is not necessarily true. Any operator that satisfies the self-cross-product relationship does not represent an angular momentum operator.

Forward Lemma:

Any angular momentum operator satisfies the self-cross-product relationship, $\mathbf{l} \times \mathbf{l} = j(2\hbar)\mathbf{l}$.

Reverse Contradictory Lemma:

Any operator that satisfies the self-cross-product relationship, $\mathbf{l} \times \mathbf{l} = j(2\hbar)\mathbf{l}$, does not represent Angular

Momentum Operator.

Lemma:

Matrix operators that satisfy the self-cross-product relationship, $\mathbf{l} \times \mathbf{l} = j(2\hbar)\mathbf{l}$, do not represent Spin operators.

Proof will be made clear later.

When the self-cross-product relationship in Eqn. (4.4) is satisfied, we have,

$$j(2\hbar)l_x = l_y l_z - l_z l_y = [l_y, l_z] \quad (4.5)$$

$$j(2\hbar)l_y = l_z l_x - l_x l_z = [l_z, l_x] \quad (4.6)$$

$$j(2\hbar)l_z = l_x l_y - l_y l_x = [l_x, l_y] \quad (4.7)$$

We can find matrix \mathbf{S} that satisfy the cross-product relationship in Eqn. (4.4) so that,

$$\mathbf{S} \times \mathbf{S} = j(2\hbar)\mathbf{S} \quad (4.8)$$

where, $\mathbf{S}^T = [\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z]$, $\mathbf{S} \in \mathbb{C}^{3M \times M}$, $[\cdot]^T$ denotes transpose,

$\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z \in \mathbb{C}^{M \times M}$, M is an integer and $M \geq 2$.

Using the non-commutation relationships, we have,

$$j(2\hbar)\mathbf{S}_x = [\mathbf{S}_y, \mathbf{S}_z] \quad (4.9)$$

$$j(2\hbar)\mathbf{S}_y = [\mathbf{S}_z, \mathbf{S}_x] \quad (4.10)$$

$$j(2\hbar)\mathbf{S}_z = [\mathbf{S}_x, \mathbf{S}_y] \quad (4.11)$$

For the non-commutative relationships to hold, the matrices must satisfy the following conditions:

- 1) The trace of each matrix must be zero,

$$\text{Trace}(\mathbf{S}_i) = 0, i=x, y, z \quad (4.12)$$

- 2) The matrices must be Hermitian or conjugate symmetric,

$$\mathbf{S}_i = \mathbf{S}_i^H, i=x, y, z \quad (4.13)$$

There are infinitely many matrices that can satisfy the self-cross-product relationship,

$\mathbf{S} \times \mathbf{S} = j(\alpha\hbar)\mathbf{S}$, where,

$\alpha=1$ for deBroglie wavelength.

$\alpha=2$ for correct wavelength.

The smallest order 2×2 matrices that satisfy the auto cross-product are given in the box below.

$\mathbf{S}_x = \eta\hbar \begin{vmatrix} 0 & 1 \\ 1 & 0 \end{vmatrix}, \quad \mathbf{S}_y = \eta\hbar \begin{vmatrix} 0 & -j \\ j & 0 \end{vmatrix}, \quad \mathbf{S}_z = \eta\hbar \begin{vmatrix} 1 & 0 \\ 0 & -1 \end{vmatrix}$
$\eta=1/2$ for deBroglie wavelength [11] (incorrect)
$\eta=1$ for correct wavelength
$\text{Trace}[\mathbf{S}_i]=0, i=x, y, z, \mathbf{S}_i =0, i=x, y$
\mathbf{S}_x and \mathbf{S}_y are Non-Invertible, and hence do not represent Operators.
Operators Must be Invertible.

Matrices $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ are the so-called Spin Matrices, and they satisfy the self-cross-product relationship $\mathbf{S} \times \mathbf{S} = j(2\hbar)\mathbf{S}$. The eigenvalues of the Spin Matrices $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ are $s=\pm 1$ for the correct wavelength, $\eta=1$. When the correct wavelength that the energy of a particle can support is used, the factor $1/2$ in Quantum Mechanics disappears. Since the eigenvalues of Spin

Matrices are $s=\pm 1$, there is NO Spin $1/2$.

Now, the question is, "Do these so-called Spin-Matrices $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ represent the angular momentum of any kind, Orbital angular momentum or Spin-angular momentum?" If these Spin Matrices represent angular momentum, they must also satisfy,

$$\mathcal{L}^2 \varphi = (\ell+1)\hbar^2 \varphi \quad (4.14)$$

$$L_z \varphi = (-\ell+n)\hbar \varphi, \quad \forall n, n=0, 1, 2, \dots \quad (4.15)$$

where, $(-\ell+n) \leq |\ell|$, n is a positive integer, φ is the eigen function.

It is important to note that the angular momentum is Bi-Polar and cannot be quantized. Angular momentum Quantization done in Quantum Mechanics is invalid.

For (2×2) Spin Matrices $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$, we have,

$$\mathbf{S}^2 \varphi = 3\eta^2 \hbar^2 \varphi \quad (4.16)$$

$$\mathbf{S}_z \varphi = s\hbar \varphi \quad (4.17)$$

where, $\mathbf{S}^2 \in \mathbb{C}^{2 \times 2}$, φ is a 2-dimensional eigenvector, $\eta=1$ for correct wavelength, $\mathbf{S}^2 = \mathbf{S} \cdot \mathbf{S}$ given by,

$$\mathbf{S}^2 = [\mathbf{S}_x^2 + \mathbf{S}_y^2 + \mathbf{S}_z^2] \quad (4.18)$$

From Eqn. (4.15) and (4.17), the eigenvalue s is related to ℓ by,

$$s \leq |\ell| \quad (4.19)$$

So, for the existence of Spin Matrices, the relationship $\ell(\ell+1)=3$ has to satisfy when $\ell=s_{\min}$, i.e. the minimum of s , as well as when $\ell=s_{\max}$, i.e. the maximum of s , where $s_{\min}=-1$ and $s_{\max}=1$. Since the Spin matrices are symmetric both eigenvalues of a 2-dimensional Spin matrix can never satisfy $(\ell+1)=3$. As a result, 2-Dimensional Spin Matrices cannot exist. Not even particles themselves have any existence in 2-Dimensional space. No particle can Spin in 2-Dimensional Space; it is impossible.

For 2×2 Spin Matrices, the eigenvalues of \mathbf{S}_z are $s=\pm 1$ (NOT $\pm 1/2$). The eigenvalues of \mathbf{S}_z must satisfy the relationship $s(s+1)=3\eta^2$ when $\eta=1$, for \mathbf{S}_z to be a Spin Matrix. Solution to $s(s+1)=3$ is $s=-(1/2)[1+(13)^{1/2}]$, and $s=-(1/2)[1-(13)^{1/2}]$. These s values are not eigenvalues of \mathbf{S}_z . The eigenvalues of \mathbf{S}_z are $s=\pm 1$. When $s=\pm 1$, we have, $s(s+1) \neq 3$ and hence the 2-Dimensional matrix \mathbf{S}_z does not represent a Spin Operator or angular momentum of any sort.

No eigenvalues of \mathbf{S}_z is One-Half, $s \neq \pm 1/2$. In fact, the eigenvalues of \mathbf{S}_z are $s=\pm 1$. In this case, ℓ can be $\ell=s_{\min}$ and $\ell=s_{\max}$, where $s_{\min}=-1$, $s_{\max}=+1$ and hence the eigenvalues s of \mathbf{S}_z can be any s value starting from s_{\min} in increment of $+1$ up to s_{\max} , i.e. $s=-1, s=0$, and $s=1$. If the Spin Magnetic Moment (SMM) is quantized, there should be three levels, but the Spin Matrix has only two eigenvalues. There is a mismatch. For \mathbf{S}_z to be a Spin matrix, it should have three eigenvalues. For \mathbf{S}_z to be a Spin Matrix, the number of s levels must be the same as the number of eigenvalues of the Spin Matrix \mathbf{S}_z . Further, when $s=\pm 1$, we have $s(s+1) \neq 3$. None of the eigenvalues satisfy $s(s+1)=3$, and as a result, Spin $s=\pm 1$ cannot exist. Since there are three levels, there should be 3 eigenvalues. In order to have three eigenvalues, Spin Matrices must be (3×3) matrices. 2-Dimensional Spin Matrices cannot exist. In fact, Spin Matrix of any order has no existence.

Corollary:

Matrices that satisfy the self-cross-product relationship do not represent Spin angular momentum operators.

Corollary:

Matrix operators of neither finite nor infinite order are allowed in Quantum Mechanics.

Corollary:

Although the Position and Momentum Operators generates the self-cross-product Angular Momentum relationship, the reverse is not necessarily true. Not all Operators that satisfy self-cross-product relationship represent the Spin or Angular Momentum Operators.

A. Spin Matrices are Not Operators of Observables

Any Operator Matrix that is Hermitian does not represent an Operator of an Observable. Although it is necessary for an Operator of an Observable to be Hermitian, it is not sufficient. For an Operator to be the Operator of an Observable, the Operator must also be Invertible.

When an Operator is non-invertible, there is no one-to-one relationship between the input and output of a system. There is no way to know the input for a given output. Multiple inputs can result in the same output. The input-output relationship is not unique. As a result, for an Operator to be Operator of an Observable, it is necessary that the Operator must be Invertible.

The Spin Matrix Operators have the following properties:

- $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ are Hermitian.
- $\text{Trace}(\mathbf{S}_i)=0, i=x, y, z.$
- $|\mathbf{S}_i|=0, i=x, y, \text{ and } |\mathbf{S}_z| \neq 0, \text{ where, } |.| \text{ denotes the determinant and } \mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z \in \mathbb{C}^{2 \times 2}.$
- $|\mathbf{S}_i|=0, i=x, y, z, \text{ where, } \mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z \in \mathbb{C}^{M \times M}, \forall M, M > 2, M \text{ is an integer}$

The condition $\text{Trace}(\mathbf{S}_i)=0, i=x, y, z$ is required for the satisfaction of non-commutative relationship in Quantum Mechanics. Any matrix operator that does not satisfy the non-commutative relationship has no place in Quantum Mechanics.

It is only the Spin Matrix \mathbf{S}_z of order (2×2) that is invertible. The Spin Matrices $\mathbf{S}_x, \mathbf{S}_y$ of order (2×2) are non-invertible. In fact, Spin Matrix of any order is not invertible, except \mathbf{S}_z of order (2×2) . For the Spin Matrices $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ to be Operators of Observables, they all must be Invertible. Spin Matrices do not represent the Operators of Observables since Spin Matrices are non-Invertible.

Corollary:

Spin Matrices are Non-Invertible and hence cannot represent Operators of Observables. Operators Must be Invertible.

Corollary:

Position and Momentum Matrix Operators cannot be in Quantum Mechanics. They do not satisfy non-commutative relationship, which is the basis of Quantum Mechanics.

Corollary:

Angular Momentum and Spin Matrix Operators cannot exist without the inherent Position and Momentum Matrix Operators.

B. Spin Matrices are Spin-Monopoles

For deBroglie wavelength, $\eta=1/2$ and the eigenvalues of \mathbf{S}_z are $s=\pm 1/2$. As a result, ℓ can be the minimum s , i.e. $s=-1/2$ as well as ℓ can be the maximum s , i.e. $s=+1/2$. When $s=+1/2$ we have $s(s+1)=3/4$, and hence (2×2) Spin matrix operator represent Spin $s=+1/2$. In this case, when $\ell=-1/2$, the eigenvalues of s can vary from $s=-1/2$ up to $s=+1/2$ in steps of $+1$. As a result, Spin can take values $s=-1/2$ and $s=+1/2$; there are two levels. Spin matrix has two eigenvalues, and from $s=-1/2$ to $s=+1/2$ in steps of $+1$ also has two values. So, (2×2) Spin matrix operator seems to work fine so far. However, in order for (2×2) matrix operator to be a Spin matrix, both maximum limit of s , i.e. $s=+1/2$ as well as the minimum limit of s , i.e. $s=-1/2$ must satisfy $s(s+1)=3/4$. This is where the problem arises. We have seen that $s(s+1)=3/4$ when $s=+1/2$. Unless the same Spin Matrices represent Spin $s=-1/2$, its representation will be a Spin-Monopole for $s=+1/2$ alone. As we can see, when $s=-1/2$, $s(s+1) \neq 3/4$. As a result, the same (2×2) Spin Matrix operators do not represent the Spin $s=-1/2$. When deBroglie wavelength is used, what is represented by (2×2) Spin Matrix operators is a Spin Monopole $s=+1/2$. Spin $s=+1/2$ cannot exist without Spin $s=-1/2$. Spin $s=-1/2$ cannot exist since $s(s+1) \neq 3/4$ when $s=-1/2$. Spin Monopoles do not exist, and hence, even with deBroglie wavelength, this Spin Matrix representation is irrelevant. Since $s(s+1)=3/4$ is satisfied only by $s=1/2$ and $s=-3/2$, no symmetric matrix can have only these two eigenvalues, and at the same time no non-symmetric matrix can be an operator in Quantum Mechanics. As a result, Spin Matrix Operators cannot exist. You can only find Spin Matrices for Spin Monopoles, not for Spin Bi-Poles. Spin is always bi-polar. On the other hand, Spin $s \neq \pm 1/2$ when correct wavelength is used. As a result, Spin matrices have no existence. Spin $\pm 1/2$ have no existence.

There is no Spin $1/2$. There are No Spin $1/2$ Matrix Operators. Spin $1/2$ is simply a manifestation of an incorrect deBroglie wavelength $\lambda=h/p$. DeBroglie wavelength is incorrect since no particle has the energy required to be at deBroglie wavelength. When the correct wavelength, $\lambda=2h/p$ or $\lambda=2(\text{deBroglie wavelength})$ that the energy of any particle can support, is used, Spin $1/2$ and Spin $1/2$ Matrix operators disappear from Quantum Mechanics for good. Reality is not spooky. There is no spooky Spin $\pm 1/2$. There are no quantized Spins. It is we, human,

who have injected spookiness into microscopic particles by misinterpretation of experiments, not the nature. It is we who created a creator, not the nature.

Lemma:

Spins $\pm 1/2$ have no existence. There are no fractional Spins. There are no integer Spins. Spin does not come in Quanta. Spin is not Quantized.

C. No Exclusion Principle is Required

When the correct wavelength $\lambda = 2h/p$ is used, (2×2) matrix operators S_x , S_y , S_z are the same as Pauli Matrix Operators. We have seen that for the eigenvalues of S_z , $s = \pm 1$, $s(s+1) \neq 3/4$. As a result, Pauli Matrices do not represent Spin Operators. Further, Spin cannot take place in 2-Dimensional space. There are no 2-Dimensional Spins. No particle can even exist in 2-Dimensional space. Particles can exist, Spin and Orbit only in 3-Dimensional space. If exist, Spin Matrices must be 3-Dimensional. As we are going to see later even 3-Dimension Spin Matrices do not exist. There are no Spin Matrices.

Even if there are Spin Matrices, Spin Matrices can only represent Spin Monopoles, not Spin Bi-Poles. Spin Monopoles cannot exist. Spin Matrices cannot exist without Spin Monopoles. As a result, Spin Matrices cannot exist in Quantum Mechanics.

Neighboring electrons cannot have the orientation of their Spin Magnetic Moments (SMM) facing Up-Up ($\uparrow\uparrow$) or Down-Down ($\downarrow\downarrow$) since the similar polarities repel and the opposite polarities attract. Up does not necessarily mean vertically up \uparrow . When two electrons of same SMM polarities come to be neighbors, they instantly re-orient themselves so that they face opposite polarities UP-Down ($\uparrow\downarrow$) or Down-Up ($\downarrow\uparrow$). No Exclusion Principle is required. It is simply the natural attraction and repulsion behavior of magnetic polarities that defines the orientation of neighboring spinning particles. Spin of a charge particle makes the particle a magnetic dipole, which is free to re-orient itself depending on the polarities of neighboring particles as well as any other external magnetic fields particle is in.

There are no magnetic monopoles, and hence particles do not have Spin-Up state or Spin-Down state. Spin-Up and Spin-Down are not orthogonal and cannot be represented by orthogonal basis vectors. Spin-Up and Spin-Down are non-separable and hence they are not in a superposition; one cannot exist without the other.

Spin-Up and Spin-Down are perfectly correlated negatively and as a result, if the Spin-Up is represented by orthogonal vector $+\phi$, then, the Spin-Down vector will be $-\phi$. Vector ϕ cannot be 2-Dimensional since Spin cannot take place in 2-Dimensional Space. Observable Spins are 3-Dimensional. There are no Spin Matrix Operators. Whether a particle is Spin-Up or Spin-Down is determined by an Observer, not the particle itself.

Property:

Operators must be Invertible. Pauli Matrices S_x and S_y are non-invertible and hence Pauli Matrices are not Operators of Observables.

Corollary:

Spin-Up and Spin-Down are non-separable, and hence they are not in a superposition.

Corollary:

Spin-Up and Spin-Down are not orthogonal. They are equal and opposite.

D. Spin-Up and Spin-Down are Not Separate Orthogonal States

The Positive-Spin (Spin-Up \uparrow) and the Negative-Spin (Spin-Down \downarrow) are not orthogonal. The Positive-Spin and the Negative-Spin are perfectly correlated negatively. The Positive-Spin and the Negative-Spin are the same except they are 180° degrees out of phase to each other. If one particle has its SMM at an angle θ with respect to some reference direction (Spin-Up \nearrow), then, the other neighboring particle will rotate to orient its SMM at an angle $\theta + 180^\circ$ (Spin-Down \swarrow) with respect to the same reference direction. Atoms of same kind (the same atomic number) have the same magnitude of SMM. The direction of the SMM or the orientation of a particle is determined by the neighboring particles as well as any other external magnetic field present. Spin-Up or Spin-Down is not a property of a particle.

If we line up particles, the SMM of the neighboring particles will be oriented alternatively in opposite directions so that they are either $\uparrow\downarrow$ or $\downarrow\uparrow$ due to the attraction of opposite polarities and the repulsion of the same polarities. One half of the particles in the line will be oriented in one direction while the other half is oriented in the opposite direction ($\dots \nearrow \swarrow \nearrow \swarrow \dots$) alternatively. The orientation of the neighboring particles will always be in opposite direction.

Spin-Up and Spin-Down are not orthogonal:

For Spin-Up and Spin-Down to be orthogonal, they must be Magnetic Monopoles or Spin Monopoles. Since there are no Magnetic Monopoles or Spin Monopoles, no particle can be solely Spin-Up or Spin-Down. It is not possible to represent Spin-Up as a state given by $\phi_{up} = (1, 0)$ and Spin-Down as a state given by $\phi_{down} = (0, 1)$ since Spin-Up and Spin-Down are not orthogonal, and there are no two independent Spin-Up and Spin-Down states in a single particle; Spin-Up and Spin-Down in a particle are non-separable. They only have relative existence, no absolute existence. Since Spin-Up and Spin-Down are perfectly correlated negatively, If Spin-Up is represented by vector $\phi_{up} = (1, 0)$, Spin-Down must be $\phi_{down} = -(1, 0)$ or $\phi_{down} = -\phi_{up}$.

Orientations of Neighbors are Against Each Other:

Particles in a beam always orient themselves such

that any two neighboring particles always have their Spin Magnetic Moment (SMM) or their polarities against each other (...↘↗↘↗↘).

When the First Atom in a Beam of Atoms Enters an External Magnetic Field:

If the first particle of a beam of particles enters an external magnetic field, the particle immediately aligns with the external magnetic field. It does not matter whether the particle is Spin-Up or Spin-Down, if the orientation of a particle is not against the external magnetic field, it will immediately align with the external magnetic field. If the orientation of a particle is against the external magnetic field, it remains in that orientation in the external magnetic field.

When the first particle aligns with the external magnetic field, the rest of the particles follow the suite by orienting towards or against the external magnetic field even though all the particles, except the first particle, are outside the external magnetic field. We consider a more general case where the orientation of the Atoms in the beam are at an angle to the external magnetic field. Both Spin-Up and Spin-Down Atoms are at an angle to the external magnetic field. If the external magnetic field is in the vertical direction \uparrow , and the orientation of the particles are at \nearrow (Spin-Up) or \searrow (Spin-Down), then, when the first Atom enters the external magnetic field, the orientations of particles or the directions of the SMM are as follow:

- 1) Direction of External Magnetic Field is vertical, \uparrow .
- 2) When all the atoms are outside the field, they are magnetically coupled with unknown orientation so that any two neighboring Atoms have their orientation one against the other:

...↗↘↗↘↗

- 3) The first Atom entering the external magnetic field can be Spin-Up or Spin-Down. In the example we are considering, the first Atom is Spin-Down.

When the first Spin-Down Atom with an orientation that is at an angle to the vertical \uparrow external magnetic field enters the external field and orient itself toward the external magnetic field that is vertical \uparrow , the rest of the Atoms also reorient themselves as a result of the attraction of opposite polarities and the repulsion of the alike polarities. Even though all the Atoms except the first Atom is outside the External Magnetic Field, all the atoms are aligned with or against the field due to the magnetic coupling of the atoms irrespective of where they are.

All Atoms are Outside the External Magnetic Field:

...↗↘↗↘↗ (all outside) [Magnetic Field $\mathbf{B} \uparrow$]

First Atom Enters the External Field, the Rest of the Atoms are Outside the External Magnetic Field and Atoms Reorient themselves:

... ↗↗↗↗↗ ↓ (the rest outside) [\uparrow First Atom in $\mathbf{B} \uparrow$]

The neighboring particles will always be in opposite polarities either towards the external field ($\theta=0$) or against the external field ($\theta=180^\circ$). This is the same scenario you will see if you line up compasses.

If a particle enters an external magnetic field \mathbf{B} , and the angle between the Spin Magnetic Moment (SMM) $\boldsymbol{\mu}$ and the External Field \mathbf{B} is θ , then,

1) if $\theta=0$ or $\theta=\pm 180^\circ$, then, the torque $\boldsymbol{\tau}=\mathbf{0}$, no alignment take place,

2) If $\theta \neq 0$, $\theta \neq \pm 180^\circ$, then, the torque $\boldsymbol{\tau} \neq \mathbf{0}$, and hence the torque will always align the SMM of the Atom with the external magnetic field instantly since the External Magnetic Field \mathbf{B} is strong. The original orientation information of the Atom is completely lost.

Corollary:

When the Atomic Spin Magnetic Moment (SMM) aligns with an external Magnetic field, the orientation information of the Atom is completely lost unless the orientation of the Atom is against the External Magnetic Field. The new imposed orientation of the Atom by an External Magnetic Field has nothing to do with and says nothing about the original orientation of the Atom.

Corollary:

The imposed orientation of an Atom by an External Magnetic Field is volatile. Spin-Up and Spin-Down are volatile. When a particle is out of an external magnetic field, particle has no memory of the orientation it had when it was in the magnetic field.

Stern-Gerlach Device is Not a Spin Measuring or Spin Setting Device:

You cannot use an external magnetic field to obtain the constituent coordinate component of a Spin along x, y, and z axes. If the Spin Magnetic Moment (SMM) of an Atom is $\boldsymbol{\mu}$, where, $\boldsymbol{\mu}=(\mu_x, \mu_y, \mu_z)$, you cannot obtain the x-axis component μ_x by sending the Atom through a Stern-Gerlach Magnetic Field oriented along the x-axis. Similarly, the y-axis component μ_y cannot be obtained by sending the Atom through a Stern-Gerlach Magnetic Field oriented along the y-axis, and the z-axis component μ_z cannot be obtained by sending the Atom through a Stern-Gerlach Magnetic Field oriented along the z-axis. Stern-Gerlach Magnetic (SGMF) field simply changes the orientation of the Atom to whatever the orientation of its own Magnetic Field, SGMF. SGMF is simply an enforcer. It does not care about the actual original orientation of the Atom. When an Atom is in the Stern-Gerlach Device, the orientation of an Atom is either with or against the SGMF irrespective of the original orientation of the Atom. The orientation of an Atom is no longer toward or against the SGMF when the Atom leaves the Stern-Gerlach Device.

Stern-Gerlach Device is not a Spin Measuring

Instrument. It is the failure to realize this fact that led to the Quantum Weirdness. It is here that lies the genesis of Quantum Mechanics and Quantum Weirdness. Once this is clarified, with that the Quantum Mechanics itself ceases to exist.

If atoms C and D are magnetically coupled, when atom D enters an external magnetic field and orient itself with the external magnetic field **B**, the atom C also orient to be against the new orientation of the atom D even though the atom C is outside the external magnetic field. This is the result of magnetic coupling. You can call it entanglement. The correlation between two neighboring atoms is always -1.

Corollary:

The orientation of an Atom in a population of Atoms is determined by the population of the Atoms, an external factor.

Lemma:

The magnitude of the Spin of an Atom is proportional to the Atomic number.

Corollary:

Spin-Up has no existence until an Observer comes in to label it as Spin-Up; with that Spin-Down also come into existence automatically. Spin-Up has no existence without Spin-Down. Spin-Up and Spin-Down have no existence without an observer.

Property:

Spin-Up and Spin-Down co-exist in the same Atom Relative to an Observer. Spin-Up and Spin-Down are not in a superposition since they are non-separable.

Lemma:

The Spin Correlation between two magnetically coupled neighboring Atoms is always -1. This is not a result of a Quantization. This is rather a result of the attraction of the opposite magnetic polarities and the repulsion of the alike.

Atomic Neighbors Motto:

I am always against my neighbor and My neighbor is always against me. This is the motto of the neighboring Atoms. This natural phenomenon is due to the Spin magnetic moment (SMM) of the Atoms. Not a Spin Quantization. It is the same natural law that governs the orientation of two neighboring compasses.

E. Spin Matrices cannot be 2-Dimensional

Spin of a particle cannot take place in 2-Dimensional space. Spin of a particle requires 3-Dimensional space for its existence. Spin angular momentum cannot be 2-Dimensional. Spin angular momentum is a 3-Dimensional vector. Spin angular momentum arises from a spinning of an object on its own axis through the center of gravity of the object.

Spin of an object take place on a 2-Dimensional plane in a 3-Dimensional space, and the angular momentum, whether it is spin or orbital, is orthogonal to the orbiting or spinning plane. Although the spin and the orbiting take place in 2-Dimensional plane, the spin or orbital angular momentum is a vector in 3-Dimensional Space.

The Spin or orbit angular momentum cannot be described by a 2-Dimensional vector. There are no 2-Dimensional spin or orbit angular momentum vectors. If exists, the Spin-Matrices must be (3×3) square matrices. Since any operator of an observable must be Hermitian, the Spin-Matrix must be Hermitian or conjugate symmetric. As a result, matrix operators must be square. Since matrices of infinite order cannot be symmetric, matrix operators cannot be of infinite dimension.

We know that the Spin angular momentum matrix operator $\mathbf{S} = [\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z]$ satisfies,

$$\mathbf{S} \times \mathbf{S} = j(2\hbar)\mathbf{S} \quad (4.20)$$

For this to hold, $\mathbf{S} \times \mathbf{S}$ cannot be on the same Space as \mathbf{S} . Here, $\mathbf{S} \times \mathbf{S}$ is orthogonal to \mathbf{S} . For matrices $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ to be Spin angular momentum operators, they must be in 3-dimensional matrices, $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z \in \mathbb{C}^{3 \times 3}$. It is only then, we can write

$$\mathbf{J}^2 = \mathbf{L}^2 + \mathbf{S}^2 \quad (4.21)$$

$\mathbf{J}, \mathbf{L}, \mathbf{S} \in \mathbb{C}^{3 \times 3}$, \mathbf{J} is the total angular momentum matrix operator, \mathbf{L} is the orbital angular momentum matrix operator, and \mathbf{S} is the Spin angular momentum matrix operator. If \mathbf{L}^2 is (3×3) matrix, then \mathbf{S}^2 must also be a (3×3) matrix. There are no 2-Dimensional Spin Matrices.

Corollary:

Spin of a particle cannot take place in 2D Space. Spin takes place in 3D Space. There are no (2×2) Spin Matrix Operators. A particle cannot even have any existence in a 2D Space.

Corollary:

Spin matrix operators are singular, non-invertible. Operators must be invertible. Spin matrices cannot represent operators of observables.

F. 3-DIMENSIONAL SPIN-MATRIX OPERATORS

We have seen that there cannot be (2×2) Spin Matrix operators. Now the question is, "Can there be (3×3) Matrix Operators?" Let us consider (3×3) Matrix Operators that satisfy the relationship,

$$\mathbf{S} \times \mathbf{S} = j(\alpha\hbar)\mathbf{S} \quad (4.22)$$

$\alpha=1$ for deBroglie wavelength.

$\alpha=2$ for correct wavelength

The correct wavelength is the wavelength that the energy of a particle can support. No particle has the energy required to be at deBroglie wavelength.

The (3×3) Matrices, given in the Box below, satisfy the self-cross product relationship $\mathbf{S} \times \mathbf{S} = j(\alpha\hbar)\mathbf{S}$.

$$\mathbf{S}_x = \eta\hbar \begin{vmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{vmatrix} \quad \mathbf{S}_y = \eta\hbar \begin{vmatrix} 0 & -j & 0 \\ j & 0 & -j \\ 0 & j & 0 \end{vmatrix} \quad \mathbf{S}_z = \sqrt{2}\eta\hbar \begin{vmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & -1 \end{vmatrix}$$

$\eta = 1/\sqrt{2}$ (for deBroglie wavelength) [11], incorrect
 $\eta = \sqrt{2}$ (for correct wavelength)

$|\mathbf{S}_i| = 0$ and Trace $[\mathbf{S}_i] = 0$, $i = x, y, z$.

$\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ are Non-Invertible, and hence do not represent Operators.

Operators Must be Invertible.

Operators $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ are Hermitian or conjugate symmetric. Further Trace $[\mathbf{S}_i] = 0$, $i = x, y, z$. Now, we can obtain the Operator \mathbf{S}^2 ,

$$\mathbf{S}^2 = [\mathbf{S}_x^2 + \mathbf{S}_y^2 + \mathbf{S}_z^2] \quad (4.23)$$

Substituting for $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$, since $\eta = \sqrt{2}$ for the correct wavelength, we get,

$$\mathbf{S}^2 = 8\hbar^2 \mathbf{I} \quad (4.24)$$

Where, 'I' is an identity matrix.

The Eigenvalues of \mathbf{S}_z are $s = 0, s = \pm 2$.

We also have,

$$\mathcal{L}^2 \varphi = \ell(\ell+1)\hbar^2 \varphi \quad (4.25)$$

$$l_z \varphi = (-\ell + n)\hbar \varphi, \quad \forall n, n = 0, 1, 2, \dots \quad (4.26)$$

where, $(-\ell + n) \leq |\ell|$, n is a positive integer.

It is noteworthy that the Angular momentum is Bi-Polar and hence cannot be quantized; it cannot come in quanta since there are no Spin Monopoles or Magnetic Monopoles.

For (3×3) Spin Matrices $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$, we have,

$$\mathbf{S}^2 \varphi = 8\hbar^2 \varphi \quad (4.27)$$

$$\mathbf{S}_z \varphi = s\hbar \varphi \quad (4.28)$$

When $s = \pm 2$, we have, $s(s+1) \neq 8$. So, (3×3) Spin Matrix Operators do not exist. Spin matrices cannot represent Bi-Polar entities such as Spin and angular momentum since the relationship $s(s+1) = 8$ cannot be satisfied by all the Eigenvalues of any Hermitian symmetric matrix operator.

There cannot exist Spin Operators without accompanying Position and Momentum Operators. As we are going to see, if there is a Spin Matrix Operator of finite dimension, there must also exist finite Position and Momentum Matrix Operators, which is a contradiction since there cannot be finite Position and Momentum Matrix Operators in Quantum Mechanics. Therefore, there cannot be any Spin-Matrices.

In the case of (3×3) Spin Matrices, $\ell = 2$ and hence from Eqn. (4.26), s can have discrete values from -2 to $+2$ in steps of $+1$. That means s can have five values, $s = \pm 2, s = \pm 1, s = 0$. So, there is a conflict here. If there exists (3×3) Spin Matrix, then, it can have only three eigenvalues, $s = 0, s = \pm 2$. There is a mismatch. Values $s = \pm 1$ must be there as eigenvalues, but they are not eigenvalues of (3×3) Spin Matrix. Hence, Spin Matrix representation of angular momentum is in direct conflict with Quantized angular momentum.

Lemma:

There are no Spin Matrix Operators.

The whole assumption that the Spin or the Angular momentum comes in quanta is incorrect. Vectors cannot come in quanta. The direction of a vector is observer dependent. Observer dependent quantities cannot be quantized. Observer dependent quantities don't come in quanta. Spin and the Angular momentum are Bi-Polar. Bi-Polar quantities cannot be quantized without the existence of corresponding Monopoles. There are no Spin or angular momentum monopoles. Spin and Orbit angular momentum do not come in Quanta; they cannot be quantized.

Noteworthy:

- Stern-Gerlach Device is not a Spin Measuring Instrument. It is a volatile Spin enforcer.
- Setting of the Spin of an Atom using SGMF is volatile; only holds as long as the Atom is within the SGMF.
- Stern-Gerlach Device can neither set nor measure nor filter the Spin of a Particle.
- SGMF forces the Orientation of an Atom or Spin to be in the direction of the SGMF, if it is not already against it, as long as the Atom is within the SGMF.
- When an Atom leaves the SGMF, Atom will no longer be in the direction of or against the SGMF.
- It is the failure to realize this fact that led to the Quantum Weirdness.

Corollary:

Orbital and Spin Angular Momentum as well as Spin Magnetic Moment are vectors. Vectors do not come in Quanta; vectors cannot be quantized.

Corollary:

Direction of Spin is relative, Observer dependent. Observer dependent quantities cannot be Quantized.

Lemma:

Spin-Up or Spin-Down is not a Signature of a Particle. Spin-Up and Spin-Down have no existence without an observer.

V. ANGULAR MOMENTUM CANNOT BE REPRESENTED BY MATRIX OPERATORS

Angular momentum operator is given by,

$$\mathbf{l} = \mathbf{r} \times \mathbf{p} \quad (5.1)$$

where, $\mathbf{r} = r\mathbf{l}$, 'I' is the identity operator,

$\mathbf{r} = (x, y, z)$, $\mathbf{p} = (\mathbf{p}_x, \mathbf{p}_y, \mathbf{p}_z)$, $\mathbf{l} = (l_x, l_y, l_z)$.

Angular momentum operator satisfies the self-cross-product relationship,

$$\mathbf{l} \times \mathbf{l} = j(2\hbar)\mathbf{l} \quad (5.2)$$

If $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ are square matrices of order $(M \times M)$, $M \geq 2$, then, we have angular momentum matrix operator \mathbf{S} of order $(3M \times M)$, $\mathbf{S} \in \mathbb{C}^{(3M \times M)}$, $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z \in \mathbb{C}^{(M \times M)}$.

Since $\mathbf{l} = \mathbf{r} \times \mathbf{p}$, for an angular momentum matrix

operator \mathbf{S} to exist, there must also exist matrices for the position and the momentum operators so that,

$$\mathbf{S}_x = \mathbf{R}_y \mathbf{P}_z - \mathbf{R}_z \mathbf{P}_y \quad (5.3)$$

$$\mathbf{S}_y = \mathbf{R}_z \mathbf{P}_x - \mathbf{R}_x \mathbf{P}_z \quad (5.4)$$

$$\mathbf{S}_z = \mathbf{R}_x \mathbf{P}_y - \mathbf{R}_y \mathbf{P}_x \quad (5.5)$$

$$\mathbf{R}_x, \mathbf{R}_y, \mathbf{R}_z \in \mathbb{C}^{(M \times M)}, \mathbf{P}_x, \mathbf{P}_y, \mathbf{P}_z \in \mathbb{C}^{(M \times M)}.$$

where, $\mathbf{R}_x, \mathbf{R}_y, \mathbf{R}_z$ are position matrix operators and $\mathbf{P}_x, \mathbf{P}_y, \mathbf{P}_z$ are momentum matrix operators of order $(M \times M)$. Position and momentum matrix operators must be Hermitian or conjugate symmetric, which implies that they must be square. In other words, if angular momentum matrix operators, $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z \in \mathbb{C}^{(M \times M)}$ exist, for them to exist, there must also exist position matrix operators $\mathbf{R}_x, \mathbf{R}_y, \mathbf{R}_z$ and momentum matrix operators $\mathbf{P}_x, \mathbf{P}_y, \mathbf{P}_z$, all of which are of order $(M \times M)$.

If position matrices $\mathbf{R}_x, \mathbf{R}_y, \mathbf{R}_z$ and momentum matrix operators $\mathbf{P}_x, \mathbf{P}_y, \mathbf{P}_z$, all of which are order $(M \times M)$ exist, we have the non-commutation relationships,

$$\mathbf{R}_n \mathbf{P}_n - \mathbf{P}_n \mathbf{R}_n = j(2\hbar)\mathbf{I}, n=x, y, z. \quad (5.6)$$

where 'I' is the identity operator of order $(M \times M)$.

For these to be true,

$$\text{Trace} [\mathbf{R}_n \mathbf{P}_n - \mathbf{P}_n \mathbf{R}_n] = \text{Trace} [j(2\hbar)\mathbf{I}], n=x, y, z. \quad (5.7)$$

We know that,

$$\text{Trace} [\mathbf{R}_n \mathbf{P}_n - \mathbf{P}_n \mathbf{R}_n] = 0, n=x, y, z \quad (5.8)$$

$$\text{Trace} [j(2\hbar)\mathbf{I}] = j(2\hbar)M \neq 0. \quad (5.9)$$

This is a contradiction.

$$\text{Trace} [\mathbf{R}_n \mathbf{P}_n - \mathbf{P}_n \mathbf{R}_n] \neq \text{Trace} [j(2\hbar)\mathbf{I}], n=x, y, z. \quad (5.10)$$

As a result, there cannot be position and momentum matrix operators of finite dimension. Irrespective of whether it is orbital angular momentum or spin angular momentum, angular momentum matrix operators of finite dimension $(M \times M)$, $M \geq 2$ cannot exist.

One may argue that matrix operators of infinite dimension can bypass this situation and hence matrix operators of infinite dimension can represent operators in Quantum Mechanics. This is exactly the argument that has been used to justify the Heisenberg's Matrix representation of Quantum Mechanics [1]. However, this argument is incorrect, and invalid. For matrix operators to be operators in Quantum Mechanics, the matrices must be square matrices. Matrices of infinite dimension cannot be square. As a result, matrix operators cannot be in Quantum Mechanics, where non-commutation relationships are fundamental. Without non-commutative relationships, there would be no Quantum Mechanics. With matrix operators, there would be no non-commutative relationships.

We know Spin Matrix angular momentum operators, $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ satisfy the non-commutative relationships since they are Hermitian and $\text{Trace} [\mathbf{S}_n] = 0, n=x, y, z$. However, $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ matrix operators for angular momentum cannot exist without the existence of matrix operators for position and momentum. As a result, any matrix operator that satisfies the self-cross-product, $\mathbf{L} \times \mathbf{L} = j(2\hbar)\mathbf{L}$ does not represent the angular momentum, neither Orbital nor

Spin. Further, Spin Matrices $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ are non-invertible, $|\mathbf{S}_i| = 0, i=x, y, z$ except the (2×2) matrix \mathbf{S}_z , and hence Spin Matrices are not Operators of Observables.

Corollary:

There is no Spin Angular Momentum without Position and Momentum Matrix Operators. Position and Momentum Matrix Operators have no existence in Quantum Mechanics.

Although the position and the momentum operators generate angular momentum operator \mathbf{L} that satisfies the auto cross-product relationship $\mathbf{L} \times \mathbf{L} = j(2\hbar)\mathbf{L}$, the reverse is not necessarily true. Any matrix \mathbf{S} that satisfies $\mathbf{S} \times \mathbf{S} = j(2\hbar)\mathbf{S}$ does not represent angular momentum operator. If you can reverse it with matrix operator \mathbf{S} , then, you must also be able to forward it with matrix operators, which creates a contradiction in Quantum Mechanics. It is not possible to go in forward direction with position matrix operators and momentum matrix operators in deriving the angular momentum operators since matrix operators cannot satisfy the non-commutative matrix relationship $\mathbf{R}\mathbf{P} - \mathbf{P}\mathbf{R} = j(2\hbar)\mathbf{I}$, where \mathbf{R} is the position matrix operator and \mathbf{P} is the momentum operator matrix, 'I' is the identity matrix. Matrix operators, irrespective of whether they are finite dimensional or infinite dimensional, cannot satisfy the non-commutative relationship $\mathbf{R}\mathbf{P} - \mathbf{P}\mathbf{R} = j(2\hbar)\mathbf{I}$, the very foundation of Quantum Mechanics, without which Quantum Mechanics has no existence.

Further, in order for matrix operators to satisfy the non-commutative relationship $\mathbf{R}\mathbf{P} - \mathbf{P}\mathbf{R} = j(2\hbar)\mathbf{I}$, matrix operators \mathbf{R} and \mathbf{P} must be square matrices. For a matrix to be a square matrix, it must be of finite dimensional. As a result, no matrix operator can satisfy the non-commutative relationship $\mathbf{R}\mathbf{P} - \mathbf{P}\mathbf{R} = j(2\hbar)\mathbf{I}$. Matrices of infinite order cannot be square. Matrix operators of neither finite nor infinite order can be in Quantum Mechanics.

More importantly, for a matrix operator to represent an observable, the operator must be Hermitian. For a matrix operator to be Hermitian, it must be square. For a matrix operator to be square, it must be finite dimensional. Matrices of infinite dimensions cannot be square. As a result, no matrix of infinite dimension can be Hermitian since matrices of infinite dimension cannot be square. Quantum mechanics is out of bound for matrix operators of any dimension.

Lemma:

Matrix Operators of infinite dimensions cannot represent observables since infinite dimensional matrices cannot be Hermitian.

Lemma:

Matrix Operators of finite dimensions cannot represent observables since finite dimensional matrices cannot satisfy the non-commutative

relationship.

Corollary:

Matrix Operators cannot represent observables in Quantum Mechanics.

VI. PARTICLES HAVE NO SPIN-UP STATE OR SPIN-DOWN STATE

Corollary:

Whether a particle is Spin-Up or Spin-Down is determined by an Observer, not a particle itself. Spin-Up for one Observer can be Spin-Down for another.

Corollary:

Whether a particle is Spin-Up, Spin-Down, Spin-Right, Spin-Left, Spin-In or Spin-Out depends on the location of the Observer. Spin-Up particle for an Observer at one location can be Spin-Down, Spin-Right, Spin-Left, Spin-In or Spin-Out for the same Observer at a different location.

Spin Magnetic Moment (SMM) of Atom: The Origin

Orbiting systems such as atoms generate angular momentum. It is this residual orbiting angular momentum that generates the Spin of an atom or any orbiting system in general so that the net angular momentum of an atom or orbiting system is zero. The spin of an atom generates a Spin angular momentum, which counteract the orbiting angular momentum so that the net angular momentum of the atom is zero. Although an atom is electrically neutral, when atom spins on an axis through the nucleus, in effect, it is the electrically charged nucleus that is spinning. Spinning nucleus generates Spin Magnetic Moment (SMM). In addition, when nucleus spins, the Spinning nucleus also takes its bound electrons in a Merry-Go-Round ride generating Spin Magnetic Moment (SMM), which annihilates the Orbit Magnetic Moment due to the orbiting electrons. Although the net angular momentum of an atom, that is the sum of the orbiting angular momentum plus the Spin angular momentum, is zero, the Spin Magnetic Moment of the neutral atom is not zero since the orbit angular momentum of an orbiting system is not zero. We will consider how a neutral atom generates a Spin Magnetic Moment (SMM) in detail later.

Lemma:

Spinning Atom generates a Magnetic Moment, Spin Magnetic Moment (SMM), even when the Atom is electrically neutral since a neutral Atom consists of charge particles. Spin is an inherent property of every orbiting system. Every Atom is an orbiting system and every Atom spins.

Corollary:

Spin of a particle is a result of being a part of an orbiting system. When a particle is dislodged from an orbiting system, it carries with it the spin that it possessed while it was a part of the orbiting system.

No Spin-Up or Spin-Down Particles:

When a charge particle spins about its own axis, it generates a Spin Magnetic Moment (SMM). The SMM is always orthogonal to the plane of Spin. This Spin is neither Up nor Down. Nature has no Up direction or Down direction. Nature has no clockwise direction or anti-clockwise direction. Up and Down are not states of a particle. Up and Down exist only relative an observer. There is no 'Up' or 'Down' without an observer. A particle is Spin-UP or Spin-Down only relative to an Observer.

Assume you have a particle with Spin Magnetic Moment that you considered to be Spin-Up position. Now, rotate the same particle by 180° degrees. Now, the particle is no longer Spin-Up particle. It is now a Spin-Down particle. But the particle did not change. Spin did not change. What has changed is the orientation of the particle with respect to the Observer. This rotation is done by an observer. Spin of the particle is the same. Spin-Up or Spin-Down is not an intrinsic property of a particle; it is not a state of a particle. It is only the Spin that is intrinsic to an orbiting system, not the directions Spin-Up or Spin-Down.

Orientation of Neighboring Electrons:

Individual electrons are particles that have dislodged from an orbiting system, Atom. When electrons are dislodged from an Atom, they carry with them their Spin they possessed while they were in the Atomic Orbiting system. Assume you have two electrons nearby. If they are spinning, that generates Spin Magnetic Moment (SMM) perpendicular to the plane of spin. The Spin Magnetic Moments of two nearby electrons have their orientation one against other. Two neighboring electrons have their SMM oriented in opposite direction for a very simple reason. The opposite polarities attract, and similar polarities repel. It is this very basic reason why two electrons have the opposite orientations of their SMM, or why no two neighboring electrons can have the same orientation. It has nothing to do with Pauli matrices or some exclusion principle. There is no Exclusion Principle. Pauli Matrices do not represent Spin.

When two electrons are nearby, they repel each other since they both are electrically negative. However, they have their orientation of Spin Magnetic Moments (SMM) against one another generating an attractive magnetic force. The repulsion due to the electrostatic force and the attraction due to the Spin Magnetic force keep the electrons coupled at a distance, not too close, not too far, just the right social distance. No two electrons can be further apart or too close due to the leverage of electrostatic force and the Spin Magnetic force between two electrons. In an Atom, several electrons can be in the same orbit, yet, they keep their social distance due to the balance of electrostatic and Spin Magnetic Forces. When there are only two electrons in an orbit, they are not in the opposite ends of the orbit. They will be close to each

other, but not too close. The distance between the two electrons are determined by the Spin Magnetic force and the electrostatic force of the electrons.

Corollary:

The coupling distance between two electrons is determined by the attractive Spin Magnetic force and the repulsive electrostatic force between the electrons.

What is Up with Spin-Up:

When we look at a particle from one direction, we may see it as Spin-Up direction by our definition. If we see the same particle from the opposite direction, we see the same particle as Spin-Down particle. Particle did not change. What changed was the direction we looked at the particle. What changed was our perspective of the particle. The orientation of a particle with respect to an observer defined direction tells us if the particle is Spin-Up or Spin-Down. Nature cannot quantize something it has no clue. Nature cannot quantize something we, observers, envision.

What determines the orientation of the magnetic moment of a particle is the external environment. If a particle is in an external magnetic field, it will align with the external magnetic field as a result of the torque generated. If a particle is next to another particle, both particles align to face opposite polarities due to the attraction of the opposite and the repulsion of the opposites.

The Spin-Up has no independent existence on its own. Spin-Down has no independent existence on its own. Spin-Up and Spin-Down only have a dual existence; they always exist together, but in opposition in the same particle. Spin-Up has no existence without Spin-Down and vice versa. Spin-Up and Spin-Down are not orthogonal. Spin-Up and Spin-Down cannot be orthogonal without Spin monopoles and magnetic monopoles. If Spin-Up is represented as a vector,

$$\varphi_{up} = [1, 0], \text{ then,}$$

$$\text{Spin-Down is NOT } [0, 1], \varphi_{dn} \neq [0, 1],$$

Contrary to what was implied by (2x2) Spin matrices and the Pauli matrices,

$$\varphi_{dn} \neq [0, 1].$$

In fact, if Spin-Up is represented as,

$$\varphi_{up} = [1, 0], \text{ then,}$$

the Spin-Down, φ_{dn} is given by,

$$\varphi_{dn} = -\varphi_{up}$$

$$\varphi_{dn} = (\exp(j\pi)) \varphi_{up}$$

In addition, Spin cannot be represented by 2-Dimensional vectors. No particle can even exist in 2-Dimensional space. If no particle can even exist in 2-Dimensional Space, how can a particle Spin in 2-Dimensional Space? There are no 2D spins.

In other words, Spin-Down is nothing more than 180° degree rotation of the Spin-Up vector. The (2x2) Spin matrices or Pauli matrices-based representation where Spin-Up is represented as vector [1, 0] and the Spin-Down is represented as an orthogonal vector [0, 1] is incorrect. Spin-Up vector cannot be orthogonal to

Spin-Down since they have no independent existence. Particles do not have Up or Down states intrinsic to particles. Spin-Up is the same as Spin-Down except the 180° phase difference relative to each other or relative to an observer.

Corollary:

Spin-Down is 180° rotation of Spin-Up relative to an observer,

$$\varphi_{dn} = (\exp(j\pi)) \varphi_{up}$$

Orientation of Atoms are Not Random:

The magnitude of Spin is an inherent property of a particle. All the silver atoms have the same magnitude of the Spin. Atoms with the same atomic number have the same Spin magnitude.

The orientation of an atom, i.e. the direction the Spin Magnetic Moment, is determined by the neighboring silver atoms as well as the external magnetic field as well as, if any, the magnetic field of the environment atoms are in. The orientation of an atom is never random since neighboring atoms are magnetically coupled and solely determined by the attraction of the opposite and the repulsion of the alike as well as the alignment torque in the presence of an external magnetic field. As we are going to see later, this is exactly the reason why a beam of silver atoms is split into two separate beams of equal number of atoms in the Stern-Gerlach experiment.

Corollary:

The orientation of an Atom is not a property of a particle. The Orientation of an Atom is not random. It is determined by the population of Atoms as well as the magnetic field, if any, of the environment it is in.

Spin Up and Spin-Down are Observer Labels:

There are no Spin-Matrices. There are no Pauli Matrices in action. There is no need for an Exclusion Principle. What is there is Magnetic Coupling of neutral Atoms. Even though atoms are neutral, every Atom has a Spin Magnetic Moment (SMM). There is no Spatial Quantization of Spin. No Ups and Down in Nature:

- Spin-Up and Spin Down are observer perspectives. They are not inherent properties of a particle or the Nature. Orbiting systems spin. There is no Spin-Up or Spin-Down without an Observer.
- Since there are no Ups and Downs in the nature, nature cannot quantize something nature does not have.
- The so-called Spin-Down is nothing more than 180° degree rotation of Spin-Up atom relative to the environment or an Observer. What is anti-clockwise for people in the northern Hemisphere of the Globe is Clockwise for those in the Southern Hemisphere of the Globe. Spin is observer dependent.

Corollary:

Spin-Up and Spin-Down are not absolute, they vary from observer to observer depending on the location of the observer.

VII. SPIN MAGNETIC MOMENT (SMM)**Theorem:** Spin Magnetic Moment (SMM)

For a particle of radius r and charge q spinning on its own axis at spin frequency f , the Spin Magnetic Moment (SMM) μ is given by,

$$\mu = (3/128)q\omega\mathcal{A}$$

where $\omega = 2\pi f$, \mathcal{A} is the surface area of the particle, $\mathcal{A} = 4\pi r^2$.

The direction of the Spin Magnetic Moment is orthogonal to the plane of the spin.

Consider a particle of charge q and radius r at the origin of a coordinate system (x, y, z) . Assume that the center of the mass is at the origin and the particle is spinning at frequency f on the z -axis. The radius of the mass is r . If the charge is uniformly distributed on the surface, the surface density ρ of the charge is given by,

$$\rho = q/(4\pi r^2) \quad (7.1)$$

When a charge particle spins, it generates a Spin Magnetic Moment (SMM) μ . We want to find μ . Let us consider a cross sectional slice at distance z parallel to the xy -plane at an angle θ with z . Then, the radius of the slice is $r \sin \theta$. If the thickness of the slice is ∂z , the charge ∂q of the slice is given by,

$$\partial q = \rho(2\pi r \sin \theta) \partial z \quad (7.2)$$

The Spin Magnetic Moment (SMM) due to the spinning of the slice is given by,

$$\partial \mu = (f \partial q)[\pi (r \sin \theta)^2] \quad (7.3)$$

where, f is the frequency of the Spin.

For a positively charged particle spinning on xy -plane around z -axis in the counter-clockwise direction, the direction of the Spin Magnetic Moment $\partial \mu$ is in the z direction. As far as particle is concerned, the direction does not matter since the particle has no preferred choice of direction; it is not spinning for a determined purpose. Spin of an orbiting system is a balancing act brought forward by the Orbital angular momentum so that the Spin angular momentum is equal and opposite of the Orbital angular momentum. It is the angular momentum of an orbiting system that brings the particle to spin so that the net angular momentum of the orbiting system or the sum of the orbital angular momentum and the Spin angular momentum is zero.

Spin angular momentum counterbalances the Orbital angular momentum. In the case of an atom, the result is the Spin of electrons and the nucleus of the atom so that the net total angular momentum of an atom is zero. All atoms of the same kind (same Atomic number) have the same Spin. It is only the orientation that may differ from atom to atom. The orientation is determined by the external forces. As far as a particle is concerned, the orientation is immaterial since both directions resides in the same particle concurrently;

Spin seen from one side will be directly the opposite of the same Spin seen from the opposite side by an observer. The direction of Spin only has a meaning for an Observer, not for the particle or the nature.

Now, we have,

$$\partial \mu = [f (\rho(2\pi r \sin \theta) \partial z)][\pi (r \sin \theta)^2] \quad (7.4)$$

Since $z = r \cos \theta$, we have,

$$\partial z = -r \sin \theta \partial \theta \quad (7.5)$$

Substituting for ρ and ∂z in Eqn. (7.4), we have,

$$\partial \mu = -(qf/2) (\pi r^2 \sin^4 \theta) \partial \theta \quad (7.6)$$

Since $\sin^2 \theta = (1/2)(1 - \cos 2\theta)$, we have,

$$\sin^4 \theta = (1/4)[(3/2) - 2\cos 2\theta + (1/2)\cos 4\theta] \quad (7.7)$$

Now, we have,

$$\partial \mu = -(1/8)qf\pi r^2[(3/2) - 2\cos 2\theta + (1/2)\cos 4\theta]\partial \theta \quad (7.8)$$

Spin Magnetic Moment μ is given by,

$$\mu = -(1/8)qf\pi r^2 \int_0^\pi [3/2 - 2\cos 2\theta + \cos 4\theta] \partial \theta \quad (7.9)$$

$$\mu = -(1/8)qf\pi r^2 (-3\pi/2) \quad (7.10)$$

$$\mu = (3/32)q\omega\pi r^2 \quad (7.11)$$

where, $\omega = 2\pi f$, the angular frequency.

The magnitude of the Spin Magnetic Moment is proportional to the square radius of the particle, Spin frequency, and the charge of the particle as expected. If the surface area of the particle is \mathcal{A} , then, $\mathcal{A} = 4\pi r^2$ and hence,

$$\mu = (3/128)q\omega\mathcal{A} \quad (7.12)$$

Larger the surface area of the particle, the larger is the Spin Magnetic Moment μ . For an electrically neutral particle, the charge $q=0$, and hence $\mu=0$. As a result, A particle that is electrically neutral does not have a Spin magnetic Moment. However, this does not apply to an Atom since an Atom is not a particle. Although an Atom is electrically neutral, an Atom is a Composite Unit that consists of many charge particles. As a result, in the case of an Atom the Spin Magnetic Moment (SMM) is not zero, $\mu \neq 0$.

The direction of the Spin Magnetic Moment is orthogonal to the plane of the Spin. Whether the Spin is Spin-Up or Spin-Down is not a property of the Spin itself since the direction of the Spin is determined by an Observer.

Assume we have an Observer looking down from $+z$ direction and see the Spin as Counter-Clockwise. For that Observer, the Spin Magnetic Moment is in $+z$ direction or Spin-Up for a positive charge. However, for the same Observer looking up from $-z$ direction, the same particle is spinning in Clockwise direction. As a result, for the same Observer, the Spin Magnetic Moment (SMM) is Spin-Down for a positive charge. The direction of the Spin is Observer dependent, not a property of a particle. Magnetic field lines are in loops, going out from the top and coming in from the bottom. It is we defined the right-hand rule. It is we defined what is positive or negative. Orientation is observer defined.

Assume we have a Spin-Up particle relative to an Observer. We turn it around by 180° degrees. Now, what we have is a Spin-Down particle. Properties of the particle did not change. The state of the particle did not change. It is spinning in the same way it used

to, yet it is no longer a Spin-Up particle; it is a Spin-Down particle now. Spin-Up or Spin-Down is not a property of a particle. Spin-Up and Spin-Down are not states of a particle. The same particle can be Spin-Up or Spin-Down depending on the observer.

Ask someone in Northern Hemisphere of the Globe, "What is the direction of Spin of the Globe?" Ask the same question when that person is in Southern Hemisphere of the Globe. You will get opposite answers and both answers are right. You can say Globe is both Spin-Up and Spin-Down state since spin is bi-polar. However, Spin-Up and Spin-Down are not in a superposition since they are non-separable. There are no Monopolar Spins and hence they are non-separable.

For our particle, for positive charge and counter-clockwise Spin, the Spin Magnetic Moment μ is in the $+z$ direction or Spin-Up. For a negative charge, the same Spin is in $-z$ direction or Spin-Down. The direction of spin depends on our definition of positive charge and our definition of the positive frequency:

Charge	Direction	Spin
+q	$+\omega$	Up
+q	$-\omega$	Down
-q	$+\omega$	Down
-q	$-\omega$	Up

Magnitude of the charge is independent of the observer. The magnitude of the frequency is independent of the observer. However, whether a particle is Spin-Up or Spin-Down is determined by an Observer. It does not matter which is Up and which is Down; what matters is that they must be opposite to each other. Magnetic field must go in from one side and come out from the other side. The magnitude of $|\mu|$ is a property of a particle and independent of the observer. Nature cannot quantize observer dependent quantities since Spin-Up or Spin-Down is not determined by the nature. Nature cannot quantize what we create in our mind. Nature has no Ups and Downs.

Corollary:

An Atom is a Composite unit of many charge particles. As a result, the Spin Magnetic Moment of an Atom is not zero.

Lemma:

In the presence of an external magnetic field, the torque exerted on a neutral Atom is not zero due to the Spin Magnetic Moment of an Atom, $\mu \neq 0$. Spin Magnetic Moment is inherent in every Atom since an Atom is an orbiting system.

A. Orbital Magnetic Moment (OMM) of a Charge Particle

Theorem: Orbit Magnetic Moment (OMM)

For a particle of charge q orbiting on a circular orbit

of radius r and orbiting frequency f , the Orbit Magnetic Moment (OMM) μ is given by,

$$\mu = (1/2\pi)q\omega A$$

where $\omega = 2\pi f$, A is the area covered by the, $A = 4\pi r^2$.

The direction of the Orbit Magnetic Moment is orthogonal to the plane of the orbit.

When a charge particle orbits, it generates an Orbital Magnetic Moment. Consider a particle of charge q on a circular orbit of radius r orbiting at frequency f . Then the Orbit Magnetic Moment (OMM) μ_o is given by,

$$\mu_o = IA \quad (7.13)$$

where I is the loop current and A is the area of the orbit, and I is given by,

$$I = qf \quad (7.14)$$

For a circular orbit, $A = \pi r^2$ and hence, the OMM μ_o is given by,

$$\mu_o = qf(\pi r^2) \quad (7.15)$$

$$\mu_o = (1/2)q\omega r^2 \quad (7.16)$$

where, $\omega = 2\pi f$, the angular frequency.

The direction of the Orbit Magnetic Moment μ_o is orthogonal to the orbital plane. Unlike the Spin Magnetic Moment of electron due to the spin of an electron on its own axis, the Orbit Magnetic Moment of an electron in an Atom is significant.

For an orbiting system of multiple charges, the Orbital Magnetic Moment μ_o is given by,

$$\mu_o = (1/2)q\sum \omega_i r_i^2, \forall i, i=1, 2, \dots, n \quad (7.17)$$

where ω_i is the angular orbit frequency of the i^{th} charge and r_i is the orbit radius of the i^{th} charge, n is the number of orbits.

Lemma: OMM of Multi-Electron Atom

For a multi-electron Atom, the Orbital Magnetic Moment (OMM) μ_o of the Atom is given by,

$$\mu_o = (1/2)e\sum \omega_i r_i^2, \forall i, i=1, 2, \dots, n \quad (7.18)$$

where e is the charge of an electron.

B. Spin Magnetic Moment (SMM) of an Electron

Lemma: Spin Magnetic Moment (SMM) of Electron

For an electron of radius r_e , charge e spinning on its own axis at frequency f_{se} , the Spin Magnetic Moment (SMM) μ_{se} is given by,

$$\mu_{se} = (3/32)e\omega_{se}\pi(r_e)^2$$

where, $\omega_{se} = 2\pi f_{se}$ and e is the charge of electron.

The direction of the Spin Magnetic Moment is orthogonal to the plane of the spin.

Consider an electron of charge e spinning at angular frequency ω_{se} on its own axis while orbiting the nucleus at angular frequency ω_o . From the previous sections, the contributions to the Magnetic Moment of an Atom from the Orbit Magnetic Moment μ_{oe} of an electron, and the from the Spin Magnetic Moment μ_{se} of an electron, are given by,

$$\mu_{oe} = (1/2)e\omega_o(r_o)^2 \quad (7.19)$$

$$\mu_{se} = (3/32)e\omega_{se}\pi(r_e)^2 \quad (7.20)$$

where, r_e is the radius of the electron mass, r_o is the radius of the electron orbit, ω_{se} is the Spinning angular frequency of the electron, ω_o is the orbiting angular

frequency of the electron, e is the charge of the electron.

The radius r_e of the electron mass is much smaller than the orbit radius r_o of an electron,

$$r_e \ll r_o \quad (7.21)$$

In fact, the radius of the electron mass r_e is totally negligible compared to the orbiting radius r_o of an electron. Since the Magnetic Moment is proportional to the square radius of the electron mass,

$$r_e^2 \ll r_o^2 \quad (7.22)$$

As a result,

$$\mu_{se} \ll \mu_{oe} \quad (7.23)$$

In other words, compared to the Orbit Magnetic Moment of an electron, the Spin Magnetic Moment of an electron is negligible or zero,

$$\mu_{se} \approx 0 \quad (7.24)$$

We can also write Spin Magnetic Moment of an electron itself due to the Spin on its own axis as,

$$\mu_{se} = (3/128)e\omega_s A_e,$$

where A_e is the surface area of an electron.

The Spin Magnetic Moment of an electron is proportional to the surface area of the electron. The surface area of an electron is negligible, and hence the Spin Magnetic Moment of an electron is negligible; we can disregard its contribution to the total Spin Magnetic Moment of an atom.

Corollary:

Orbital Magnetic Moment (OMM) of an Atom due to the orbiting electrons is cancelled out with the Merry-Go-Round Spin Magnetic Moment (SMM) of an Atom since they are equal and opposite.

Corollary:

Spin Magnetic Moment (SMM) of an electron due to the Spin of the electron on its own axis is negligible since the surface area of electron mass is negligible.

Corollary:

Spin Magnetic Moment (SMM) of an electron due to the Spin of the electron on its own axis is negligible compared to the Spin Magnetic Moment of the nucleus on its own axis, which is also the axis of Atomic spin.

C. Spin Magnetic Moment (SMM) of Nucleus

Lemma: Spin Magnetic Moment (SMM) of Nucleus

For an Atomic nucleus of radius r_{nu} , and Atomic number n spinning on its own axis at frequency f_s , the Spin Magnetic Moment (SMM) μ_{snu} is given by,

$$\mu_{snu} = (-3/32)ne\omega_s\pi(r_{nu})^2$$

where, e is the charge of electron, $\omega_s = 2\pi f_s$

The direction of the Spin Magnetic Moment is orthogonal to the plane of the spin, which is also the orbital plane.

It is not just the electrons in an atom that spin on their own axes, the nucleus of an atom, or the central mass of an orbiting system, spins on its own axis. Consider an atom of n electrons. Then, the nucleus

has a charge $-ne$, where e is the charge of an electron. Let us consider the nucleus of radius r_{nu} with charge $-ne$ uniformly distributed on the surface of the nucleus mass spins on its own axis through the center of the nuclear mass at spinning angular frequency ω_s . Then, the Spin Magnetic Moment of the nucleus μ_{snu} is given by,

$$\mu_{snu} = (-3/32)ne\omega_s\pi(r_{nu})^2 \quad (7.25)$$

The Spin Magnetic Moment μ_{snu} is proportional to the square of the radius of the nucleus. Since the radius of the nucleus is not as small as the radius of electron, the Spin Magnetic Moment μ_{snu} due to the Spin of the nucleus is significant. We can also write μ_{snu} as,

$$\mu_{snu} = (-3/128)ne\omega_s A_{nu} \quad (7.26)$$

where A_{nu} is the surface area of the Nucleus.

It is clear, as in the case of an electron, the radius of the Nucleus of an Atom is negligible compared to the orbit radius of an electron, and hence the Spin Magnetic Moment of an Atom due to the Spin of the Nucleus itself on its own axis may appear as negligible compared to the Orbital Magnetic Moment due to orbiting electrons. However, as we will see later, Orbital Magnetic Moment is annihilated by the Merry-Go-Round Spin Magnetic Moment since they are equal and opposite. As a result, the Spin Magnetic Moment of the nucleus μ_{snu} is going to be the only significant Spin Magnetic Moment left in an Atom.

When the nucleus spins, it is the whole atom that spins taking all the bound electrons on a Merry-Go-Round ride. This Merry-Go-Round motion of electrons in an atom due to the Spin of the nucleus generates a Spin Magnetic Moment that is more significant than the Spin Magnetic Moment due to the Spin of the nucleus itself, and the Spin Magnetic Moment due to the Spin of all the bound electrons themselves on their own axes in an atom. However, this Merry-Go-Round Spin Magnetic Moment disappears in the presence of the Orbit Magnetic Moment due to the orbiting electrons since they are equal and opposite, leaving behind the Spin magnetic Moment due to the spin of the nucleus as the Spin Magnetic Moment of the Atom.

D. Atomic Merry-Go-Round Spin Magnetic Moment

Theorem: Merry-Go-Round Spin Magnetic Moment (SMM) of an Atom

For an Atom of Atomic number n spinning on its own axis at spinning frequency f_s , the Merry-Go-Round Spin Magnetic Moment (SMM) μ_{mgr} is given by,

$$\mu_{mgr} = (1/2)e\omega_s(r_{rms})^2$$

where, $r_{rms} = [(1/n)\sum_{i=1}^n(r_i)^2]^{1/2}$, $\forall i, i=1, 2, \dots, n$

e is the charge of electron, r_i is the orbit radius of the i^{th} electron, $\omega_s = 2\pi f_s$

The direction of the Spin Magnetic Moment is orthogonal to the orbital plane.

Orbiting systems such as atoms have net Orbit angular momentum. The Spin of an orbiting system is a result of this net Orbit angular momentum so that the total angular momentum of an orbiting system is a

null vector. In the case of an atom, the spin of atom is the spin of the nucleus. Even though an atom itself is neutral, the constituent elements of an atom are electrically charged. The spin of charged particles in otherwise neutral Atom generates a Spin magnetic field of an Atom.

As we have already seen, although the Spin Magnetic Moment due to the Spin of electrons is negligible, the Spin Magnetic Moment due to the Spin of the nucleus is significant. However, the Spin Magnetic Moment due to the Spin of the nucleus is negligible compared to the Orbit Magnetic Moment due to orbiting of the electrons. We now want to see the effect of the spin of the nucleus on the bound electrons. What happens to the bound electrons when nucleus spins? The effect of the nucleus Spin on bound electrons generates Spin Magnetic Moment (SMM) that contributes to the total Spin Magnetic Moment of an atom.

Spin of the nucleus of an Atom is the same as the Spin of an Atom. When nucleus spins, it takes all the bound electrons on a Merry-Go-Round ride creating current loops that results in Spin Magnetic Moment of an atom. When nucleus spins, it is the whole atom that spins. When nucleus spins, it generates circular loops for each bound electron that generates the Spin Magnetic Moment of an atom. This Merry-Go-Round Spin Magnetic Moment is also orthogonal to the plane of spin.

Further, the Orbit Magnetic Moment of an Atom aligns with the Merry-Go-Round Magnetic Moment since any misalignment result in generating an alignment torque. As a result, all the Spins take place on the Orbital plane. The torque due to any misalignment will make sure that all the Spins are taking place on the Orbital plane so that the Spin Magnetic Moments are all aligned orthogonal to the Orbital Plane, which is also the plane of all the Spins.

If the Merry-Go-Round radius of the current loop of the i^{th} electron is r_i , then, the Merry-Go-Round Spin Magnetic Moment μ_i from the i^{th} electron is given by,

$$\mu_i = (ef_s)\pi(r_i)^2 \quad (7.25)$$

$$\mu_i = (1/2)e\omega_s(r_i)^2 \quad (7.26)$$

where, $\omega_{sn} = 2\pi f_s$, and f_s is the frequency of the Nucleus Spin on an axis through the center of the nucleus, which is orthogonal to the plane of Spin.

Unlike the spin of electrons on their own axes, the Merry-Go-Round Spin Magnetic Moments of all the electrons are in-phase. All the electrons spin at the same frequency that is the spinning frequency of the nucleus f_s . Merry-Go-Round Magnetic Moments of all the electrons have the same direction; they are all either positive or else they are all negative relative to an observer. Therefore, we can simply add the Merry-Go-Round Magnetic Moment of each electron to obtain the total Merry-Go-Round Magnetic Moment of an atom,

$$\mu_{mgr} = \sum \mu_i, \forall i, i=1, 2, \dots, n \quad (7.27)$$

$$\mu_{mgr} = (1/2)e\omega_s \sum r_i^2, \forall i, i=1, 2, \dots, \quad (7.28)$$

where, μ_{mgr} is the Merry-Go-Round Spin Magnetic

Moment of an atom due to the Spin of the nucleus or the atom at angular frequency ω_s , and r_i is the Merry-Go-Round radius of the i^{th} electron, n is the number of electrons in the atom.

The root-mean-square of the radii of all electrons r_{rms} is given by,

$$r_{rms} = [(1/n) \sum_1^n (r_i)^2]^{1/2}, \forall i, i=1, 2, \dots, n \quad (7.29)$$

Now, we have,

$$\mu_{mgr} = (1/2)n e \omega_s (r_{rms})^2 \quad (7.30)$$

Since the plane of Spin is the same as the plane of Orbit, the Spin radius of an electron is also the same as the orbital radius. The Merry-Go-Round Spin Magnetic Moment of an Atom is proportional to the root-mean-square of the orbit radii of all the electrons, charge of an electron and the Spin frequency of an atom; intuitively, this is expected.

Since the Orbital Magnetic Moment and the Merry-Go-Round Spin Magnetic Moment of all the electrons align themselves, the Merry-Go-Round Spin radius of an electron is the same as the orbital radius of the electron. So, the atomic structure is planer, not spherical. All electrons orbit, spins, and take Merry-Go-Round ride on the same plane; the nucleus spin is also on the same plane. Any misalignment will be brought back to alignment immediately by the torque generated by the misalignment of the Spin Magnetic Moment.

Lemma:

Merry-Go-Round Spin Magnetic Moment cancels out with the Orbit Magnetic Moment (OMM) since they are equal and opposite.

E. Orientation of Electrons in an Atom

If there is no mechanism in an Atom to cancel out the Orbital Magnetic Field generated by orbiting electrons, this Orbital Magnetic Field acts as an external magnetic field for the electrons in an Atom forcing the Spin Magnetic Moment of each electron to orient itself with the Orbital Magnetic Moment robbing their freedom. As we are going to see, it is not going to happen since the Orbital Magnetic Moment is exactly equal and opposite to the Merry-Go-Round Spin Magnetic Moment. Orbit Magnetic Moment and the Merry-Go-Round Spin Magnetic Moment in an Atom cancel each other out, leaving electrons free to orient themselves making the mutual magnetic coupling between electrons in an Atom possible. In the absence of both Orbital Magnetic Moment and the Merry-Go-Round Spin Magnetic Moment as external magnetic fields for the electrons in an Atom, the orientation of electrons in an Atom is such, no two neighboring electrons have the same Spin Magnetic Moment polarities since opposite polarities attract and similar polarities repel. The orientation of one electron will be against the orientation of the other electron in an Atom. As a result, the net Spin Magnetic Moment due to the spin of all the electrons on their own axes will be approximately zero. Spin of electrons on their own axes makes no contribution to the Spin Magnetic

Moment of an Atom. This would not have been possible if the Orbit Magnetic Moment and the Merry-Go-Round Magnetic Moments had not been cancelled out.

Orientations of electrons are not affected by the Spin Magnetic Moment due to the spin of the nucleus itself since the radius of nucleus is negligible compared to the radius of the electron orbits where electrons are orbiting. Since the Spin Magnetic Moments of neighboring electrons are of opposite polarities and each Atom consists of even number of electrons, the net Spin Magnetic Moment of an Atom due to the spin of electrons on their own axes is null. As a result, the only contribution to the Atomic Spin Magnetic Moment mainly comes from the Spin Magnetic Moment due to the spin of nucleus itself on its own axis. We will consider Atomic Spin Magnetic Momentum in detail later. In the meantime, it is important to notice that there is a magnetic coupling of neighboring Atoms due to this Atomic Spin Magnetic Moment. It is this magnetic coupling of neighboring Atoms that is responsible for the splitting of a beam of Atoms into two beams of opposite orientations in the Stern-Gerlach Experiment, not a mysterious spatial Spin Quantization.

Corollary:

Orientations of electrons are not affected by the Spin Magnetic Moment due to the spin of the nucleus itself since the radius of nucleus is negligible compared to the radius of the electron orbits where electrons are located.

Corollary:

Spin of electrons on their own axes makes no contribution to the Spin Magnetic Moment of an Atom.

Corollary:

The Merry-Go-Round Spin Magnetic Moment of an Atom is proportional to the root-mean-square (rms) of the orbit radii of all the electrons.

Corollary:

Atomic Structure is planer, NOT Spherical. Atoms are nucleus-thick disks with the radius of the outermost orbit.

VIII. GENESIS OF ATOMIC SPIN

Theorem: Spin Frequency of an Atom

For an Atom of atomic number n spinning on its own axis, the angular spinning frequency ω_s is given by,

$$\omega_s = - [\sum_1^n \omega_i(r_i)^2] / [n(r_{rms})^2]$$

where, $r_{rms} = [(1/n) \sum_1^n (r_i)^2]^{1/2}$, $\forall i, i=1, 2, \dots, n$

r_i is the orbit radius of the i^{th} electron, ω_i is the angular orbiting frequency of the i^{th} electron.

We know that every Orbiting System, irrespective of its size, spins on an axis through the center of mass perpendicular to the plane of Orbits. Orbiting Systems

such as atoms spin on an axis through the center of the nucleus. The question is, "what generates the spin?" What causes an orbiting system to spin?

Any orbiting system has an angular momentum orthogonal to the orbiting plane. It is this angular momentum that generates a spin so that the net angular momentum of orbiting system is zero. As a result, the Spin angular momentum is always equal and opposite to the angular momentum of an orbiting system.

Spin is an inherent property of any orbiting system. The Spin angular momentum of an orbiting system is always equal and opposite to the Orbit angular momentum of the Orbiting System. Since the orbit angular momentum of any orbiting system is time-invariant or a constant, the Spin angular momentum of an orbiting system is also time-invariant or a constant.

Atoms are orbiting systems. An atom spins on an axis through the center of the nucleus. Spin of an atom is synonymous with the spin of the nucleus of an atom. All the bound electrons in an atom orbit the nucleus on the orbiting plane. Since the angular momentums of all the electrons are orthogonal to the planes of orbit, all the orbits are on a plane orthogonal to the direction of the angular momentum; in other word, orbits are planer. If the i^{th} electron of the atom is orbiting at orbiting frequency f_i on a circular orbit of radius r_i , then, the angular momentum ℓ_i is given by,

$$\ell_i = m\omega_i(r_i)^2, \forall i, i=1, 2, \dots, n \quad (8.1)$$

where, $\omega_i = 2\pi f_i$, m is the mass of an electron, n is the number of electrons in the atom.

Although the angular momentum of an electron in a multi-electron atom is not conserved [6], the total angular momentum of all the electrons in an orbiting system is conserved. The exact relationship for the total angular momentum of an orbiting system that takes the mutual interactions into account is given elsewhere in [6]. Here, we disregard the mutual interactions of the orbiting objects. The approximate total angular momentum ℓ_o of an orbiting system is given by,

$$\ell_o = m\sum_1^n \omega_i(r_i)^2, \forall i, i=1, 2, \dots, n \quad (8.2)$$

The total angular momentum of an atom is conserved. The total angular momentum ℓ_o is time invariant and $\ell_o \neq 0$. If $\ell_o = 0$, then, there will not be an Atomic Spin. It is the non-zero Orbit angular momentum of an Atom that generates the Spin angular momentum so that the net angular momentum of an atom is zero,

$$\ell_o + \ell_s = 0 \quad (8.3)$$

The sum of Orbit angular momentum of an atom and the Spin angular momentum of an atom is zero. Since Orbit angular momentum of any Orbiting System is non-zero, Spin is an intrinsic characteristic of any Orbiting System.

If an atom Spins at angular frequency ω_s , it will take all the electrons on a Merry-Go-Round ride generating Spin Magnetic Momentum ℓ_s , where,

$$\ell_s = m\omega_s \sum_1^n (r_i)^2, \forall i, i=1, 2, \dots, n \quad (8.4)$$

Since Orbiting and Spin plane are the same, Spin radii r_i , $i=1, 2, \dots, n$, are the same as the orbit radii r_i , $i=1,$

2, ..., n. Notice the difference between eqn. (8.2) and (8.4). In the case of Orbit angular momentum of electrons, each electron has its own orbiting frequency, whereas Spin frequency is the same for all the electrons since it is the Spin frequency of the nucleus.

Now, substituting for ℓ_o and ℓ_s in Eqn. (8.3) from Eqns. (8.2) and (8.4), we have,

$$m\omega_s \sum_1^n (r_i)^2 = -m \sum_1^n \omega_i (r_i)^2 \quad (8.5)$$

$$\omega_s = -[\sum_1^n \omega_i (r_i)^2] / [\sum_1^n (r_i)^2] \quad (8.6)$$

An atom of n electrons Spin at the angular frequency ω_s . Since the orbiting angular frequency ω_i of the i^{th} electron of an atom is a constant and the orbit radius r_i of i^{th} atom is a constant for all the electrons $i=1, 2, \dots, n$, the Spin angular frequency ω_s of an atom is a constant. However, the Spin frequency of an Atom changes with the loss of electrons by an Atom.

The Spin Magnetic Moment (SMM) μ_s is given by,

$$\mu_s = (e/2m)\ell_s \quad (8.7)$$

Since $\ell_o + \ell_s = 0$, we have,

$$\mu_s = -(e/2m)\ell_o \quad (8.8)$$

where, ℓ_o is the Orbit angular momentum of the atom. Since ℓ_o is a constant, the Spin Magnetic Moment of an atom is a constant. In other words,

$$\mu_s = \pm \beta \quad (8.9)$$

where, β is a constant given by,

$$\beta = (e/2m)\ell_o \quad (8.10)$$

Any Orbiting System maintains zero net angular momentum due to the Spin of the Orbiting System. An Atom has zero net angular momentum due to the spin of the Atom on an axis through the center of the Atom. Although electrically neutral orbiting systems such as Atoms have zero net angular momentum, they have non-zero Spin Magnetic Moment making electrically neutral atoms magnetic. It is this Atomic Spin Magnetic Moment that determines the behavior of Atoms in an external magnetic field as in the case of the behavior of Atoms in the Stern-Gerlach Magnetic field.

The direction of the Spin Magnetic Moment of an Atom is orthogonal to the plane of Spin, which is also the Orbital plane of the Atom. The direction is either positive or negative relative to an observer. It is only relative to an observer the direction can be defined. The magnitude of Spin Magnetic Moment of an Atom is a constant for given Atomic Number. As a result, atoms in atomic population are magnetically coupled; they are not free; their orientation are not random. It is only relative to an observer that the Spin can be Up or Down.

Property:

Spin is an intrinsic property of any Orbiting System, whether it is planetary or Atomic. Spin of any Atom generates a Spin Magnetic Moment that turns an Atom into a magnet. As a result, Atoms behave as magnets.

Corollary: Magnetic Neutral Atoms

Although electrically neutral spinning orbiting

systems such as Atoms have zero net angular momentum, they have non-zero Spin Magnetic Moment (SMM) making electrically neutral Atoms magnetic.

IX. SPIN MAGNETIC MOMENT OF ATOM

Theorem: Atomic Nullification

The vector sum of Merry-Go-Round Spin Magnetic field and the Orbit Magnetic Moment of an Atom is a null vector,

$$\mu_{mgr} + \mu_o = 0.$$

where μ_{mgr} is the Merry-Go-Round Spin Magnetic Moment and μ_o is the Orbit Magnetic Moment of the Atom.

Lemma:

The Spin Magnetic Moment of Atom μ_s is the same as the Spin Magnetic Moment of the Nucleus and it is given by,

$$\mu_s = (3/128)q\omega_s \mathcal{A}_{nu}$$

where, q is the total electric charge of the nucleus, $q = -ne$, e is the charge of electron, \mathcal{A}_{nu} is the surface area of the nucleus and ω_s is the angular frequency of the Spin of the Atom given by,

$$\omega_s = -[\sum_1^n \omega_i (r_i)^2] / [n(r_{rms})^2]$$

$$r_{rms} = [(1/n) \sum_1^n (r_i)^2]^{1/2}, \forall i, i=1, 2, \dots, n, r_i \text{ is the orbit radius of the } i^{\text{th}} \text{ electron, } f_i \text{ is the orbiting frequency of the } i^{\text{th}} \text{ electron, } f_s \text{ is the spin frequency of the Atom, } \omega_i = 2\pi f_i, \omega_s = 2\pi f_s.$$

Let us consider an atom of n electrons or atomic number n. Each electron spins on its own axis generating Spin Magnetic Moment orthogonal to the plane of Spin. The orientations of neighboring electrons are one against the other. One half of electrons align positively while the other half aligns negatively due to the attraction of the opposite and the repulsion of the alike. As a result, the net Spin Magnetic Moment of an Atom due to the Spin of electrons on their own axis is approximately zero.

The nucleus also spins on its own axis. In addition, the Spin of the nucleus also takes all the bounded electrons on a Merry-Go-Round Spin. The Merry-Go-Round Spin of the bound electrons also generates a magnetic moment, which is also orthogonal to the orbiting plane. Therefore, all the Spin Magnetic Moments are additive. The Spin Magnetic Moment μ_s of a neutral atom is given by,

$$\mu_s = [\sum_1^n \mu_{se}(i)] + \mu_{snu} + \mu_o + \mu_{mgr}, i=1, 2, \dots, n \quad (9.1)$$

where, μ_{se} is the Spin Magnetic Moment of an electron, μ_{snu} is the Spin Magnetic Moment of nucleus, μ_{mgr} is the Merry-Go-Round Spin Magnetic Moment of the atom, μ_o is the Orbit Magnetic Moment of the Atom, and n is the number of electrons in an atom.

We have already seen,

$$\mu_o = (1/2)e\sum \omega_i r_i^2, \forall i, i=1, 2, \dots, n \quad (9.2)$$

$$\mu_{se}(i) = \pm (3/32)e\omega_{se}\pi[r_e(i)]^2 \quad (9.3)$$

$$\mu_{snu} = -(3/32)n\omega_s\pi(r_{nu})^2 \quad (9.4)$$

$$\mu_{mgr} = (1/2)n\omega_s\pi(r_{rms})^2 \quad (9.5)$$

$$r_{rms} = [(1/n) \sum_1^n r_i^2]^{1/2}, \forall i, i=1, 2, \dots, n \quad (9.6)$$

where, r_i is the orbit radius of i^{th} electron, r_e is the radius of electron mass, and r_{nu} is the radius of nucleus, ω_{se} is the Spin angular frequency of an electron, ω_s is the Spin angular frequency of the nucleus or the Spin angular frequency of the atom, n is the number of electrons in the atom.

We have already considered the Spin Magnetic Moment μ_{se} of an electron due to its Spin on its own axis through the center of the electron. Each electron has its own axis of Spin, and hence the Spin Magnetic Moment can be perpendicular to the plane of Spin in one direction (positive, Spin-Up \nearrow) or direct opposite to that direction (negative, Spin-Down \searrow); Up or Down is relative and can only exist relative to the plane of Spin with respect to an observer. Any neighboring electrons pair will have opposite polarities aligned ($\nearrow\searrow$ or $\searrow\nearrow$) due to the attraction of opposite and the repulsion of the alike; just like compasses or free to orient magnets. As a result, the Spin Magnetic Moments of electrons cancel out, and hence the Spin Magnetic Moment of an atom due to the Spin of electrons is a null vector,

$$\sum_1^n \mu_{se}(i) \approx 0, \forall i, i=1, 2, \dots, n \quad (9.7)$$

Further, we know that the radius of electron r_e is negligible compared to the radius of the nucleus r_{nu} of an Atom,

$$r_e \ll r_{nu} \quad (9.8)$$

However, the radius of nucleus is negligible compared to the orbital radius,

$$r_{nu} \ll r_{rms} \quad (9.9)$$

where, r_{rms} is the root-mean-square radius of the electron orbits of the Atom.

We know the both Orbital Magnetic Moment and the Merry-Go-Round Spin Magnetic Moment are both orthogonal to the plane of orbit since the plane of orbit coincides with the plane of Atomic Spin. As a result, the vector sum of the Orbital Magnetic Moment and the Merry-Go-Round Spin Magnetic Moment is given by,

$$\mu_{mgr} + \mu_o = (-1/2)n\omega_s(r_{rms})^2 + (1/2)e\sum \omega_i r_i^2, \forall i \quad (9.10)$$

where,

$$r_{rms} = [(1/n) \sum_1^n r_i^2]^{1/2}, \forall i, i=1, 2, \dots, n \quad (9.11)$$

Further, from eqn. (8.6), we have already seen that the spin frequency of an Atom ω_s is given by,

$$\omega_s = - [\sum_1^n \omega_i (r_i)^2] / [n(r_{rms})^2] \quad (9.12)$$

Substituting for ω_s in eqn. (9.10), we have,

$$\mu_{mgr} + \mu_o = 0 \quad (9.13)$$

The vector sum of the Orbit Magnetic Moment (OMM) due to the electron orbits and the Merry-Go-Round Spin Magnetic Moment (SMM) of electrons due to the spin of the Atom is a null vector.

Now from eqn. (9.1), the net Spin Magnetic Moment (SMM) of an Atom, μ_s is simply the Spin Magnetic Moment due to the Spin of the nucleus of the Atom,

$$\mu_s = \mu_{snu} \quad (9.14)$$

$$\mu_{snu} = -(3/32)n\omega_s \pi (r_{nu})^2 \quad (9.15)$$

where r_{nu} is the radius of the nucleus.

If the surface area of the nucleus is \mathcal{A}_{nu} , then we have,

$$\mu_{snu} = -(3/128)n\omega_s \mathcal{A}_{nu} \quad (9.16)$$

where, $\mathcal{A}_{nu} = 4\pi(r_{nu})^2$.

The direction of the Spin Magnetic Moment is orthogonal to the plane of Spin, which is also the same as the orbital plane.

A spinning atom has its Spin Magnetic Moment μ_s in the positive (Spin-Up \nearrow) or negative (Spin-Down \searrow) direction of the Spinning Axis of the nucleus or the Atom relative to the plane of Spin with respect to an observer. Up and Down do not mean what we consider to be Up \uparrow and Down \downarrow ; it could be at any orientation, Up \nearrow and Down \searrow . In the case of an Atom, the direction of the Spin coincides with the direction of the Spin Magnetic Moment, and hence, the direction of the Spin Magnetic Moment is also the orientation of the atom since there is no obstacle to the free motion of electrons. As a result, there is no tilt between the atomic Spin and the Spin Magnetic Moment of the Atom. However, in the case of a composite object such as earth, paths that charge particles can take in the Spin are restricted, not free, and as a result, the Spin Axis does not coincide with the Spin Magnetic Moment. In the case of free moving electrons in an atom they do coincide.

Each Atom has its own independent Spin Axis. The orientation may be independent from atom to atom when they are at distance or when there is no social correlation between them. However, orientations of nearby atoms are perfectly socially correlated negatively due to the attraction of opposite polarities and the repulsion of the same polarities. In other words, nearby atoms are magnetically coupled negatively.

A. Atom in an External Magnetic Field

If we denote Spin-Up as \nearrow and Spin-Down as \searrow , then, two nearby particles can both be in Spin Up $\nearrow\nearrow$ position only in the presence of an external magnetic field in the same direction \nearrow . If the external magnetic field is in vertical \uparrow direction, then both Atoms will be $\uparrow\uparrow$ orientation. As soon as the external magnetic field is taken away or switched off, they re-orient themselves to be in its natural orientation (Up-Down) $\nearrow\searrow$ or $\searrow\nearrow$ (Down-Up) due to the attraction of opposite and the repulsion of the alike. There is no exclusion principle here. No Pauli Spin Matrices at work here. What is at work preventing for two electrons to have the same orientation of Spin Magnetic Moment is the attraction of opposite polarities and the repulsion of the same polarities. Two nearby atoms naturally orient to be at position $\nearrow\searrow$ or $\searrow\nearrow$. It is only in the presence of an external magnetic field $\mathbf{B} \uparrow$, two atoms can have the same orientation $\uparrow\uparrow$ toward the direction of \mathbf{B} . If the \mathbf{B} is in the direction \nwarrow , then the two atoms will be in the orientation $\nwarrow\nwarrow$. When the External Magnetic Field is switched off, the atoms will be in their natural opposite orientation of $\nearrow\searrow$ or $\searrow\nearrow$; the inclination can be any angle determined by the population of atoms and the environmental magnetic field they are in. If two atoms are in the orientation $\searrow\nearrow$, then, when they enter

an external magnetic field \mathbf{B} of same orientation, there will be no torque and hence they remain in the same \nearrow orientation in the Magnetic Field \mathbf{B} ; in this case the orientation remains the same even when the magnetic field is turned off since it is their natural orientation, not a forced orientation.

You can set up the orientation of an Atom using an external magnetic field. The orientation of an Atom in an external magnetic field will always be towards the external magnetic field unless the Atom is already against the external magnetic field, in which case the orientation of the Atom remains unaltered in the external magnetic field. However, it will remain at that set orientation towards the external magnetic field as long as the external magnetic field is present only. As soon as the external magnetic field is taken away or switched off, the orientation of the Atom no longer be at that set orientation; it will be at an orientation determined by the neighboring Atoms and the environment. By placing an Atom in an external magnetic field, what you are doing is changing the orientation of the Atom to be in the direction of the external magnetic field; information of the original orientation of the Atom is completely erased. If you place an atom in a vertical (z direction) external magnetic field that is not direct opposite of that of the orientation of the Atom, then orientation of the Atom will be in z direction while it is in the external magnetic field. If you then pass that Atom through a horizontal magnetic field (x direction), the orientation of the Atom will now be horizontal, in the x direction; now, the Atom does not contain any information about its previous z direction orientation or the original orientation, where it had been. This will be very important in understanding the Stern-Gerlach Experiment.

B. Bushism in Action in Stern-Gerlach Experiment

Any External Magnetic Field has one message for any Atom that enters its realm or jurisdiction. You are either with us or against us, the Classic Bushism. If you are not totally against us, we will consider you a friend and torque you Up (Spin-Up). If you are totally against us, you will go Down (Spin-Down), that is all to it, period. That is all to Stern-Gerlach Experiment. Orientation of an Atom is determined by the External Magnetic Field unless its orientation is not complete opposite of the External Magnetic Field. If the orientation of an Atom is completely opposite of the External Magnetic Field, the External Magnetic Field has no effect on the orientation of the Atom, simply because the orientation torque is zero when the Spin Magnetic Moment of the Atom is in the direction of the External Magnetic Field or the direct opposite of the direction of the External Magnetic Field. There is no probability here. There is no Uncertainty or Uncertainty Principle here. Everything here is certain. No rolling of dies. No 50-50 chance here. The direction of the External Magnetic Field dictates here unless the orientation of the Atom is direct opposite of

the External Magnetic Field.

There are no Spin-Up atoms or Spin-Down atoms. Spin-Up and Spin-Down are present always together in a particle relative to an observer. Spin-Up and Spin-Down are non-separable since the separation means the creation of magnetic monopoles. There are no magnetic monopoles. Spin-Up and Spin-Down are not states of an atom. Spin-Down is just the rotation of the Spin-Up by 180° degrees and vice versa. The rotation of an Atom does not change the intrinsic state of an Atom. As a result, neither the Spin-Up nor the Spin-Down is an intrinsic property of an atom of any spinning object. What is the Spin of the earth? Answer depends on where you are. If the earth is Spin-Up relative to your current location, then, move to the opposite Hemisphere and the earth is now Spin-Down. Earth's state did not change, it is your perspective of the object that changed.

In the Stern-Gerlach Experiment, what is at work is the Spin Magnetic Moment due to the Spin of the nucleus, which is also the same as the Spin of the Atom. Now, we want to find out what exactly happens when a neutral atom with magnetic moment μ_s interact with an external magnetic field \mathbf{B} . Stern-Gerlach Experiment is all about the interaction of μ_s with \mathbf{B} . Since the net Spin Magnetic Moment due to the Spin of electrons on their own axes is negligible compared to the Spin Magnetic Moment due to the spin of the nucleus, Stern-Gerlach Experiment has nothing to do with the Spin of electrons on their own axes when a beam of atoms is used. If you want to consider the Spin of electrons on their own axes, you must use a beam of electrons in the Stern-Gerlach Experiment, but the drift-path will be a spiral theoretically when a beam of electron is used; however, practically, you may not see any beam splitting when a beam of electron is used. Spin Magnetic Moment due to the Spin of an electron on its own axis is proportional to the square radius of the electron mass, which is negligible, and hence if a beam of electrons is used in the Stern-Gerlach Experiment, it will not give any observable beam splitting. Further, it is the orbiting electrons that Spins, not the isolated electrons in a beam unless the electrons that are dislodge from an atom carries with it a Spin.

Corollary:

Stern-Gerlach Experiment with a beam of Atoms has nothing to do with the Spin of electrons on their own axes. It has all to with the Atomic Spin, which is the Spin Magnetic Moment due to the spin of the nucleus.

Corollary:

If a beam of electrons is used in the Stern-Gerlach Experiment, the beam will split theoretically into two spirals, and the deflection is negligibly small that the split spirals will be hardly noticeable.

If a beam of charge particles is used in the Stern-Gerlach experiment, the beam will be split into two spirals; it is still possible to make the beams hit the screen by choosing the length of the Stern-Gerlach Magnetic Field and the speed of the electrons appropriately. Those may be the factors for choosing a beam of Silver Atoms rather than a beam of electron, which would not have been practical in the Stern-Gerlach Experiment.

When neutral atoms are used, the Atomic Spin Magnetic Moment due to the spin of the nucleus is strong enough for splitting the beam in the Stern-Gerlach Magnetic Field. Since Atoms are electrically neutral, they will not be splitting into spirals. A beam of atoms will be split and deflected into two beams of equal number of Atoms by the Stern-Gerlach Magnetic Field. Larger is the atomic number of the Atom, the larger is the Spin Magnetic Moment of an Atom due to the spin of the nucleus; this is the reason for choosing Atoms with large atomic number such as silver Atoms in the Stern-Gerlach Experiment.

Now, let us see why a beam of Silver Atoms is split into two separate beams by the Stern-Gerlach Magnetic Field. As we are going to see, it has nothing to do with the Spin of the electrons, Spin Matrices, Pauli Matrices, Pauli's Exclusion Principle, so-called Uncertainty Principle, or Spatial Quantization or so-called Spin-1/2. It has nothing to do with Quantum Mechanics! It all has to do with the magnetic coupling between Atoms due to the Atomic Spin Magnetic Moment of Atoms.

Stern-Gerlach Under Bushism in Action:

- You are either with us or against us, the Classic Bushism.
- If you are not totally against us, we will torque you Up (Spin-Up).
- If you are totally against us, you will go Down (Spin-Down).
- That is all to Stern-Gerlach, nothing more, period. No rolling of Dies.

Surprise! Surprise indeed! Who expected to find the Bushism at work in the nature? What a surprise it is to find the Bushism in the working of the nature.

Corollary:

Split of a beam of Atoms into two beams of equal number of Atoms by Stern-Gerlach Magnetic Field has nothing to do with Quantum Mechanics. Nothing to do with probability.

Corollary:

Split of a beam of Atoms into two beams of equal number of Atoms by Stern-Gerlach Magnetic Field is deterministic; it is due to magnetic coupling of Atoms.

X. INTERACTIONS OF NEUTRAL ATOMS WITH EXTERNAL MAGNETIC FIELD

Angular momentum of an orbiting system makes

its constituent particles in the orbiting system to spin on their own axes so that the net angular momentum of orbiting system is a null vector. Since an atom is an orbiting system, its constituent particles also spin on their own axes. Although the atom is neutral, its spinning constituent particles are electrically charged and hence generate Spin Magnetic Moment (SMM). There are several spins in an atom that contributes to the overall Spin Magnetic Moment of an atom:

- Spin Magnetic Moment due to the Spin of electrons on their own axes. This is negligible since the Spin Magnetic Moment of an electron is proportional to the square radius of an electron mass or the surface area of the electron, which is negligible. Further, the Spin Magnetic Moment of electrons on their own axes are not in-phase. In fact, Spin Magnetic Moment of two neighboring electrons are opposite to each other due to the attraction of opposite polarities and the repulsion of the alike. Therefore, half of the electron Spin has positive polarity while the other half is of opposite polarity. As a result, the overall Spin Magnetic Moment of an atom due to the Spin of the electrons on their own axes is approximately zero since they cancel out.
- Spin Magnetic Moment due to the Spin of the nucleus on its own axes generates a Spin Magnetic Moment of its own too. This is also proportional to the square radius of the nucleus or the surface area of the nucleus. As we have already seen, Atomic Spin Magnetic Moment is mainly a result of the Spin Magnetic Moment due to the spin of the nucleus.
- Spin of nucleus, which is the same as the spin of the atom, also takes the bound electrons on a Merry-Go-Round ride generating Spin Magnetic Moment. However, the Merry-Go-Ride Spin Magnetic Moment is equal and opposite to the Orbital Magnetic Moment due to the orbiting of electrons in an Atom. As a result, Merry-Go-Round Spin Magnetic Moment and Orbital Magnetic Moment cancel out each other.

A. Merry-Go-Round Spin Magnetic Moment of Atom

When nucleus spins, it also takes the bound electrons of the atom on a Merry-Go-Round ride. The Spin of the nucleus is the same as the spin of the whole atom on an axis through the center of the nucleus. When atom spins, it generates electrons loops or current loops around the spin axis of the nucleus. The magnetic moment of each electron loop is proportional to the square radius of the loop. These electron loops due to the spin of the nucleus are circular. The current through an electron loop is proportional to the angular frequency of the nuclear spin or the atomic spin. Since each electron is tracing its own circular path as a result of the spin of the nucleus, the directions of the current in all the current loops are the same or they are all in-phase. As a

result, the Merry-Go-Round Spin Magnetic Moments of all the electrons are in-phase, and they add together constructively to generate a strong Spin Magnetic Moment for electrically neutral atom. Every electrically neutral atom contains a Merry-Go-Round Spin Magnetic Moment due to the spin of the nucleus or the atom. Every atom has a spin since every atom is an orbiting system. Orbiting systems spin. Every orbiting system also generate an Orbit Magnetic Moment. The Spin Magnetic Moment of an electrically neutral atom as a result of this Merry-Go-Round Spin is equal and opposite to the Orbital Magnetic Moment generated by the orbiting of electrons, and hence they cancel each other out. So, we can forget about both the Merry-Go-Round Magnetic Moment and the Orbit Magnetic Moment of an Atom. We have seen that the Spin Magnetic Moment due to the spin of electrons on their own axes is also negligible due to the magnetic coupling of the neighboring electrons. As a result, what is left is the Spin Magnetic Moment due to the spin of the nucleus on its own axis, which is the Spin Magnetic Moment of an Atom.

Corollary:

Although an Atom is neutral, its constituent particles are electrically charged, and hence spinning neutral Atom generates a Spin Magnetic Moment (SMM), which is mainly the result of the spin of the nucleus. SMM of an Atom is not due to the spin of the electrons.

B. Moving Atom in a Uniform Magnetic Field

When a particle of charge q travels through a uniform magnetic field \mathbf{B} at velocity \mathbf{v} , the force \mathbf{F} exerted on the charge is given by,

$$\mathbf{F} = q\mathbf{v} \times \mathbf{B} \quad (10.1)$$

The direction of \mathbf{F} is orthogonal to the plane of \mathbf{v} and \mathbf{B} . In other words, there is an acceleration orthogonal to the velocity \mathbf{v} of the particle. As a result, the particle takes a circular path. If the particle is a neutral atom, then $q=0$, and hence the acceleration force is a null vector, $\mathbf{F}=0$. Therefore, a neutral particle such as an Atom does not take a circular path when it travels through a uniform magnetic field. A neutral atom follows a linear path in a uniform external magnetic field \mathbf{B} .

Corollary:

Unlike an electrically charged moving particle that takes a circular path, a moving neutral atom follows a linear path in a uniform external magnetic field.

Any spinning charge particle has a Spin Magnetic Moment. Any neutral Atom also has a Spin Magnetic Moment. The Spinning Magnetic Moment μ_s of a particle generates a torque when the particle is in an external magnetic field \mathbf{B} . The tendency of the torque is to align the Spin Magnetic Moment μ_s with the external magnetic field \mathbf{B} . The total effect on a spinning particle moving at velocity \mathbf{v} through a

uniform magnetic field \mathbf{B} is the superposition of the force that leads to a circular path and a torque that makes Spin Magnetic Moment to align with the external magnetic field.

In the case of a neutral atom travelling through a uniform magnetic field, the force that leads the atom to take a circular path is zero and hence atom takes a straight path. However, the torque τ that aligns the Spin Magnetic Moment μ_s with the external magnetic field is always present. Therefore, a moving electrically neutral atom takes a straight path through a uniform external magnetic field while being aligned the Spin Magnetic Moment μ_s of the atom with the external magnetic field \mathbf{B} .

If the Spin Magnetic Moment of the atom μ_s is at an angle θ with the external magnetic field \mathbf{B} , then, when $\theta=0$ or $\theta=\pm 180$, the torque $\tau=0$, and as a result an atom with the orientation towards or against the external magnetic field undergoes no alignment and hence no rotation. It does not matter what the angle θ is, the torque will always align the Spin Magnetic Moment of the Atom with the External Magnetic Field, and the Atom passes through the External Magnetic Field with Positive Polarity (Spin-Up) except when $\theta=\pm 180$. When $\theta=\pm 180$, the atom passes through the external magnetic field without being subjected to any rotation while maintaining its opposite polarity (Spin-Down); μ_s remains opposite to the direction of the external magnetic field \mathbf{B} as long as the Atom is in the External Magnetic Field. However, it is noteworthy that $\theta=\pm 180$ is a critical stable point; any perturbation will result in a non-zero torque that brings the orientation of the atom towards the external magnetic field \mathbf{B} making $\theta=0$. For a neutral atom, the effect of the motion of the atom through an external magnetic field will be solely the result of the Spin Magnetic Moment μ_s interaction with the external magnetic field \mathbf{B} .

When a spinning particle of charge q travels at velocity \mathbf{v} through a uniform magnetic field \mathbf{B} , the force \mathbf{F} and the torque μ_s are given by,

$$\mathbf{F} = q\mathbf{v} \times \mathbf{B} \quad (10.2)$$

$$\tau = \mu_s \times \mathbf{B} \quad (10.3)$$

$$\tau = \mu_s B \sin \theta \quad (10.4)$$

where, θ is the angle between μ_s and \mathbf{B} ,

$$\tau^2 = \tau \cdot \tau, B^2 = \mathbf{B} \cdot \mathbf{B}.$$

The direction of the torque is orthogonal to the plane μ_s and \mathbf{B} . Force $\mathbf{F}=0$ when $q=0$. For a neutral atom, $q=0$, and hence $\mathbf{F}=0$. However, in the case of neutral atoms, $\mu_s \neq 0$ even though $q=0$. Any atom, irrespective of whether the atom is electrically charged or not, has an Spin Magnetic Moment μ_s and hence is subjected to a torque in the presence of an external magnetic field \mathbf{B} unless the Spin Magnetic Moment of the atom μ_s is aligned with (positively, Up) or against (negatively, Down) the external magnetic field \mathbf{B} .

The Magnetic Potential V of a particle is given by,

$$V = -\mu_s \cdot \mathbf{B} \quad (10.5)$$

$$V = -\mu_s B \cos \theta \quad (10.6)$$

where, θ is the angle between μ_s and \mathbf{B} .

C. Moving Atom in a Non-Uniform Magnetic Field

The Spin Magnetic Moment μ_s is independent of the position of the particle, and hence, we have,

$$\nabla V = -\mu_s \bullet \nabla B \quad (10.7)$$

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

In the presence of non-uniform magnetic field B , there exist a potential gradient. When there is a potential gradient, there exists a force.

The drift force F on an atom is given by,

$$F = -\nabla V \quad (10.8)$$

Substituting from eqn. (9.7), we have,

$$F = \mu_s \bullet \nabla B \quad (10.9)$$

where, F is the magnitude of the drift force F . The direction of the drift force is in the direction of the negative gradient of the potential V . The F is the drift force due to the gradient of the external magnetic field.

In the case of uniform magnetic field,

$$\nabla B = 0 \quad (10.10)$$

Now, for a Uniform Magnetic Field, we have,

$$F = 0 \quad (10.11)$$

$$\tau \neq 0 \quad (10.12)$$

For a particle travelling through a uniform magnetic field, $\nabla B = 0$, and as a result, there is no drift force, $F = 0$. However, the torque is present, $\tau \neq 0$ irrespective of the type of external magnetic field as long as external magnetic is present, $B \neq 0$; torque τ is independent of the charge of the Atom.

Stern-Gerlach did not take this non-zero torque $\tau \neq 0$ into account. Atom can be electrically neutral, but the torque is always present when an Atom is in an External Magnetic Field when $\theta \neq 0$ or $\theta \neq \pm\pi$. It is only when $\theta = 0$ or $\theta = \pm\pi$ that the torque is zero. Not taking this non-zero torque τ into account in the Stern-Gerlach Experiment is one of the major mistakes in the experiment. Atoms can be electrically neutral, but the torque is still present in the presence of an external magnetic field due to the Spin Magnetic Moment of the atom.

Lemma:

When an Atom is in an External Magnetic Field, there will be an orientation torque even though the Atom is electrically neutral due to the Spin Magnetic Moment of the Atom. Orientation of an Atom with an External Magnetic Field takes place instantly at the arrival of the Atom in an External Magnetic Field since the External Magnetic Field is strong.

Corollary:

In the presence of an External Magnetic Field, an Atom always aligns toward the External Magnetic Field unless the orientation of the Atom is already against the direction of the External Magnetic Field, in which case the orientation of the Atom remains unaltered by the External Magnetic Field.

XI. MAGNETIC COUPLING OF A BEAM OF ATOM

Definition: Orientation of an Atom

The orientation of an Atom is defined as the direction of the Spin Magnetic Moment of an atom, which is also the Spin of an Atom.

Corollary:

The orientation of an Atom is determined by the environment the Atom is in. The orientation of an Atom is not determined by the Atom itself and hence the orientation of an Atom is not a property or state of an Atom.

Lemma:

The orientations of two neighboring Atoms are always one against the other due to the attraction of opposite polarities and the repulsion of alike.

Consider a beam of atoms or atoms lined up in a straight line. Each atom has Spin Magnetic Moment and hence they are little magnets. When magnets are nearby, they become magnetically coupled. Since atoms are nearby in a beam, they become magnetically coupled to their neighbors due to the Spin Magnetic Moment of atoms.

The magnitude of the Spin Magnetic Moment is the same if we choose the same kind of atoms, atoms with same atomic number, such as Silver atoms. Since the atoms are free to orient themselves in a beam, the atoms in a beam will orient themselves in such a way the nearby atoms are of opposite polarities. In other words, two nearby atoms have their Spin Magnetic Moment oriented against one another. As a result, one half of the atoms in a beam will be oriented in one direction, while the other half will be oriented in exactly the opposite direction. If one atom has orientation of angle θ with the vertical direction z , then, its neighbor will be oriented at an angle $\theta \pm 180^\circ$ to the vertical direction z . In other words, the neighboring atoms have their Spin Magnetic Moment oriented one against the other just like magnets or compasses. "Just like magnets" is an understatement, Atoms are magnets.

Orientation of Atoms in a Beam of Atoms:

.... $\nearrow \nwarrow \nearrow \nwarrow \nearrow \nwarrow$ Oriented at angle θ or $\theta \pm 180^\circ$
No two nearby atoms have the same orientation.

Now, let us assume we get hold of right most atom in the beam and apply a torque anti-clockwise and force it to orient in the vertical z direction \uparrow , $\theta = 0$. Then, the rest of the atoms will follow the suite since all the atoms in the beam are magnetically coupled or entangled. The second Atom to the left of the first will orient itself \downarrow , against the orientation of the first at an angle $\pm 180^\circ$ degrees to $+z$ direction or toward the $-z$ direction. The third atom to the left will orient \uparrow , against the orientation of the second atom at an angle 0° degree to $+z$ and so on.

..... $\uparrow\downarrow\uparrow\downarrow\uparrow$ \uparrow when we forced right most atom in a beam to be vertical, the rest of the atoms follow suit due to magnetic coupling so that no two neighbors have the same orientation.

One half of the atoms in the beam will be oriented vertically in $+z$ direction, while the other half orients themselves in the $-z$ direction. No two neighboring atoms have the same orientation due to the attraction of the opposite polarities and the repulsion of the alike. It only takes the change of the orientation of only one atom to change the orientation of all the atoms in the beam since all the atoms in a beam are magnetically coupled. The orientation means the direction of the Spin Magnetic Moment of an atom. By changing the orientation of one atom, you are affecting the orientation of all the magnetically coupled atoms even though they are at distant.

The so-called entanglement is a fancy word for magnetic coupling, nothing more. This is exactly what is happening in the Stern-Gerlach Experiment. It is the failure to take this magnetic coupling of Atoms into account that led to the mysterious and invalid probabilistic interpretation of the Stern-Gerlach Experiment, voodoo-fication of microscopic particles; this is the Genesis of Quantum Mechanics.

XII. EFFECT OF TORQUE ON NEUTRAL ATOMS

Even a neutral Atom has a Spin Magnetic Moment μ_s and hence generates a torque τ in the presence of an external magnetic field \mathbf{B} . What does this torque do to an atom? This torque forces the Spin Magnetic Moment to align in the direction of the external Magnetic field \mathbf{B} . When the Spin Magnetic Moment aligns along the direction of the external magnetic field \mathbf{B} , the magnetic potential of the atom will be at minimum, a stable orientation.

If the Spin Magnetic Moment of an atom is at an angle θ with the external magnetic field \mathbf{B} , the torque will try to bring it back to the orientation where it is in alignment with the external magnetic field \mathbf{B} so that $\theta=0$.

If the Spin Magnetic Moment of the atom is directly opposite to the external magnetic field \mathbf{B} , $\theta=\pm 180^\circ$ degrees, then, the torque $\tau=0$ and hence the atom remains at that orientation. However, the atom is at maximum potential now. As a result, $\theta=\pm 180^\circ$ is a critical stable point. There will be no torque on atom that has its Spin Magnetic Moment aligned against the external Magnetic field \mathbf{B} . However, a slightest perturbation in the orientation of the atom from $\alpha=\pm 180^\circ$ to $\alpha=\pm 180^\circ+\delta$, where δ is a small perturbation, then, $\tau\neq 0$, and hence the atom will undergoes rotation until it orient itself in the direction of the external magnetic field \mathbf{B} . If the angle between the Spin Magnetic Moment μ_s and the external magnetic field \mathbf{B} is θ , for an atom that is free to orient

itself, we have,

- If $\theta=0$, then, $\tau=0$: orientation of the atom remains in the direction, $+\mathbf{B}$.
- If $\theta=\pm 180^\circ$, $\tau=0$: orientation of the atom remains unchanged in the direction, $-\mathbf{B}$
- If $\theta\neq 0$, $\theta\neq\pm 180^\circ$, $\tau\neq 0$: atom rotates until it aligns with $+\mathbf{B}$. The orientation is immediate since \mathbf{B} is strong in the case of Stern-Gerlach Experiment.

The orientation of atoms in a beam of atom depends on the environment the beam is in:

1. In the absence of external magnetic field, half of the atoms will have the same orientation θ with the z axis, while the other half has the opposite orientation, $\theta\pm 180^\circ$. No two neighboring atoms can have the same orientation due to the attraction of the opposite polarities and the repulsion of alike.
2. If a beam of atoms is in a strong external magnetic field \mathbf{B} , each atom in the beam will be oriented towards or against \mathbf{B} immediately depending on how they enter the external magnetic field. If all the Atoms are exposed to the beam at once and the orientation of the beam is different from the direction of \mathbf{B} , then, all the Atoms in the beam will be oriented towards the external magnetic field \mathbf{B} .
3. If the first atom in a beam enters a strong magnetic field \mathbf{B} , it immediately orients along the direction of \mathbf{B} due to the torque that forces it to align with \mathbf{B} . All the atoms in the beam follow the suite aligning against or towards the orientation of the first Atom alternatively even though the rest of the atoms are outside the external magnetic field \mathbf{B} since atoms in a beam are magnetically coupled. Even though it is only the first atom that is in the external magnetic field \mathbf{B} , half of the atoms in the beam will be oriented in the direction of $+\mathbf{B}$, while the other half will be oriented against the external magnetic field or in the direction $-\mathbf{B}$. When the orientation of one atom has changed, the rest follows since all the atoms in a beam are magnetically coupled. This is the reason why all the atoms in the Stern-Gerlach experiment enter with the orientation towards (Spin-Up) or against (Spin-Down) the Stern-Gerlach magnetic field. This also explains without a doubt why the number of atoms in both the Spin-Up and Spin-Down beams are the same in the Stern-Gerlach Experiment. As we have seen, it has nothing to do with probability.

We have already seen that the Spin Magnetic Moment (SMM), μ_s of a neutral atom is given by,

$$\mu_s = -(3/128)n e \omega_s \mathcal{A}_{nu} \quad (12.1)$$

where, $\mathcal{A}_{nu} = 4\pi(r_{nu})^2$, r_{nu} is the radius of the nucleus of the Atom and ω_s is the spin angular frequency of the atom, e is the charge of an electron and n is the Atomic number.

For atoms with fixed number of electrons or the same atomic number, $(3/128)n e \omega_s \mathcal{A}_{nu}$ is a constant; let that constant be β . then we have,

$$\mu_s = \pm \beta \quad (12.2)$$

The direction of μ_s is orthogonal to the plane of Atomic Spin, which is also the same as the orbital plane of the electrons in an Atom.

After the first atom enters the external magnetic field, the rest of the atoms in the beam of atoms enter the external magnetic field one by one either aligned with the external magnetic field or against the external magnetic field. If the angle θ between the orientation of the first Atom and the external magnetic field is \mathbf{B} , and $\theta \neq \pm 180^\circ$, then, immediately after the first Atom enters the external magnetic field \mathbf{B} , it aligns itself towards \mathbf{B} (Spin-Up). All the rest of the odd atoms (... 7, 5, 3) will enter oriented towards the \mathbf{B} (Spin-Up), while all the even Atoms (... 8, 6, 4, 2) enter oriented against \mathbf{B} or $-\mathbf{B}$ (Spin-Down) direction. If $\theta = \pm 180^\circ$, then, all the odd atoms (... 7, 5, 3, 1) will enter oriented against the \mathbf{B} or $-\mathbf{B}$ (Spin-Down), while all the even Atoms (... 8, 6, 4, 2) enter oriented toward \mathbf{B} (Spin-Up) direction.

As a result, $\mu_s \cdot \mathbf{B} = \pm \beta B$, and hence the potential $V = \pm \beta B$, where $\mu_s = \pm \beta$, which is a constant. Since all the atoms in the beam, except the first atom, enters the external magnetic field with orientations $\theta = 0$ or $\theta = \pm 180^\circ$, there is no torque, $\tau = 0$. We will consider this in more detail when we consider the Stern-Gerlach experiment and its setup in a separate section later.

It is important to notice that the number of atoms having potential, $+\beta B$ is the same as the number of atoms having the potential, $-\beta B$ in the Stern-Gerlach Experiment. This is because, when the first atom entered and immediately aligned with the external magnetic field, the rest follows the suite while they are outside the magnetic field; no two neighboring atoms in the beam have the same orientation. This is due to the Spin Magnetic Coupling of the atoms, or so-called entanglement, in a beam due to the attraction of the opposite polarities and the repulsion of the same polarities.

XIII. $\pm \beta$ SPIN ATOM

We have seen that the Spin Magnetic Moment of an Atom is a constant, $\mu_s = \pm \beta$ relative to the plane of the Spin for atoms with the same number of electrons or atomic number. Spin of an Atom is $+\beta$ from one direction relative to the plane of Spin and the same Spin is $-\beta$ from the opposite direction relative to the plane of spin with respect to an observer; the plane of the Spin is also the same as the Orbit plane of the electrons.

If $\mu_s = +\beta$, the Spin Magnetic Moment is in one direction (Spin-Up), and if $\mu_s = -\beta$, then, the Spin Magnetic Moment is in the opposite direction (Spin-Down) relative to the plane of the Spin with respect to an Observer. The orientation of the Plane of Spin can be in any direction in the absence of external field or other nearby atoms. As a result, an Atom is Spin-Up or Spin-Down relative to an Observer. The Spin can be Spin-Up by a constant $+\beta$ or Spin-Down by a constant $-\beta$ with respect to the plane of Spin, which is also the plane of orbit, relative to an Observer. This is

the reason why it is said that the Spin is either Up or Down; it is with reference to the plane of Spin relative to an Observer, not an absolute measure. There is no absolute measure of Spin-Up \uparrow or Spin-Down \downarrow . There is no absolute measure of Clockwise or Counter-Clockwise either. Direction of any Spin is always relative. There are no Spin-Up atoms or Spin-Down atoms. There are no Spin $+\beta$ atoms or Spin $-\beta$ atoms. We can only say the magnitude of atomic Spin is a constant β .

However, the magnitude of the Spin Magnetic Moment or the Spin β of an Atom changes if an electron is dislodged from an Atom. It is because the Spin frequency ω_s changes with the change of number of orbiting electrons. When the Spin frequency changes, Spin β changes.

The orientation of the plane of spin of an Atom can be in any direction only if the atom is not near any other atoms or in an external magnetic field. If two atoms are at close proximity, then, the orientation of each atom is influenced by the other due to the Spin Magnetic Moment of atoms. No two nearby atoms can have the same polarity, or in other words, no two nearby atoms can have their Spin Magnetic Moments in the same direction.

Atoms are microscopic magnets due to their Atomic Spin, and hence they attract opposite polarities and repulse the alike. As a result, the spinning planes of all the nearby atoms will be on the same plane, or in other words, the Spin Magnetic Moments of half of the atoms will be toward one direction (Spin-Up) while the other half is in the opposite direction (Spin-Down). Two adjacent atoms always have the opposite polarities Up-Down, Down-Up; it could be $\uparrow\downarrow$, $\downarrow\uparrow$ or $\nearrow\swarrow$, $\nwarrow\searrow$ at any angle. Up does not mean vertical $+z$ axis and Down does not mean $-z$ axis. Up mean any orthogonal direction with respect to the Spin plane relative to an Observer, and the Down is the opposite.

If there are two neighboring atoms, they can only be in one of two positions. They can be next to each other having same plane of spin but facing opposite polarities, or they can be one on top of each other having their plane of Spins parallel to each other but opposite polarities facing each other. If you place two atoms in any other position, they will end up in one of those two positions due to the magnetic coupling. The separating distance between two atoms are determined by the attraction force due to the Spin magnetic field and the electrostatic repulsion force of the nuclei. The Atomic distance is such these two electrostatic and magnetic forces are equal and opposite.

If we have a population of atoms, one half of the atoms will be Spin-Up while the other half is Spin-Down. By changing the orientation of one atom, you can change the orientation of all the atoms since the atoms in a population of atoms are magnetically coupled. If one atom in the population is affected by an external magnetic field in the vertical z direction,

the rest of the atoms in the population will automatically be aligned in the $-z$ direction and $+z$ direction. One half of the atoms in the population have their polarization in the $+z$ direction while the other half have their polarization in the $-z$ direction; all these orientations take place when one atom in the population of atoms changed its orientation toward $+z$ direction.

It is only one atom that is in the external magnetic field, all the rest of the atoms are away from the external magnetic field, yet, they are all either directed toward or against the external magnetic field. This is due to the magnetic coupling of atoms by their Spin Magnetic Moment.

Before an atom reaches an external magnetic field, the orientation of the Spin Magnetic Moment of the atom can be at any angle θ with the direction of the external magnetic field \mathbf{B} . However, when the atom enters the external magnetic field \mathbf{B} , the alignment torque generated will bring the Spin Magnetic Moment into alignment with the direction of the external magnetic field making $\theta=0$. As a result, half of the atoms in the population align in the direction of the external magnetic field while the other half of the Atoms align against it even though all the atoms are outside the external magnetic field except the one atom that is inside the External Magnetic Field. This is the action at a distance due to magnetic coupling. It is not spooky, it is causal. There is no probability involvement here. Nature does not do probability. It is we who enforced probability on nature due to the lack of our understanding of the nature. Probability and statistics are not science, it is a decision-making tool invented by human. We use it to extract some information when we do not have complete understanding of the underline mechanisms of nature.

We now have one atom within the external magnetic field aligned in the direction of the external magnetic field. The rest of the atoms are also aligned towards or against the external magnetic field even though the rest of the atoms are outside the magnetic field. Now Let us rotate the external magnetic field while the first atom is still inside the magnetic field and the rest are outside. When we rotate the external magnetic field, all the atoms follow the rotation by the same angle in synchrony due to the magnetic coupling. They act like they are invisibly attached, in fact, they are attached by magnetic coupling.

Corollary:

Atoms in a beam of Atoms are magnetically coupled. If you rotate one atom, it results in the rotation of all the Atoms in the beam. You cannot change the orientation of one Atom without affecting all the Atoms.

Corollary:

There are no Spin-Up or Spin-Down Atoms. There are no Spin-Right or Spin-Left Atoms. There are no Spin-in or Spin-Out Atoms. Up, Down, Right, Left, In,

Out labels only exist relative to an observer. Atoms do not exist relative to observers.

XIV. STERN-GERLACH EXPERIMENT

(Contraption that turned Physics into a Voodoo-Physics, Physicist into voodoo-Practitioners and voodoo-Science writers, Scientific Books and Journals into religious texts, Employees and Students into slaves of a religious ideology)

There is nothing much to discover from the Stern-Gerlach Experiment (SGE). The only thing you can prove using Stern-Gerlach Experiment is the existence of Spin Magnetic Moment of an Atom. You cannot use Stern-Gerlach Device to measure the Spin of an Atom. It is not a Spin measuring device; it is a Spin Enforcer that works under Bushism (you are either with us or against us).

You cannot use Stern-Gerlach Device to filter out atoms with orientation that differs from the orientation of the Stern-Gerlach Magnetic Field. Stern-Gerlach Experiment is simply blind to the orientation of the Spin Magnetic Moment (SMM) of an Atom. Stern-Gerlach Device does not care what the orientation of the Atom is in. If an Atom is not either in the direction of the SGMF or against it, Stern-Gerlach Device will align the Spin Magnetic Moment of the Atom along the SGMF.

When Atom arrives in the Stern-Gerlach Magnetic Field, Spin Magnetic Moment (SMM) of the Atom aligns itself with the Stern-Gerlach Magnetic Field (SGMF) immediately, unless its orientation is direct opposite of SGMF, in which case the orientation torque is zero. Orientation of any Atom in the Stern-Gerlach Magnetic field is either with the SGMF or direct opposite to it; nothing in between. Atom, you are either with us or against us.

The Stern-Gerlach Experiment itself is simple and straight forward. There is nothing strange about the outcome of the experiment for a beam of Silver Atoms. There is nothing strange about the splitting of a beam of silver Atoms into two beams of equal number of Atoms. There is nothing strange about the Split Beams following the rotation of the Stern-Gerlach Magnetic Field. If the incoming beam is at an angle to the device, it is not a problem; it will work fine. It is the interpretation of the observation of the experiment that is completely insane, it is not Science; it even surpasses the voodoo-science.

Let us see what exactly happens in the Stern-Gerlach Experiment and why the beam of silver atoms split into two beams of equal number of Atoms and why the split follows the direction of the Stern-Gerlach Magnetic field when we rotate the magnetic field at any direction. We already know that the reason is the magnetic coupling of the atoms in a beam of atoms. Let us see in more detail what is exactly happening in the Stern-Gerlach Experiment so that we can put an end to bizarre Voodoo-Physics.

The core of the Stern-Gerlach Experiment is specially shaped magnet; there is nothing more to it.

The specially shaped magnet produces a non-linear magnetic field \mathbf{B} , which is also known as Stern-Gerlach Magnetic Field such that,

$$\mathbf{B}=(0, 0, B_z) \quad (14.1)$$

$$\nabla \mathbf{B}=(0, 0, \partial B_z/\partial z) \quad (14.2)$$

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

$$\partial B_z/\partial z \neq 0 \quad (14.3)$$

In the Stern Gerlach-Experiment, a beam of electrically neutral Silver Atoms travels along the y-axis is split into two separate beams of exactly equal number of atoms and hit the screen at two separate points. The line joining those points is along the direction of the Stern-Gerlach Magnetic Field. If you rotate the Stern-Gerlach Magnetic Field, those two points on the screen or the Split-Beams will rotate in-phase by the same angle. Two points on the screen will rotate with the rotation of the Stern-Gerlach Magnetic Field. The distance between the two point will not change by the rotation.

This split of beam of Silver Atoms into two beams and their following of the rotation of the Stern-Gerlach Magnetic Field had been used incorrectly to claim that Spin of a particle is Spatially Quantized and it comes in two flavors, Spin-Up \nearrow , Spin-Down \searrow ; this conclusion is completely wrong. We have already shown that there is no such thing as Spin $\pm 1/2$ and it is a result of incorrect wavelength used in Quantum Mechanics. Now, there are two question. Why does a beam of neutral Silver Atoms split into two separate beams of exactly equal number of Silver Atoms when the beam passed through the Stern-Gerlach Magnetic Field? Also, why do the Split-Beams follow the rotation of the Stern-Gerlach Magnetic field?

We have already shown that a neutral atom has a Spin Magnetic Moment μ_s , which is a positive or negative constant $\pm\beta$. The direction of μ_s is orthogonal to the plane of Spin, which is also the orbit plane of an atom. As a result, Spin cannot be 2-Dimensional matrix operators. Of course, you can use a 2-Dimensional Matrix Operator to rotate a vector on a plane as long as there is no involvement of a mass. However, you cannot use a 2-Dimensional Matrix Operator to rotate a mass on a plane. Rotation of a mass take place only in 3-Dimension.

Further, Spin-Up is not orthogonal to Spin-Down. If Spin-Up and Spin-Down are orthogonal to each other, then, if the Spin-Up is in the vertical direction \uparrow or \downarrow , then, Spin-Down should be in the horizontal direction \rightarrow or \leftarrow . Spin-Up and Spin-Down cannot be orthogonal without Magnetic-Monopoles. If Spin-Up and Spin-Down are orthogonal, they must be separable. Spin is Bi-Polar. Spin-Up and Spin-Down are not separable. Spin-Up cannot exists without Spin-Down, and vice versa. In fact, Spin-Up and Spin-Down are perfectly correlated negatively. If Spin-Up is in the vertical direction \uparrow , then, Spin-Down is 180° degrees to that in the opposite direction \downarrow or vice versa. It is also important to note that you can call direction \downarrow as Spin-Up and the direct opposite of it, \uparrow as Spin-Down if you like. In fact, for an observer at

different location it would be the case.

Quantum Mechanics representation of Spin-Up and Spin-Down as orthogonal basis vectors is incorrect. There is no Spin-Up or Spin-Down without an Observer. There are no Spin-Up or Spin-Down Atoms. There is no Spin-Up state or Spin-Down state in an Atom. There are Spinning Atoms, Spinning Orbit Systems. Observer dependent entities cannot be states intrinsic to Particles. Spin-Up for one Observer can be Spin-Down for another Observer.

It is not the Spin of electrons that generate the Spin Magnetic Moment of an Atom. Spin Magnetic Moment of an Atom due to the spin of an electron is negligibly small since it is proportional to the surface area of an electron, which is negligible. In addition, the Spin Magnetic Moment of an Atom due to the Spin electrons will be nearly zero due to the magnetic coupling of the electrons; the orientations of neighboring electrons are one against the other.

It is the Spin of Nucleus or the Spin of the Atom that generates the Spin Magnetic Moment of an atom μ_s . Spin Magnetic Moment of an Atom due to the spin of the nucleus itself is proportional to the surface area of the nucleus and the atomic number. When nucleus spins, it also takes all the bound electrons on circular paths on a Merry-Go-Round ride on the spinning axis through the center of the atom generating the Spin Magnetic Moment. However, Merry-Go-Round Spin Magnetic Moment cancels out with the Orbit Magnetic Moment since they are equal and opposite to each other. So, what is left as Atomic Spin Magnetic Moment is the Spin Magnetic Moment due to the spin of the nucleus itself on its own axis, which is also the spinning axis of the Atom.

The Spin Magnetic Moment μ_s is given by,

$$\mu_s = \pm\beta \quad (14.3)$$

where, $\mu_s = (1/2)ne\omega_s(r_{rms})^2$

$$r_{rms} = [(1/n) \sum r_i^2]^{1/2}, \forall i, i=1, 2, \dots, n.$$

r_i is the radius of the Spin current loop of the i^{th} electron, ω_s is the Spin angular frequency of the nucleus, e is the charge of the electron, and n is the number of electrons in an atom.

Even though atoms are neutral, atoms have Spin Magnetic Moment μ_s . It does not matter if the atoms are neutral, in the presence of an external magnetic field, there is going to be a torque or alignment pressure to bring μ_s in alignment with the external magnetic field \mathbf{B} if it is not already (in-phase, 0°) aligned with or (out of phase, 180°) aligned against it, since each atom has a Spin Magnetic Moment μ_s .

When an atom with Spin Magnetic Moment μ enters an external magnetic field \mathbf{B} , the alignment pressure or the torque τ is given by,

$$\tau = \mu \times \mathbf{B} \quad (14.4)$$

$$\tau = (\mu_y B_z, -\mu_x B_z, 0) \quad (14.5)$$

where,

$$\mu = (\mu_x, \mu_y, \mu_z) \quad (14.6)$$

$$\mathbf{B} = (0, 0, B_z) \quad (14.7)$$

$$\tau = (\tau_x, \tau_y, \tau_z) \quad (14.8)$$

If the angle between μ and \mathbf{B} is θ , we have,

$$\tau = \mu B \sin \theta \quad (14.9)$$

where,

$$\tau^2 = \tau \bullet \tau \quad (14.10)$$

$$\mu^2 = \mu \bullet \mu \quad (14.11)$$

Note that we have dropped the suffix s from μ for convenience. $\mu = \mu_s$. The torque τ is orthogonal to the plane of μ and B .

The potential $V(z)$ of the atom is given by,

$$V(z) = -\mu \bullet B \quad (14.12)$$

$$V(z) = -\mu B_z \cos \theta \quad (14.12)$$

A. Moving Atom in an External Magnetic Field

Now, let us see what happens to an Atom when it arrives at an external magnetic field B . If an Atom is arriving at velocity v when it enters the magnetic field B , the force $q\mathbf{v} \times \mathbf{B} = 0$ since $q=0$ for a neutral Atom. So, there is no force perpendicular to the v and B . As a result, a neutral Atom is not subjected to a circular path on a plane perpendicular to v and B .

However, when an Atom enters an external magnetic field B , there will be a torque τ since any Atom has a Spin Magnetic Moment μ . The presence of torque τ does not depend on the charge of the Atom. A neutral Atom carries a Spin Magnetic Moment μ , and hence when an Atom enters an External magnetic field B , it generates the torque τ . When the magnetic field is in the direction of the vertical z-axis, we have,

$$\tau = (\mu_y B_z, -\mu_x B_z, 0) \quad (14.13)$$

$$\tau = \mu B_z \sin \theta \quad (14.14)$$

The torque has two components, τ_x and τ_y . The component τ_x will rotate μ on yz-plane while the component τ_y will rotate μ on xz-plane. There is no rotation on xy-plane since $B_x=0$ and $B_y=0$. As a result of the rotation, immediately after the arrival of an atom in an external magnetic field B , the Spin Magnetic Moment μ of the Atom aligns with B and hence the angle θ will be zero, $\theta=0$,

$$\mu_x=0, \mu_y=0, \mu=\mu_z \quad (14.15)$$

where, $\mu^2 = \mu \bullet \mu$.

The torque τ brings μ in alignment with the external magnetic field B_z , making $\theta=0$. In other words, immediately after the arrival of an atom at an external magnetic field B_z , the Spin Magnetic Moment μ of the Atom aligns with the external magnetic field B_z bringing the angle between them to zero, $\theta=0$. Since the external magnetic field B_z is strong, the alignment of Atom's Spin Magnetic Moment μ with B_z take place immediately upon the arrival of the atom. The alignment is so immediate that it is as if the atom has arrived already aligned with the external magnetic field.

Immediately after the arrival of atom at the external magnetic field, we have,

$$\theta=0 \quad (14.16)$$

$$V(z) = -\mu B_z \quad (14.17)$$

Where, $V(z)$ is the Potential.

Once μ has aligned with B_z , since μ is independent of z , we have,

$$\partial V(z)/\partial z = -\mu \partial B_z/\partial z \quad (14.18)$$

This potential gradient generates a drift force $F(z)$ for the atom,

$$F(z) = -\partial V(z)/\partial z \quad (14.19)$$

From Eqns. (14.18) and (14.19), we have,

$$F(z) = \mu \partial B_z/\partial z \quad (14.20)$$

For a neutral Atom, there is no force on the Atom that is perpendicular to the velocity of the Atom, and hence the Atom does not have a circular motion. The force $F(z)$ will be a drift force on the Atom in $+z$ direction (along the External Magnetic Field, $+B$ direction) or $-z$ direction (against the External Magnetic Field, $-B$ direction). It drifts the atom in $+z$ direction (along the External Magnetic Field, $+B$ direction) or $-z$ direction (against the External Magnetic Field, $-B$ direction) depending on whether μ is positive ($\mu=+\beta$) or negative ($\mu=-\beta$), where β is a constant given in Eqn. (14.3).

There is also one important thing to notice here. The alignment torque τ is proportional to B_z while the drift force $F(z)$ is proportional to the spatial gradient, $\partial B_z/\partial z$. We also know that,

$$B_z \gg \partial B_z/\partial z \quad (14.21)$$

As a result,

$$\tau \gg F \quad (14.22)$$

Therefore, as soon as an Atom enters the Stern-Gerlach Magnetic Field (SGMF), θ becomes zero, $\theta=0$, or the Spin Magnetic Moment (SMM) of the Atom immediately aligns with the magnetic field B_z before any drift takes place. The alignment of the orientation of the Atom with the Stern-Gerlach Magnetic Field (SGMF) takes place immediately at the arrival of the Atom at the SGMF, it is as if the Atom has arrived already aligned with the SGMF that almost no drift takes place during the alignment. The drift in the Stern-Gerlach Experiment is insensitive to the orientation of the atom.

We have already seen that the Spin Magnetic Moment (SMM) μ is given by,

$$\mu = \pm \beta \quad (14.20)$$

where, β is a constant.

Hence, the drift force F is given by,

$$F = \pm \beta \partial B_z/\partial z \quad (14.21)$$

Atoms with the drift force $F = +\beta \partial B_z/\partial z$ will drift in one direction giving Spin-Up beam (nothing prevents you calling this as Spin-Down), and the atoms with drift force $F = -\beta \partial B_z/\partial z$ will drift in the opposite direction giving Spin-Down (you can equally call this as Spin-Up) beam. Since starting orientation and $\beta \partial B_z/\partial z$ are the same for all the atoms in the Spin-Up beam, they all converge at one point in the screen. Similarly, since the starting orientation and $-\beta \partial B_z/\partial z$ are the same for all the atoms in the Spin-Down beam, they all converge at another single point on the screen in the opposite direction.

Corollary:

The amount of \pm drift in the Stern-Gerlach Experiment is insensitive to the orientation of the atom.

Corollary:

Spin-Up and Spin-Down are observer labels for mutually opposite directions chosen by an observer by the choice of the direction of the SGMF, no literal meaning. They are not fixed directions in space.

B. Beam Splitting in the Stern-Gerlach Experiment

In the Stern-Gerlach experiment, the number of atoms on both beams had been observed to be the same. As we are going to see here, this should be the case. Now, the question is "what make the number of atoms in two split beams exactly the same?" We already know the answer to this.

If all the atoms in a beam has random orientation and If it is just the torque τ that aligns atoms with the Stern-Gerlach magnetic field \mathbf{B}_z before they are drifted by the drifting force F that splits the incoming beam of atoms into Spin-Up beam and Spin-Down beam, any atom with $\theta \neq \pm\pi$ will be rotated to align its Spin Magnetic Moment μ with \mathbf{B}_z and drifted in $+\mathbf{B}_z$ direction as Spin-Up while only the atoms approaching with orientation $\theta = \pm\pi$ get drifted in $-\mathbf{B}_z$ direction without being subjected to any rotation as Spin-Down. Since number of atoms with initial orientation $\theta \neq \pm\pi$ is much more than the number of atoms with $\theta = \pm\pi$, most of the atoms must have ended up in the Spin-Up ($+\mathbf{B}_z$ direction) beam and only a very few Atoms would have ended in Spin-Down ($-\mathbf{B}_z$ direction) beam. But this is not what had been observed in the Stern-Gerlach experiment. The number of atoms in the Spin-Up beam is the same as the number of atoms in the Spin-Down beam.

As we have shown earlier, the Number of atoms in both Spin-Up and Spin-Down are the same for a very good reason. Although the atoms are electrically neutral, they are like little compasses, free to orient magnets due to the Spin Magnetic Moment μ . When atoms, which are also free-to-orient magnets, are next to each other, they become magnetically coupled with each other naturally. If you change the orientation of one atom, you are changing the orientation of the whole population due to domino effect. This orientation adjustment takes place when just the first atom enters the Stern-Gerlach magnetic field, even though all the atoms, except the first Atom, are outside the Stern-Gerlach magnetic field.

When two compasses are next to each other, their polarities align (Up, Down) $\nearrow\searrow$ or (Down, Up) $\swarrow\nearrow$ positions, but never in (Up, Up) $\nearrow\nearrow$ or (Down, Down) $\searrow\searrow$ positions, unless an external magnetic is present. If we have a beam of $2n$ particles, n particles will have their Spin Magnetic Momentum align in the Spin-Up \nearrow orientation while the other n particles will be aligned in the completely opposite direction Spin-Down \searrow in the absence of an external magnetic field. If all the Spin-Up particles are aligned at an angle θ to the vertical $+z$ direction, all the Spin-Down particles will be aligned at an angle $\theta \pm \pi$ to the $+z$ direction or completely opposite to the Spin-Up direction. The angle θ may vary depending on the number of atoms involved. In addition, no two adjacent atoms in a beam have the

same orientation since the opposite polarities attract and the same polarities repel.

So, if we have a beam of atoms, the atoms will be magnetically coupled. No two neighboring atoms will have the same polarity. All the atoms in a beam will be in one of two orientations, either Spin-Up \nearrow or Spin-Down \searrow . Number of atoms in Spin-Up \nearrow orientation will be the same as the number of atoms in the Spin-Down \searrow orientation.

Let us consider the different stages of a beam of atoms in the Stern-Gerlach experiment:

1) Free-to-orient beam of atoms without any external magnetic field.

.... $\searrow\nearrow\searrow\nearrow\searrow\nearrow$

The orientation Spin-Up atoms is θ to the vertical z axis. The orientation Spin-Down atoms is $\theta \pm \pi$ to the vertical z axis. This is due to the magnetic coupling of the atoms in the beam.

2) Only the First Atom in the beam enters the Stern-Gerlach Magnetic Field \mathbf{B}_z .

... $\nearrow\searrow\nearrow\searrow$ all outside [\uparrow Stern-Gerlach Field \mathbf{B}_z]

.. $\uparrow\downarrow\uparrow\downarrow$ rest is outside [\uparrow First Atom Entered \mathbf{B}_z]

When the first atom enters the Stern-Gerlach Magnetic Field \mathbf{B}_z , its Spin Magnetic Moment μ immediately aligns with the Stern-Gerlach Magnetic Field \mathbf{B}_z before any other atom enters the Stern-Gerlach Magnetic field. It is immediate because the Stern-Gerlach Magnetic field is strong and hence the alignment torque is strong. Once the first atom is aligned with the Stern-Gerlach Magnetic Field \mathbf{B}_z , the rest of the atoms that are outside the magnetic field in the beam follow suite since they are magnetically coupled and θ become zero.

Although only one atom has entered the Stern-Gerlach Magnetic Field \mathbf{B}_z and the rest of the atoms are outside the Stern-Gerlach Magnetic Field \mathbf{B}_z , the atoms in the beam are now aligned with or against the Stern-Gerlach Magnetic Field \mathbf{B}_z . Since the nearby atoms must have opposite orientation, half of the atoms in the beam aligns with the Stern-Gerlach Magnetic Field \mathbf{B}_z and the other half orients against the Stern-Gerlach Magnetic Field \mathbf{B}_z .

It is as though all the atoms are arriving pre-aligned with or against (... $\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow$) the Stern-Gerlach Magnetic Field $\uparrow \mathbf{B}_z$.

3) $|B_z| > |\partial B_z / \partial z|$. If $B_z / \partial z > 0$.

- Half of atoms in the beam with \uparrow Spin-Up orientation deflect to $+z$ direction.
- Half of atoms in the beam with \downarrow Spin-Down orientation deflect to $-z$ direction.

4) One beam of Silver Atoms has split into two beams with equal number of Atoms.

- Atoms in Spin-Up \uparrow beam remains at Spin-Up \uparrow orientation as long as the Atoms in the split beam are within the Stern-Gerlach Magnetic Field \mathbf{B}_z .

- Atoms in Spin-Down \downarrow beam also remain in the Spin-Down orientation as long as the Atoms in the split beam remain in the Stern Gerlach Magnetic Field.

5) If you rotate the Stern-Gerlach Magnetic Field \mathbf{B}_z on xz plane, i.e. the plane orthogonal to the direction of the beam, you will be turning the Spin-Up and Spin-Down beams by the same angle. Because, when you rotate one atom in a beam, you are rotating all the atoms in the beam; this is due to the magnetic coupling of the atoms in a beam of atoms. When you rotate Stern-Gerlach Magnetic Field (SGMF) on xz plane, you are rotating not only the Atoms withing the Stern-Gerlach Device, but also all the Atoms in the beam outside the SGMF waiting to enter the SGMF.

Corollary:

When you rotate one Atom in a beam you are rotating all the Atoms since they are magnetically coupled by SMM.

C. Sending Output of One SGMF into Another SGMF of the Same Orientation (in Phase)

When we send a beam of Atoms into the first Stern-Gerlach Magnetic Field, the beam will split into two separate beams of equal number of Atoms, Spin-Up and Spin-Down. Now, let us send Spin-Up beam from one SGMF into another second Stern-Gerlach Magnetic field that has the same Orientation as the first SGMF. We do it while the Atoms are still under the influence of the first SGMF before they enter the second SGMF. In this case, Atoms in Spin-Up orientation relative to the first SGMF remain as Spin-Up relative to the second SGMF also since two devices in series are in-phase. When all the Atoms are still in the first SGMF, all the Atoms in the Spin-Up split beam remain in the same orientation; the same is the case for the Spin-Down split beam. Let us consider both Spin-Up and Spin-Down beams separately:

1) Spin-Up from the first SGMF into a second SGMF

Here we are sending Spin-Up beam from the output of the first Stern-Gerlach Device into a second Stern-Gerlach Device with the same Magnetic Field orientation as the first SGMF. In this case, all the atoms are pre-oriented with the Second SGMF, $\theta=0$. Atoms enter the second Stern-Gerlach Magnetic Field with the same orientation as its Magnetic Field. As a result, there is no alignment torque.

Placing another Stern-Gerlach Device in series with the same Magnetic Field orientation as the first Stern-Gerlach Device ($+\mathbf{B}$ direction, z axis) or in phase, along the direction of the beam (y axis) is equivalent to the extension of the range of the first Stern-Gerlach Magnetic field ($+\mathbf{B}$ direction, z axis) along the direction of the beam (y axis). As a result, all the atoms will be drifted by the same amount in $+z$ direction ($+\mathbf{B}$ direction), Spin-Up relative to the second

SGMF, and hit the screen at the same point. There is no beam splitting when all the Atoms enter a Stern-Gerlach Device in a forced orientation that is the same as the SGMF. It is just positive deflection.

2) Spin-Down from the first SGMF into a Second SGMF Placed in Series in-Phase

If the Spin-Down split beam from the first SGMF is sent through a second Stern-Gerlach Magnetic Field that has the same orientation as the first SGMF, all the atoms enter the second SGMF pre-aligned against the second SGMF, ($-\mathbf{B}$ direction) $\theta=180^\circ$. As a result, there is no alignment torque. All the atoms will be drifted by the same amount in $-z$ direction ($-\mathbf{B}$ direction), Spin-Down relative to the second SGMF, and hit the screen at the same point. There is no beam splitting when all the Atoms enter a Stern-Gerlach Device under forced orientation that is against the SGMF. It is just negative deflection. This is expected since placing two Stern-Gerlach Devices in series in-phase is simply equivalent to the extension of the Stern-Gerlach Magnetic Field of a single Stern-Gerlach Device.

D. Output of first SGMF into a Second SGMF in Series, but with different Orientation (Out of Phase)

Here we are sending Spin-Up beam from the output of the first SGMF into a second SGMF that is oriented at non-zero angle to the first SGMF. In this case, placing a second SGMF along the direction of the beam next to the first SGMF is not the same as the extension of the first SGMF. First SGMF is at an angle α to the second SGMF, and $\alpha \neq 0$. Now, the Atoms must leave the first SGMF to enter the second SGMF since the magnetic fields are out of phase. When the Atoms leave the first SGMF, the Atoms in Spin-Up beam are no longer Spin-Up since the attraction of the opposite polarities and the repulsion of the alike polarities take over. Atoms leaving the first SGMF are magnetically coupled so that neighboring Atoms are of opposite orientation. As soon as the first Atom enters the second SGMF, it orients itself with the second SGMF. Since the first Atom is magnetically coupled to the second Atom, second Atom enters with the opposite orientation, i.e. against the second SGMF. All the Atoms at odd positions, 1, 3, 5, ... enters with the orientation of the second SGMF. All the Atoms at even positions, 2, 4, 6, ... enter the second SGMF with the orientation against the second SGMF. As a result, Atoms with the orientation toward the second SGMF will be drifted towards the second SGMF (+deflection, Spin-Up), while the Atoms with the orientation against the second SGMF are drifted against the second SGMF (-deflection, Spin-Down) resulting a beam split. Spin-Up from the second SGMF has nothing to do with the Spin-Up from the first SGMF; they are completely unrelated. Spin-Up and Spin-Down directions from the first Stern-Gerlach Device are different from the Spin-Up and Spin-Down

from the second Stern-Gerlach Device. Spin-Up and Spin-Down directions from a Stern-Gerlach Device are not properties of an Atom. They say nothing about the properties of an Atom. Stern-Gerlach Experiment just implies that the Atoms are magnets.

Corollary:

Spin-Up beam means that the orientation of Atoms is toward the SGMF as long as the beam is within the SGMF. Spin-Down beam means the orientation of the Atoms are against the SGMF as long as the beam is within the SGMF.

Once the beams leave the SGMF, no two neighboring Atoms have the same orientation due to magnetic coupling, and hence the orientation of the Atoms in the beams will be the same as the orientation of the Atoms in the original beam before entering the SGMF. Nothing more to it.

When the orientation of the magnetic fields of the two SGMFs are at a non-zero angle, Spin-Up beam from the first SGMF splits into two separate beams by the second SGMF. The new split beams are again Spin-Up and Spin-Down relative to the second SGMF. Spin-Up is always in the direction of the SGMF; it has nothing to do with the original orientation of the Atom.

If we send Spin-Down beam from the first SGMF into a second in series but out of phase SGMF, the beam will split into two beams, Spin-Up and Spin-Down relative to the second SGMF. In this case, all the Atoms at odd positions, 1, 3, 5, ... will end up in Spin-Up beam while all the Atoms at even positions, 2, 4, 6, ... will end up in Spin-Down beam, just like sending Spin-Up from one SGMF into in series out of phase second SGMF. Spin-Up and Spin-Down are always relative to the direction of the SGMF. This Spin-Up and Spin-Down has nothing to do with, says nothing about, the properties of an Atom.

E. Once all the Atoms are Out of the first SGMF, Atoms are sent as Input to second SGMF placed at an Arbitrary Orientation

In this case, Spin-Up and Spin-Down Split beams are now completely out of the First SGMF. There is no external magnetic field to keep them in a forced orientation. As a result, the attraction of the opposite polarities and the repulsion of the alike take over. Once all the Atoms in a split beam are out of the influence of external magnetic field, Atoms in Spin-Up split beam is no longer in one orientation, and the Atoms in Spin-Down split beam are no longer in the opposite orientation. Neighboring atoms in any split beam will have opposite polarities in the absence of an external magnetic field due to magnetic coupling. Spin-Up split beam remains as Spin-Up only when the Atoms in the split beam are still in the SGMF. Spin-Down split beam remains as Spin-Down split beam as long as Atoms in the Spin-Down split beam remains in the SGMF.

Before any Atom enter the Second SGMF, there is

no external torque forcing the atoms to orient in certain direction since all the Atoms are now out of the influence of the First SGMF. Before any Atom enters the Second SGMF, the external magnetic field $\mathbf{B}=0$. Every atom is a free to orient itself atom. So, two Split beams are subjected to the natural tendency of attracting the opposite polarities and repelling the alike polarities. As a result, no two neighboring atoms in a split beam will have the same polarity. Half of the atoms in a split beam will be oriented in one direction, Spin-Up or \nearrow while the other half will be in opposite direction, Spin-Down or \searrow . These Spin-Up and Spin-Down directions have nothing to do with the Spin-Up and Spin-Down directions of the First SGMF. Since a split beam of Atom is now completely out of the First SGMF, no two neighboring atoms in a beam will have the same orientation. Both Split beams will be just like the original beam except they have half the number of atoms, and different θ , where θ is an angle between Up orientation with an observer defined z axis. Split beams are no longer Spin-Up and Spin-Down beams when they are out of the Stern-Gerlach Magnetic Field. There is no difference between the two Split beams once they are completely out of a SGMF, except that the orientations of Atoms in one split beam is the mirror image of the other.

If you send any of these split beams now through another second Stern-Gerlach Device, that beam will be split into two separate Spin-Up and Spin-Down beams, just like what happen to the original beam when it was sent into a SGMF. New Spin-Up direction and Spin-Down direction are relative to the second SGMF.

Spin-Up and Spin-Down are not properties of a particle. Particles do not have Spin-up or Spin-Down states. Particles in Spin-Up beam are Spin-Up as long as the beam is in the SGMF. Similarly, particles in Spin-Down beam are Spin-Down as long as the beam is in the SGMF. Once both split beams are out of the second SGMF, they are no longer Spin-Up or Spin-Down split beams. The orientations of the Atoms in each split beam will be such two neighboring Atoms are of opposite orientation due to the magnetic coupling between the Atoms; that is what happens naturally in the absence of an enforcer. In the absence of an enforcer, Atoms are free naturally to behave in the way that free Atoms do, just like kids out of sight of parents or teachers or even adults out of sight of their bosses or spouses.

Corollary:

Spin-Up split beam is no longer Spin-Up when the split beam is out of the Stern-Gerlach Device. Spin-Down split beam is no longer Spin-Down when the split beam is out of the Stern-Gerlach Device. When split beams are out of SGMF, two neighboring Atoms in a split beam are of opposite orientations due to magnetic coupling by the SMM of an Atom.

F. Facts of the Stern-Gerlach Experiment (Fact of

the Matter)

The result of the Stern-Gerlach experiment can be explained using natural magnetic coupling. There is no Spin Quantization. There is no Spatial Quantization. You cannot prepare an Atom to be Spin-Up or Spin-Down. You can only force an Atom to be at the direction of an External Magnetic Field or against it as long as the Atom remains in the External Magnetic Field. As soon as an Atom is out of the SGMF or the External Magnetic Field, that forced orientation is lost.

The orientation of Spin Magnetic Moment of an atom is not a state of an atom. The orientation of Spin Magnetic Moment of an atom is determined by external factors and depends on the rest of the neighboring atoms in the population. Neighboring Atoms are magnetically coupled. Change the orientation of one single atom, you are changing the orientation of the entire population of the atoms even in the absence of external magnetic field.

What happens in the Stern-Gerlach Experiment is completely a deterministic process. Probability plays no role here. An atom can arrive at SGMF at any orientation. As soon as an Atom enters the SGMF, it orients itself toward the Stern-Gerlach Magnetic Field due to the alignment torque. The only exception is that any atom arriving with the orientation against the SGMF does not undergo alignment since the torque is zero at that orientation. If atoms are arriving with no magnetic coupling, almost all the atoms will be deflected toward the SGMF as Spin-Up. Only the arriving atoms with the orientation exactly opposite to the direction of the SGMF, which is very rare, will deflect as Spin-Down. If there is no magnetic coupling between the arriving atoms, almost all the atoms will be on Spin-Up beam, almost none at Spin-Down beam. There is no 50-50 split without magnetic coupling of atoms. A lonely Atom almost always ends up as Spin-Up. Spin-Up or Spin-Down given by the SGMF has nothing intrinsic to the Atoms.

Corollary:

First Atom of any beam to Stern-Gerlach Device is always deflected towards the SGMF as Spin-Up, except when the orientation of the first Atom is exactly opposite of the direction of the SGMF, in which case it is Spin-Down.

The magnetic coupling between incoming atoms is unavoidable and as a result the beam will split into two beams of equal number of atoms. The orientation of atoms after the split of the beam is a forced orientation by the Stern-Gerlach Magnetic Field; it is not a projection of the orientation of the atoms on to the direction of the SGMF when they arrive at the SGMF.

When all the atoms in the split beams are out of the influence of the SGMF, the magnetic coupling between atoms will take over and the atoms will reorient themselves so that no two neighbors have the

same orientation due to the attraction of opposite and the repulsion of the alike. Atoms in the SGMF are just like kids under parental or teacher supervision. Once kids are out of sight of the parents or teachers, they do whatever natural for kids and have no memory of parent or teacher advice.

The orientations, Spin-Up and Spin-Down of Atoms in the split beams are not the projections of the original orientation of the Spin Magnetic Moment of the atoms on the SGMF. Spin-Up and Spin-Down are forced orientations by the SGMF. You cannot maintain the orientation of the Atoms in the split beams as Spin-Up (aligned with SGMF) and Spin-Down (aligned against SGMF) without the continued presence of SGMF. You cannot generate Spin-Up atoms by blocking the Spin-Down beam.

There is no such thing called Spin-Up beam. Atoms in the Spin-Up beam remain at Spin-Up position as long as they are in the SGMF. In the absence of an external magnetic field, no two neighboring atoms can have the same orientation due to the attraction of opposite and the repulsion of the alike polarities. Do not think you can make Spin of any desired direction you want by sending it through Stern-Gerlach Device oriented in that desired direction; that is not going to happen. If you have done that in carrying out experiments, you may want to re-evaluate the conclusions; those are false conclusions. It is we who defined Spin-Up or Spin-Down, not the nature.

Q-Bit is Simply an Atomic-Bit:

If your Q-Bit gismo is working, it is not the reason what you think it is. If it is working, it has nothing to do with Quantum Mechanics. You have some explaining to do because Spin-Up and Spin-Down are not states of a particle. Spin-Up and Spin-Down are not in a superposition since they are non-separable. Spin-Up and Spin-Down are non-separable since there are no Spin monopoles. Spin-Up and Spin-down are Spin Bi-poles. Spin-Up has no existence without Spin-Down. Spin-Up and Spin-Down are observer dependent. One person's Spin-Up is another person's Spin-Down. One person's Spin-Up at one location can be a Spin-Down for the same person at different location.

If your Q-bit gismo, is working, it is because of the Spin Magnetic Moment of an Atom. It has nothing to do with Quantum Mechanics. You can use the relative orientation of the Spin Magnetic Moment of an Atom to represent not just 0 and 1, but a digital word of whatever the length you want. Many flip-flops in a digital computer can be replaced by an Atom with specific relative orientation. Spaced Lock Atomic Memory (SLAM) based on Atomic Spin Magnetic Moment can be used not just as an efficient data storage, but also for data manipulation, an Atomic computer (ATOC).

Corollary:

If you have carried out experiments thinking that

you have set a particle Spin-Up or Spin-Down by using Stern-Gerlach Device, your experiment is an experimental blunder at the very inception since Spin-Up and Spin-Down set up by Stern-Gerlach Device or any other Device are always volatile.

Corollary:

There are no non-volatile Spin-Up and Spin-Downs.

Permanent spin set up of a particle is not possible.

No Probability in Stern-Gerlach:

There is no Probability here. Everything is deterministic. There is no Schrödinger equation at work here. There is no Wave Function at work here. There is no human fabricated collapse of a Wave Function here. There is no Berlin-Hagen interpretation at work here. Wavefunction collapse is utter nonsense. There is no multi-World [3] Crafted Prophecy (CRAP) here. Schrodinger equation is nothing more than the time derivative of plane wave subjected to the energy and boundary constraint [7]. Particles do not behave as waves. Waves are not particles. The so-called Schrodinger equation, which had been strangely, for no apparent justifiable reason, touted as the greatest discovery of the century, is nothing more than time derivative of the plane wave equation under an invalid assumption that the mechanical energy of a particle is quantized. Everybody was intrigued since Schrodinger presented it without mentioning why he put $j\hbar$ in front of operator $\partial/\partial t$. No surprise there since everybody was also equally intrigued by the broom-riding in Harry-Potter books; Harry-Potter series became a big hit just like the Schrodinger equation.

Representation of observable as eigenvalues of operators is not possible since eigenvalues are not unique. Representation of observable must be unique. Anybody who has come across inductance or capacitance of an electrical circuit with some attention might have realized instantly what Schrodinger had done, yet it went unnoticed.

Wave is not a probability distribution:

The area under probability distribution must be unity for the entire range of the variable. You cannot normalize the area under a wave to be unity when wave is in time progression or position progression. You cannot normalize a wave by normalizing it within a wavelength. Wave that is normalized within a wavelength is not a probability distribution. The waves, $(1/2\pi)^{1/2}\exp[(j/\hbar)\mathbf{p}\cdot\mathbf{r}]$ and $(1/2\pi)^{1/2}\exp[(j/\hbar)Et]$ are not a probability distribution since they are only normalized within a range of a wavelength and a time period.

For a wave to be a probability distribution, the area covered by the wave must be unity for the entire range. Wave must be normalized for the entire range, but this cannot be done for a wave that is in propagation. Propagating waves cannot be

normalized. Waves have no existence without propagation. Probability distribution cannot propagate. A function to be a probability distribution, that function must be static. Propagating wave cannot be a probability distribution. Probability function has no existence unless it is normalized for the entire range. Propagating wave cannot be normalized for the entire range.

Electromagnetic waves are not probability distributions. You cannot make the area under electromagnetic wave to be unity since it is in propagation. Wave does not exist in the absence of propagation. Nature does not normalize. You can normalize a wave only within a wavelength, not for the entire range. Being unable to be normalized within the entire range of a propagating wave, propagating wave can never be a probability distribution.

Lemma:

No propagating wave can be normalized for the entire range. As a result, waves are not probability distributions.

Just because one assumes particles to be waves does not mean they are going to be waves. Double-Slit experiment does not demonstrate anything about particles being waves [2]. Bright spots on the phosphor screen of Double-Slit experiment are the peaks of the electromagnetic waves resulted from the stopping of charge particles at the Double-Slit barrier. The use of the Double-Slit Experiment to substantiate deBroglie conjecture of particle behaving as waves is simply a Double-Slit Blunder [2].

Noteworthy Highlights:

- Every Atom, whether it is electrically neutral or not, has a Spin Magnetic Moments (SMM).
- Orientations of electrically neutral atoms in a population are not random since they are magnetically coupled by Spin Magnetic Moment (SMM) of Atoms.
- Stern-Gerlach Experiment is insensitive to the orientation of an atom.
- When an Atom passes through Stern-Gerlach Magnetic Field, the original orientation information is completely lost irrecoverably.
- Stern-Gerlach Device enforces its own direction of the magnetic field on an Atom, a dictator. SGMF is an enforcer, not a measurer of component of the Atomic orientation.
- Wave is not a probability distribution since a propagating wave cannot be normalized for the entire range.

Atoms Through Stern-Gerlach:

When you send an Atom through a Stern-Gerlach Device, it is almost always Spin-Up. It is only when angle between the orientation of the Atom and the SGMF, $\theta=180^\circ$ that an Atom is Spin-Down. Atom

remains as Spin-Up or Spin Down as long as the Atom is still in the SGMF. It is only due to the magnetic coupling of the Atoms in a beam that we get two Split beams of equal number of Atoms in the Stern-Gerlach Device.

If there is no magnetic coupling between atoms, which is indeed not possible, the atoms will almost always end up as Spin-Up in the Stern-Gerlach Experiment, there will be no Spin-Down beam. You can never get ONE LONELY Atom to be Spin-Down by using Stern-Gerlach Device. It is only using more than one magnetically coupled Atoms in a beam you can get both Up and Down deflections, Spin-Up and Spin-Down, in the SGMF.

An Atom deflected as Spin-Up or Spin-Down in the Stern-Gerlach Device no longer be at that orientation when the Atom is free of SGMF. You can never make ONE LONELY Atom to be Spin-Down using SGMF. That is why when you do the Stern-Gerlach Experiment using a beam of Atoms, the first Atom is almost always deflected as Spin-Up, unless of course the orientation of the first Atom is already against SGMF before its arrival at SGMF. If you have access to a Stern-Gerlach Device, just try it.

Lemma:

First Atom to Stern-Gerlach ($\theta \neq 180$) always deflected as Spin-Up. It is never Spin-Down. It is NOT possible to get ONE LONELY Atom to be Spin-Down by using Stern-Gerlach Device.

No Magic in Stern-Gerlach:

Stern-Gerlach Device is not a magical device that it is proclaimed to be. It is an experimental blunder. Stern-Gerlach Device is a Magician's 8th Ball for experimental physicists. Experimenter can see whatever the experimenter wants to see in Stern-Gerlach Device. Stern-Gerlach Device has turned Physicist into Voodoo Practitioners. How can a guy who preaches "particle can be at many places at the same time ... what does not happen here happens in parallel worlds ... you are sleepy, ... very... very sleepy" be a scientist? This is not any different from ancient, flat-earth and earth centric era, human Crafted Prophecies (CRAP) such as religious doctrines that have engulfed the humanity with devastating result to this day. The real danger is that Crafted Prophecies (CRAP) make the believers blind to the facts. Logics become meaningless for them. You can see how those dark prophecies are acting act out from the non-humanistic chaotic religious activities of blind, logic defying believers.

Reminder:

Stern-Gerlach Device is not a Spin Measuring instrument. If the orientation of an Atom is not against the SGMF, it forces the Atom to be in the direction of SGMF irrespective of its actual orientation. When an Atom is out of SGMF, the direction of the Spin will no longer be the direction of SGMF; Atom is totally free of

SGMF enforced orientation.

Corollary:

Spin-Up and Spin-Down are volatile.

Properties of Stern-Gerlach:

1. Stern-Gerlach Device is Blind to the actual orientation of an Atom.
2. Stern-Gerlach Device cannot give the Spin component of an Atom along the x, y, z axes.
3. The orientation of an Atom set by Stern-Gerlach Device is volatile, not permanent.
4. The orientation of an Atom set by Stern-Gerlach Device has no relation to the actual orientation of an Atom prior to entering SGMF.
5. Stern-Gerlach Device is not a Spin Measuring Instrument or Spin Setting Device.
6. Any Spin orientation of Atom set by Stern-Gerlach Device only holds as long as the Atom is still within the Stern-Gerlach Magnetic Field.
7. Whether an Atom is deflected Up (towards the SGMF) or Down (against the SGMF) is completely deterministic. NOT Probabilistic.
8. You cannot make a single Atom to be Spin-Down using SGMF. It is not possible. Single Atom is always Spin-Up.
9. First Atom enters the SGMF is always deflected Up unless its orientation is not against SGMF; it is only if the Atom is against SGMF, it is deflected Down.
10. There are no Spin-Up, Spin-Down, Spin-Right, Spin-Left, Spin-In, or Spin-Out orientations. The only orientations are towards the SGMF or against the SGMF. It is the deflections towards SGMF that is defined as Spin-Up and deflections against the SGMF that is defined as Spin-Down; they are observer definitions. Spin-Up and Spin-Down have no meaning intrinsic to an Atom.
11. Spin-Up and Spin-Down have no meaning for someone who does not know the direction of the Stern-Gerlach Magnetic Field.
12. Spin-Up and Spin-Down have no meaning to anybody once the Atoms are out of the SGMF.
13. So, Spin-Up means whatever the direction we have chosen Stern-Gerlach Magnetic Field to be, while Spin-Down is its direct opposite. It is we who decide the direction of SGMF.

Corollary:

What determines the orientation of an Atom is the population of the Atoms and the magnetic field of the environment the Atom is in. Not the Atom itself. Orientation of an Atom is not a property of an Atom or a state of an Atom.

Corollary:

It does not matter which way SGMF is oriented, if an Atom is deflected toward SGMF, it is Spin-Up. If an Atom is deflected against the SGMF, it is Spin-Down. This SGMF defined Spin-Up and Spin-Down are

volatile and have nothing to do with the actual Orientation of an Atom.

Corollary:

The Orientation of the first Atom is always Spin-Up unless it arrives pre-oriented against SGMF, in which case, it is Spin-Down. The orientation of the following Atom is always against the orientation of the previous Atom due to magnetic coupling. There is nothing more to it.

Lemma: Waves are not Probability Distributions

A wave in propagation cannot be normalized. Wave has no existence without propagation. Wave that is normalized only for a duration of a wavelength does not represent a probability distribution. For a wave to be probability distribution, wave must have a unit area under it for the entire range, not just within a wavelength, which is impossible. Wave cannot be a probability distribution. Schrodinger equation and Quantum Mechanics, in general, has no existence without waves being probability distributions.

XV. THERE IS NO QUANTUM MEASUREMENT PROBLEM

Irrespective of the size of a particle, the state of a particle is unique. Spin-Up and Spin-Down are observer dependent and hence cannot be states intrinsic to a particle. State of a particle is not probabilistic and cannot be represented by a wavefunction. Wavefunction is an illogical human creation [7]. State of a particle cannot be represented by eigenvalues of operators since eigenvalues are not unique.

Finite dimensional matrix operators cannot represent Position and Momentum Operators since Matrix operators cannot satisfy non-commutative relationship between Position and Momentum Operators that is fundamental to Quantum Mechanics, without which Quantum Mechanics has no existence. Position and Momentum matrix operators cannot be in Quantum Mechanics even when the matrix operators are of infinite dimensions since matrix operators of infinite dimensions cannot be square, and hence cannot be Hermitian.

Operators of observables must be Hermitian and invertible. Matrix operators must be square to even consider as candidates for the non-commutative relationship in Quantum Mechanics. Yet, no matrix operators of finite dimensions can satisfy the non-commutative relationship in Quantum Mechanics. Matrix Operators have no place in Quantum Mechanics.

It is only the motion of charge that generates electromagnetic waves. Momentum of a particle is essential for a motion of a charge, but momentum alone plays no part in generating radiation. Without a momentum, there will not be a chomomentum, a motion of a charge. The momentum of a neutral stable particle does not generate waves. It is the change of

chomomentum that generates the electromagnetic radiation.

Since a charge has no existence without the mass of an electron, the radiation wavelength due to the stopping of charge particle of any mass M is inversely related to the chomomentum qu as well as to the mass of an electron m_e , not to the mass of a particle M , where q is the charge and u is the speed. The frequency of the generated radiation electromagnetic waves is directly related to the chomomentum as well as the mass of electron m_e . This inverse dependence of wavelength of a particle of mass M on the mass of electron m_e will be inherent in the proportionality constant or the radiation parameter, between the wavelength λ and chomomentum qu .

Misinterpretation of this fact may be one of the reasons why some are claiming that the wavelength of a particle is inversely related to the momentum of the particle, which is incorrect. Instead, if one says that the radiation wavelength, due to the stopping of a charge particle of mass M moving with speed u , is inversely related to the momentum of an electron $m_e u$, it has some validity, although it is still incorrect since momentum of a mass does not generate waves; it is chomomentum, qu that generates electromagnetic radiation waves. There are no particle waves, mass waves, or momentum waves. You cannot call the electromagnetic radiation waves, particle waves, since they have nothing to do with particles, and all to do with charges.

The energy of a particle is Mechanical energy, and the Mechanical energy is continuous, not quantized. As a result, time evolution relationship of Schrodinger equation that links to Hamiltonian of a particle does not hold, and particles cannot be represented by wave functions. Particles do not behave as waves, and waves are not particles [8, 5, 4]. Position and momentum of a particle are mutually dependent and as a result, Position and Momentum Pair cannot be a Fourier Transform pair and hence there is no Uncertainty Principle [7]. Momentum cannot change without change in position. Momentum cannot even exist without changing position. Change in position is determined by the Momentum, nothing else. The existence of the momentum is an indication that the position is changing. Position cannot change without change of Momentum unless the path is linear or circular, which are not waves.

Momentum cannot change without change of time, and hence momentum is not time independent. Since position is determined by the Momentum, and the Momentum is time dependent, the Position is time dependent. Wave function component of position and momentum is time dependent. You cannot separate the part of the wavefunction consisting Position and Momentum as time independent. $(1/2\pi)^{1/2} \exp[(i/\hbar)\mathbf{p} \cdot \mathbf{r}]$ is not time-independent; it is time dependent.

For the Position and Momentum pair to be a Fourier Transform pair, Position and Momentum must be mutually independent. Position of a particle cannot

remain constant in the presence of a Momentum. If the momentum of a particle is a constant, path of the particle is either linear or circular, nothing else, not a wave. Position and Momentum are mutually dependent. For Position and Momentum to be a Fourier Transform pair, for a given Position, Momentum should be able to take infinitely many values concurrently at any given instant of time independently, which is not possible for a position and momentum of a particle. Likewise, for a given Momentum, position must be able to take infinitely many positions concurrently at any given time independently, which is also not possible for a position and momentum of a particle. Position and Momentum cannot be a Fourier Transform pair since the position and the momentum are mutually dependent. As a result, Heisenberg's Uncertainty Principle is invalid [7].

Corollary:

Since the Position and Momentum of a particle are mutually dependent, Position and Momentum pair cannot be a Fourier Transform pair. Heisenberg's Uncertainty Principle is false.

Precision of the position measurement is not limited or restricted by the precision of the momentum measurement of a particle and vice versa. In fact, the precision of the momentum is directly proportional to the precision of the position since momentum is a derived quantity from the rate of change of position. Precision of position and precision of momentum are not inversely related as it is claimed to be by invalid Heisenberg's Uncertainty Principle. In fact, it is quite contrary, increased precision of position gives increased precision of momentum.

Contrary to the popular bogus claim, both position and momentum of a particle can be measured concurrently. Reflected electromagnetic wave pulse from a particle gives both the position and momentum of the particle concurrently; no separate measurement is required. Time delay of the reflected electromagnetic wave burst gives the position, while frequency shift of the reflected electromagnetic wave burst gives the momentum. There is no truth to the claim made by the Heisenberg Uncertainty Principle. Heisenberg Uncertainty Principle is invalid. It is a result of Fourier Transform Ignorance [7].

Position and momentum of a charge particle cannot be uncertain since uncertainty result in radiation loss. Uncertainty cost energy, it is not free. There is no measurement problem associated with microscopic particles. Human concocted Measurement problem in Quantum Mechanics is mainly a result of misinterpretation of two experiments, namely, the Stern-Gerlach Experiment and the Double-Slit Experiment, which are based on a beam of particles. Here we are going to summarize what is wrong with the interpretation of those two experiments and what exactly happens with those experiments. We have already presented the detail

description of the Stern-Gerlach Experiment. More detail on what went wrong with the Double-Slit Experiment can be found in [2].

Lemma: Simultaneous Measurement of Position and Momentum of a Particle

Both Position and Momentum of a particle can be measured simultaneously. Reflected electromagnetic wave pulse (radar) from a particle gives both the Position and Momentum of the particle concurrently. No separate measurement is required. Time delay of a reflected electromagnetic wave burst gives the Position of the particle, while frequency shift of the reflected electromagnetic wave burst gives the Momentum.

Corollary:

The momentum of a particle does not generate radiation without a charge. Since a charge has no existence without the mass of an electron, the wavelength of radiation due to the stopping of charge particle of any mass M is inversely related (frequency is directly related) to the chomentum qu , as well as the mass of an electron m_e , not to the mass of a particle M . Since the mass of an electron m_e is a constant, it is absorbed into the radiation parameter, which is the proportionality constant between wavelength λ and chomentum qu .

A. Stern-Gerlach Output is Not Probabilistic:

There is no probability involved in the Stern-Gerlach Experiment. Beam Split is completely deterministic. When the first atom enters Stern-Gerlach Magnetic Field (SGMF), if the angle between the Spin Magnetic Moment (SMM) of the Atom and the SGMF is θ , then,

Case-1: If $\theta = \pm 180$ for the first Atom of the beam entering the SGMF

In this case, when the First Atom of the Beam enters the SGMF, the Atom is at critical stable point and there is no alignment torque when $\theta = \pm 180$. It will be deflected as Spin-Down. If the orientation of the first Atom is at $\theta = \pm 180$, then, the orientation of the second Atom entering the SGMF will be opposite to that of the first Atom due to the magnetic coupling, i.e. the second Atom enters at $\theta = 0$. There is no alignment torque when $\theta = 0$. The second Atom will be deflected as Spin-Up. Similarly, the following Atoms will be deflected as Spin-Down, Spin-Up, Spin-Down, Spin-Up, ... and so on alternately. Where an incoming Atom ends up is completely deterministic. When the first Atom enters at $\theta = \pm 180$, all the Atoms in odd positions, 1, 3, 5, ... will be deflected against SGMF as Spin-Down while the Atoms at even positions, 2, 4, 6, ... will be deflected toward the SGMF as Spin-Up. As a result, the number of Atoms in each Split beam is the same.

The first Atom of any beam arriving at Stern-Gerlach Magnetic Field aligned already exactly

against SGMF is possible, but very rare. Any slightest deviation generates an alignment torque that forces the Atom to align towards the SGMF since $\theta=\pm 180$ is a critical stable state. As a result, the first Atom of any beam of Atoms will always ends up in the Spin-Up Split Beam unless it is arriving aligned against the SGMF.

Case-2: If θ is at any value but not against SGMF, $\theta \neq 180$ for the first Atom entering the SGMF

In this case, when the first Atom enters the SGMF, it immediately aligns with the SGMF because of the alignment torque, and hence immediately after the arrival of the first Atom at the SGMF, $\theta=0$. As a result, it will be deflected towards SGMF as Spin-Up. The second atom will be aligned against the orientation of the first Atom and enters the SGMF at $\theta=\pm 180$. As a result, the second Atom will be deflected against SGMF as Spin-Down. Similarly, the following Atoms will be deflected alternatively as Spin-Up, Spin-Down, Spin-Up, Spin-Down, ... and so on. Where an incoming Atom ends up is completely deterministic. All the Atoms in odd positions, 1, 3, 5, ... will be deflected toward SGMF as Spin-Up while the Atoms at even positions, 2, 4, 6, ... will be deflected against the SGMF as Spin-Down. As a result, the number of Atoms in each Split beam will be the same.

Probability plays no role in the Stern-Gerlach Experiment. Splitting of beam is completely deterministic. Two consecutive atoms always undergo opposite deflections and end up in opposite beams all due to magnetic coupling between neighboring Atoms in a beam of Atoms. There is no measurement problem here. State of a Quantum Particle is not probabilistic.

It does not matter the orientation of an Atomic Spin Magnetic Moment (SMM), Atom will end up either aligned with the SGMF or against SGMF. You are either with us or against us. Orientation of Split beams says nothing about the actual orientation of the Atoms prior to their entering of the SGMF. You cannot use the SGMF to determine the orientation of the SMM of an Atom. You cannot use SGMF to measure the component of SMM or the component of Spin of an Atom in a certain direction. The orientations of Atoms in split beams are volatile, not permanent. As soon as the atoms in the split beams are out of the SGMF, they reorient themselves so that no two neighboring Atoms have the same orientation.

Corollary:

In the absence of an external magnetic field, the orientation of neighboring Atoms in a beam are direct opposite to each other naturally due to SMM coupling.

Corollary:

As soon as the first Atom of a beam of Atom enters the SGMF, it is torqued to orient toward the SGMF and drift it as Spin-Up.

B. It is not Possible to Prepare a Particle to be Spin-Up or Spin-Down:

Lemma:

Set or prepared Spin-Up and Spin-Down are Volatile. They only remain in the set or prepared positions, Spin-Up or Spin-down, as long as SGMF is present.

It does not matter how hard you try, if all you have is a single particle, you cannot prepare it to be Spin-Down by sending it through a SGMF. If all you have is only a single particle, when you send it through a SGMF, it always orients itself toward SGMF, and hence ends up as Spin-Up. You can take any particle and send through a Stern-Gerlach Device, it always ends up as Spin-Up. If all you have is a single particle, you cannot get it to be Spin-Down unless you can make it enter the SGMF exactly against the SGMF, which is impossible. If you have a particle that has orientation exactly against the SGMF, it is already Spin-Down relative to the SGMF, and hence there is no reason to send it through SGMF. If you send a particle that has the orientation against SGMF, then, it passes through the SGMF without any change in orientation since the orientation torque is zero.

If a single particle goes through SGMF as Spin-Down, you are certain that the orientation of the particle is against the SGMF. It cannot be of any other orientation. However, if a single particle goes through a SGMF as Spin-Up, you have no clue to the actual orientation of the particle. It says nothing about the orientation of the particle. You only know for sure that it is not against the SGMF. The actual orientation can be any angle, except it is not against SGMF. More importantly, once the particle is out of the SGMF, its alignment is neither in the direction of the SGMF nor against it. Its alignment is determined by the population of the Atoms or the magnetic field of the environment that it is a part of.

Corollary:

If a single particle goes through a SGMF as Spin-Up, it says nothing about the orientation of the particle. The actual orientation could have been any angle except it was not against the SGMF.

If you send two consecutive Atoms one after other through SGMF, the first Atom always will be deflected in the direction of the SGMF as Spin-Up while the second Atom will be deflected against SGMF as Spin-Down. Once the Atoms are out of the SGMF, their orientations are determined by the magnetic field of the environment and their magnetic coupling.

You cannot prepare particles to be Spin-Up or Spin-Down. Particles do not have a memory of its orientation. Particles have no orientational parameter. Orientation is an observer dependent quantity, which is not a state of a particle. Orientation of a particle is completely determined by population of Atoms or the

magnetic field of the environment the particle is in or particle is part of.

Noteworthy:

- Lonely Single Particle through SGMF ($\theta \neq 180$) is always Spin-Up, never Spin-Down.
- A second magnetically coupled Atom through SGMF just after the first is always Spin-Down, never Spin-Up.
- Particles Do Not have a Spin Memory.
- The orientation of Spin is not a state of a particle.

C. There are no Spin-Up or Spin-Down Particles:

Spin-Up and Spin-Down are not states of a particle. Spin-Up and Spin-Down resides in the same Particle with relative to an Observer. Spin-Up and Spin-Down are non-Separable since separation results in the creation of Magnetic Monopoles. You cannot create Magnetic Monopoles. There are no Magnetic Monopoles. As a result, Spin-Up and Spin-Down are Not in a Superposition.

The claim by some physicist that there had been a monopole soup at the beginning just after a Big-Bang (Big-Nonsense) is simply preposterous. Magnetic monopoles cannot exist at any situation. No magnetic monopole can exist in isolation in any circumstance, impossible. There was no Big-Bang [5, 9]. The non-sensical concept of Big-Bang is a result of our misinterpretation observation. Galaxies are not moving away. Galactic redshift is not a result of universe expansion. The red shift of light from distant galaxies is due to the electromagnetic propagation loss [5]. Electromagnetic energy loss and the signal strength loss are not the same. Further the galaxy away, higher the propagation loss, and hence higher is the red shift. Universe is not expanding [9]. Universe cannot expand. There is no multi-verse. There is no dark matter. or dark energy (sciencing in the dark) [6].

Spin-Up and Spin-Down are not orthogonal. They cannot be represented by orthogonal vectors. Spin-Up and Spin-Down are in perfect correlation negatively. If you represent Spin-Up by a vector, the Spin-Down is the same vector in the negative direction. There is NO Quantum Measuring Problem. There is no place here for a wave function. There is no collapsing wavefunctions. Nothing is waving here. Nothing is collapsing here. Everything is deterministic. If there is a wavefunction, and if it collapses every time it is peeked at, then, that wavefunction should be always at a collapse state since every particle is peeked at by other neighboring particles.

Wavefunction itself is meaningless. Particles do not behave as waves. Particles cannot behave as waves. What is there to wave in a particle? There is nothing waving in a particle. Probability distribution is static, never a wave. A wave is never static, always propagating, and hence a wave cannot be a probability distribution.

Unlike a probability distribution, a propagating

wave cannot have unit area under its wave. A wave normalized in the range of a wavelength is not a probability distribution. For a wave to be a probability distribution, it must be normalized for the entire range. A propagating wave cannot be normalized for the entire range. A wave does not exist if it is not propagating, and a propagating wave cannot be normalized. Wave is not a probability distribution. Nature does not normalize. Irrespective of the size of a particle, the state of a particle at any time is UNIQUE. It cost energy to be uncertain.

Stern-Gerlach Principle: Bushism

You are either with us or against us. If you are not totally against us, you have the potential to be our friend and hence we will torque you toward us (Spin-Up). If you are against us (Spin-Down) you are a high potential activist, you are our enemy, period.

Important Directional Note:

Spin-Up does not mean Up \uparrow or \nearrow . You can equally call \downarrow , \leftarrow , \rightarrow or \swarrow as Spin-Up, and it is same for Spin-Down. Up and Down are relative to an Observer. Spin-Up means in the direction of External Magnetic Field while Spin-Down is against the External Magnetic Field; the External Magnetic Field can be at any direction, North, South, East, West, Left, Right, In, Out etcetera. Particles do not have Up and Down Memory, or any other orientational memory. Nature does not have Ups and Downs. Nature does not have directions; direction is always relative to an observer.

Corollary:

Up and Down are Observer Dependent labels that do not stick to a particle. They do not represent states of a particle.

D. Double-Slit Experiment is Not Probabilistic [2]

In the Double-Slit experiment, when the moving charges are stopped by the Double-Slit barrier, it generates electromagnetic radiation waves that pass through both slits in-phase equally without discrimination generating two separate diffraction patterns if the two slits are distant apart. When the two slits are brought closer, these two diffraction patterns start to overlap producing interference pattern. Interference pattern of two slits is the superposition of two diffraction patterns generated by two slits when the two slits are closer.

Property-1:

The diffraction pattern itself is determine by the width w of the slits. The distance d between the slits determines the extent of the interference of two diffraction pattern on the screen.

Property-2:

When tow slits are separated by a large distance, two separate disjoined diffraction patterns appear on the screen.

Property-3:

When two slits are closer together, as in the case of Double-Slit experiment, these two diffraction patterns interfere on the screen generating an interference pattern of bright and dark lines on the screen. Process is totally deterministic. The major lobe of the interference pattern is centered around the point O, where the extended line along the beam through the midpoint between the slits intersects the screen.

Property-4:

Wavelength of the interference pattern is determined by the change of chomentum qu , not the momentum mu , where q is the charge, m is the mass of the particle, u is the speed of the particle. The wavelength λ is given by,

$$\lambda = \zeta(1/qu)$$

where ζ is the radiation constant. Wavelength has no direct relation to the mass of the particle. The effect of mass is indirect since the mass affects the speed.

Property-5:

Since the charge particles are stopped at the Double-Slit barrier, the change of chomentum is equal to the chomentum qu . The wavelength is inversely proportional to the change of chomentum qu . The change of momentum has nothing to do with the generation of electromagnetic waves.

Property-6:

Particle or mass enables the motion for a charge. Mass is required since charge has no existence or motion without a mass. Mass is a chauffeur for a charge.

Property-7:

Charges move at the same speed as of the speed of the particles, u . The electromagnetic radiation wave generated by the collision of charges with the barrier propagate at the speed of light.

Property-8:

The optimal electromagnetic radiation is achieved when the charge to mass ratio of the particles is the highest,

$$[q/M]_{\max} = e/m_e$$

where, q is the charge of a particle of mass M , e is the charge of an electron, and m_e is the mass of an electron.

Since a charge has no existence without the mass of an electron, electrons are the particles with the highest charge to mass ratio. This is the reason why we have Electrons Microscopes. This is the reason why a beam of electrons is used in the Double-Slit Experiment.

Property-9:

The frequency f of the radiation is given by,

$$f = c/\lambda$$

where, c is the speed of light.

When we use a beam of charge particles as input to the Double-Slit Experiment, all the particles are stopped by the Double-Slit barrier [2]. There are no particles on the other side of the barrier. No particles at the screen. If you place a particle detector at the screen, there will be no indication of any particles reaching the screen. If an electromagnetic wave detector is placed at the screen, it will indicate the presence of electromagnetic waves at the screen.

When moving charge particles are stopped suddenly, it generates electromagnetic radiation. It is this radiation that passes through the slits and interfere on the screen to create interference pattern. Wavelength of the interference pattern depends inversely on the change of speed of moving charge or the change of chomentum qu , where q is the charge of a particle and u is the speed of the particle. The frequency of the electromagnetic radiation is directly proportional to the change of chomentum qu . Since the charges are stopped by the Double-Slit barrier abruptly, change of the chomentum is equal to the chomentum.

In the Double-Slit experiment, let us assume the central line, or the extended line of the beam, that passes through the center of the line connecting two slits and intersects with the screen is point O. Then, if we have the m^{th} bright line at point P on the screen at distance z_{mb} from O, and the screen is at distance L from the double-slit barrier, the wavelength λ of the interference pattern is given by the relationship,

$$z_{mb} = (m\lambda L/d)$$

where, $(m\lambda/d) < 1$, $m = 0, \pm 1, \pm 2, \pm 3, \dots$

d is the distance between the slits, subscript mb stand to m^{th} bright line.

Smaller the distance between the slits, larger is the separation between the bright lines as long as $\lambda < d$. If $\lambda > d$, there is no interference patterns of bright and dark lines. Larger the distance between the Double-Slit barrier and the screen, the larger the separation between the bright lines. The main lobe of the interference pattern is centered at O, that is the point where the extended line of the beam crossing the midpoint point between the line connecting the two slits intersects with the screen. The beam of particles never reaches the point O. Beam is stopped by the Double-Slit barrier. But the electromagnetic waves generated by the collision propagate through the slits and reach the screen at O in-phase and add constructively producing the peak brightness of the main lobe, $m=0$.

The dark lines on the screen are at distance z_{md} given by the relationship,

$$z_{md} = (m+1/2)\lambda L/d,$$

where, $(m+1/2)\lambda < d$, $m = 0, \pm 1, \pm 2, \pm 3, \dots$

subscript md stand to m^{th} dark line.

At the first dark line, $m=0$, and hence the distance z_{od}

is given by, $z_{od}=(1/2)\lambda L/d$.

So, the main lobe of the interference pattern is centered at O and has the band width $2z_{od}$. The band width of the main lobe is $\lambda L/d$.

A beam of particles does not reach O since all the particles are stopped on the way by the Double-Slit barrier. Particles do not cross the Double-Slit barrier. There is no slit on the barrier along the line of the beam of particle for the particles to go through. Particles do not have any knowledge of two slits off its path. Particles do not go through the slits. The electromagnetic radiation waves, produced by the collision of charge with the Double-Slit barrier, undergo diffraction at the slits and propagate to the point O on the screen in-phase.

If we close slit-2, all the radiation waves arrive on the screen will be from the other open slit, slit-1. There is no interference, and hence there will be no interference pattern. However, we still can see dark and bright lines on the screen when slit-2 is closed if $\lambda < w$, where w is the width of the slit. Although this look like an interference pattern, this is not an interference pattern. When radiation waves passed through a slit, they undergo diffraction. What we see on the screen is the diffraction pattern of bright and dark spots. The distance to the m^{th} bright line on the screen z_{mb} is given by,

$$z_{mb}=(m\lambda L/w)$$

where, $m\lambda < w$, $m=0, \pm 1, \pm 2, \pm 3, \dots$

w is the width of a slit.

Similarly, the distance to the m^{th} dark line on the screen z_{md} is given by,

$$z_{md}=(m+1/2)\lambda L/w,$$

where, $(m+1/2)\lambda < w$, $m=0, \pm 1, \pm 2, \pm 3, \dots$

The distances to the bright lines are inversely related to the width of the slit. Smaller the width of the slit, w , larger the separation between the bright lines. If

the line parallel to the line of the beam through the open slit, slit-1, intersects the screen at O_1 , then, the beam is centered at O_1 on the screen. If the other slit, slit-2 is open and slit-1 is closed, the beam will be centered on O_2 , where O_2 is the point on the screen where the center line through the slit-2 parallel to the extended line of the beam intersect.

In the case where both slits were open, the beam is centered along the extended line of the beam at point O on the screen, the center point on the screen corresponding to the center point between the slits on the Double-Slit barrier. There is nothing strange happening in the Double-Slit experiment when we use a beam of particles. All the particles are stopped at the barrier. Everything that is happening behind the Double-Slit barrier is a result of the electromagnetic waves generated with the collision of charge particles at the Double-Slit barrier.

The centering of interference pattern at O on the screen, where the beam has no opening in the Double-Slit barrier to reach O, has been used to support Quantum Mechanics; this is simply

groundless, false, quite simply preposterous. Two diffraction patterns are centered at O_1 and O_2 . If two slits are closer, O_1 and O_2 are closer and hence the superimposed pattern will have the peak at O, which is the midpoint of O_1O_2 , even though point O is covered by the Double-Slit barrier. It is simply due to the diffraction when electromagnetic waves pass through a slit. You can achieve this same thing using a beam of light too. It is not limited to particles. This shows that this is not something that is peculiar to a beam of particles.

When two slits are far apart, wave through each slit generate separate diffraction patterns on the screen centered on their own center lines intersection points on the screen O_1 and O_2 . The point O on the screen is the midpoint of O_1O_2 . When we bring slit s_1 and s_2 closer together, diffraction patterns start to overlap. However, initially, the overlapping will be in the positive tail of one diffraction pattern centered at O_1 with the negative end of the tail of the other diffraction pattern at O_2 . If the slits are at a significant distance, then, there will still be two main lobes centered at O_1 and O_2 . If we bring slits close and closer, the two main lobes of the diffraction patterns start to overlap generating one interference pattern with one main lobe centered at O with peaks with decreasing magnitude in the tails. The peaks correspond to the bright lines while the troughs correspond to the dark lines.

If the screen is a phosphor screen, what we observe is not the lines since the illumination of the phosphor screen at any point correspond to the strength of the electromagnetic field. As a result, there will be bright spots corresponding to the peaks of the waves.

The peaks of the interfering electromagnetic waves appear as bright spots on the phosphor screen. It is the misinterpretation of the bright spots as particles colliding with the screen that led to a probabilistic interpretation. No particle ever reaches the screen in the double-slit experiment. Particles do not choose which slit to go through probabilistically. No particle crosses the Double-Slit barrier to the other side. All the particles are stopped at the Double-Slit Barrier. It is the electromagnetic waves generated by the collision of charge particles with the double-slit barrier that undergo diffraction through the slits in the barrier and interfere on the screen behind the double-slit barrier generating the interference pattern.

If you remove the phosphor screen completely and place a particle detector at that place, you will not see any particles there; particles cannot reach the place where the screen is. There are no particles behind the Double-Slit barrier. You will only find electromagnetic waves behind the Double-Slit barrier when you carry out the Double-Slit experiment with a beam of charge particles as input.

The claim that a Quantum Particles go through both slits is pure nonsense, not science, voodoo-science. Non-science may just appear as science

when everybody believes in it. A lie becomes the truth when the jury considered it to be right. What jury considered to be right may not be the truth. Nonsense is nonsense even when everybody believes in it. It is the same flat-earth syndrome again, we had been there before.

Commonsense must prevail ultimately, sooner or later. Irrespective of size, no particle can be at several places at the same instant. Physical laws must be the same irrespective of the size and the location of the object. There are no multiple worlds for our mental alternate realities, for alternate realities we envision. Something that has not happened is not a reality; it is a human-dreamed-up reality. Alternate realities that are brewing in our human psychic are not realities in parallel world.

There is no probability involved when Double-Slit Experiment is used with a beam of microscopic Particles. What you get for a beam of particles in the Double-Slit experiment can also be obtained using a beam of electromagnetic waves. The underline principle is the same. The only difference is the source of electromagnetic waves. In the case of a beam of light, we have a direct source. In the case of a beam of particles, we have an indirect source, where electromagnetic waves are generated by colliding charge particles, not any particles, CHARGE particles.

The outcome of a Double-Slit Experiment is deterministic. State of a particle is unique. There is no Measurement Problem in Microscopic Particles or Quantum Particles. Size of a particle does not destroy reality. Reality is that the Position and the Momentum of a particle are UNIQUE at any instant. A particle cannot be at multiple places at the same time. A particle cannot have multiple speeds at the same time.

Orbiting systems such as Atoms spin. Spin can be either Spin-Up or Spin-Down relative to an Observer. One person's Spin-Up particle can be Spin-Down for another Observer. If you are in North America, what is the Spin of the Earth? Now, phone someone in Australia and ask what the Spin of the Earth is. The answer is complete opposite of yours. If the direction of Spin-Up or Spin-Down is a state of a particle, the answers must have been the same. The answers are different because the direction of Spin is not a state of a particle. If the Spin-Up and Spin-Down are states of a particle, they should not vary from Observer to Observer; they should also be independent of the location of an observer. Spin of a particle is Observer Dependent. Observer Dependent Quantities DO NOT come in Quanta. Observer dependent Quantities cannot be Quantized. Nature cannot quantize what is in an observer's mind.

Noteworthy:

- Interference Pattern in the Double-Slit Experiment is not due to the collision of Particles on the screen.
- No Particle reaches the screen since they are

blocked by the barrier.

- It is the electromagnetic radiation generated by the collision of charge particles with the Double-Slit barrier that generates the Interference pattern on a screen behind the barrier.
- Peaks of interfered waves appear as bright spots on the Phosphor screen. Phosphor screen is sensitive to the strength of electromagnetic field; brightest where the strength is stronger (peaks) and darkest where the strength is lowest (troughs).
- There will be no interference pattern in the Double-Slit experiment if a beam of electrically neutral and stable particles is used. Stable particles do not disintegrate under a collision.
- Neutrons are not stable particles. Neutrons disintegrate under collision. A beam of neutron will generate an interference pattern since electromagnetic waves are released in a collision due to the disintegration of the neutron.

Corollary:

When two slits are at distant, the waves through slits generate two separate diffraction patterns on the screen centered at O_1 and O_2 . If we bring the two slits closer, they start to interfere to produce an interference pattern, initially with two major lobes unaltered if the slits are still significantly apart. If we bring two slits closer and closer, two major lobes merge to become one centered at O , which is the middle of the O_1O_2 .

Corollary:

Particles do not go through the slits since the slits are not on the path of the beam of particles. Particles have no knowledge of the slits.

E. Act of Observation does not Make Interference Pattern Disappear in the Double-Slit Experiment

It has been claimed that the act of observation makes the interference pattern disappear. This claim is false. It is hard to comprehend the existence of such a claim in physics.

If that claim comes from a voodoo practitioner or someone belongs to a strange religious cult it is understandable since it is a part of their doctrines; there are plenty of those mis-guided blind faith religious groups are around creating havocs in the world; some are extremely cruel to the fellow human as well as to the rest of the species and the planet in the disguise of the religious faith. Some try to justify any barbaric activity under the faith. If man can have multiple wives, why can a woman not have multiple husbands? What is the logic other than down right discrimination and subjugation? It is the religious dogmas that allow such subjugation to perpetuate.

The act of observation does not make the interference pattern in the Double-Slit experiment disappear. One has to be scientifically blind to make such a claim. It is not science. It is voodoo science.

Property:

Superposition of reflected waves from the passive surface of a detector and the waves generated by the active detector with the interference pattern of the Double-Slit experiment on the screen makes the interference pattern disappear. The act of observation itself has no effect on the interference pattern. Failure to realize this is the genesis of voodoo-physics.

It has been experimentally observed that the interference pattern in the double-slit experiment disappears when a detector is placed near one or both slits to make simple observation. It is this experimental observation that led to the proclamation that the mere observation itself makes the interference pattern in the Double-Slit experiment disappear.

Yes, if you place a detector near the slits in the double-slit experiment to observe the slits or even just for the fun of it, the interference pattern may disappear. You do not even have to observe, just the placement of the detector itself is sufficient to make the interference pattern disappear. You do not even need a detector, just the placement of any reflector surface will make the interference pattern disappear. Because this disappearance has nothing to do with the involvement of an observer, detector, or the act of observation itself.

When you place a detector, the surface of the detector reflects part of the waves from the slits back onto the screen on slightly longer paths that can annihilate the interference pattern on the screen. It is the position of the detector that annihilate the interference pattern on the screen, not the act of observation itself. The placement of a detector will reflect part of the waves back onto the screen in different paths at different time delays.

In addition, waves generated by the active detector also propagate on to the screen directly together with the reflections from the surface of the detector of the waves from the slits in the double-slit barrier. The interference of this reflected waves and the waves generated by the detector will always make the interference pattern partially or completely disappear. It is only when the detector is at certain positions or certain angles that the interference pattern disappears completely.

It clearly shows that it is not the act of the observation itself that annihilates the interference pattern on the screen. It is the interference of the reflected as well as the generated waves from the detector with the interfering waves on the screen that annihilate the interference pattern. If you change the position of the detector or the orientation of the detector, it affects the interference pattern differently. If the disappearance of the interference pattern is due to the act observation itself, then, the position and the orientation of the detector should not have made any difference on the interference pattern since

observation is an observation irrespective of the position of the detector or the angle of the detector.

Observation is observation whether it is observed directly or peaked into it from distance by human or any other object. Act of observation is not the cause for the disappearance of the interference pattern. It is the superposition of miscellaneous unwanted spurious waves, due to the placement of the detector, with the interference pattern that makes the interference pattern disappear in the Double-Slit experiment. Interference pattern is delicate. Superposition of any unwanted spurious waves such as the reflections from a detector surface with the interference pattern will result in the disappearance of the interference pattern.

You do not need a detector to make the interference pattern disappear. You can make the interference pattern disappear by replacing the detector with any reflector. Part of the waves that go through the slits hit the reflector and travel on to the screen on longer paths than the path that travels directly on to the screen. Now, the waves directly from the two slits as well as waves from the reflector interfere on the screen. Any point on the screen has waves in superposition from two slits and the reflector on non-equal paths and hence with different time delays, which destroy the interference pattern due to the superposition of waves from two slits alone. The reflected wave that travel on a longer path interferes with the waves that go through the slits on the screen. The proper positioning or the orientation of the reflector annihilates the interference pattern completely.

The claim that the act of observation itself can make the interference pattern disappear is simply preposterous, simply nonsense. The act of observation of the slits in the double-slit experiment does not make the interference pattern disappear. The interference pattern disappears when a detector is placed near a slit because part of the wave through the slits are reflected onto the screen with different time delays.

Corollary:

If the act of observation makes the interference pattern disappear, then there will never be any interference pattern on the screen since particles are under continuous watch by other particles.

Interference pattern in the Double-Slit experiment is due to the interference of two waves from two slits on the screen. The interference disappearance is due to the superposition of the interference pattern with the reflected and direct waves from the director. In other words, the disappearance of the interference pattern is due to the interference of more than two wave fronts on the screen.

You do not need an expensive detector to make the interference pattern disappear. You can make the interference pattern disappear simply by placing any reflector. This interference pattern disappearance with

the placing of a reflector or a detector is not limited to the Double-Slit experiment with a beam of particles. The same phenomena can be observed with a beam of light too.

If you are falsely and blindly certain that a particle probabilistically chooses which slits it goes through to make an interference pattern on the screen, and it is the act of observation itself that destroys the interference pattern, then, when a beam of light is used, the same act of observation should not have destroyed the interference pattern since light is sure to pass through both slits. However, that is not what happens. The placement of reflector or detector anywhere at any orientation destroys the interference pattern due to beam of light. This shows without a doubt, whether it is a beam of particles or a beam of light that is used in the Double-Slit Experiment, what is going through slits are not particles, but electromagnetic waves. Electromagnetic interference pattern disappears when third active or passive source or both come into the scene with the placement of an active detector. If a beam of light is used, what you observe on a phosphor screen is interference pattern made of bright spots just like an interference pattern from a beam of particles.

Corollary:

Interference pattern on the screen in the Double-Slit experiment is due to the electromagnetic radiations from the collision of charge particles on the double-slit barrier [2].

Corollary:

Act of observation does not make the interference pattern disappear.

Corollary:

It is the superposition of the reflected and generated waves on different paths of different time delays from the detector/reflector with the interference pattern due to the waves from the two slits on the screen that makes the interference pattern in the double-slit experiment disappear, not the act of observation itself by the detector.

Lemma:

If a beam of electromagnetic waves is used in place of a beam of particles in the Double-Slit experiment, what will be present on a phosphor screen is an interference pattern made out of bright spots, not continuous fringes.

If a beam of light is used in the Double-Slit experiment with non-phosphor screen, as it was the case with the original Thomas Young experiment, an interference pattern of solid bright and dark fringes will be present, not an interference pattern of bright spots.

Whether the interference pattern consists of solid lines or bright spots is determined by the properties of the screen:

- If the screen is made of phosphor, then the interference pattern will be in bright and dark spots for a beam of particles as well as for a beam of light.
- If the screen is made of non-phosphor material, then the pattern will be solid bright and dark fringes for a beam of light.

Noteworthy Facts in Double-Slit Experiment:

1. Double-Slit experiment with a beam of charge particles is one of the most misunderstood experiment from the very beginning. This is the experiment that derailed the physics into a mysterious path that it has been taking to this day. It transformed common-sense physics into voodoo-physics non-sense.
2. Double slit experiment does not generate an interference pattern if a beam electrically neutral and stable particles is used. This indicates that it is not the momentum that generates an interference pattern. There is no wave when there is no moving charge.
3. Although it is not the momentum that generates the interference pattern, without a momentum there will not be an interference pattern since it is the momentum that generate chomomentum, the motion of charge. Momentum is responsible for getting charges moving. Moving charges are responsible for the generation of interference pattern.
4. What generate the interference pattern on the Double-Slit experiment is the electromagnetic radiation resulted from the sudden stopping of the charge particles at the double slit barrier. Particle mass here is simply the carrier of charge. Smaller is the mass, higher is the speed and hence higher is the frequency of radiation. That is exactly the reason why we have electron microscopes, not the proton microscopes. If we have proton microscope, the resolution will not be as good as the electron microscopes. This is a direct contradiction to the deBroglie wavelength.
5. It is the chomomentum, which is the product of the charge q and the speed u , qu that is responsible for the interference pattern on the Double-Slit experiment. Higher is the chomomentum, shorter is the wavelength or higher is the frequency of the interference pattern.
6. The wavelength λ is inversely proportional to the chomomentum, qu and hence, $\lambda = \zeta(1/qu)$, where, q is the charge of a particle and u is the speed of the particle, and ζ proportionality factor or the radiation parameter that can be determined experimentally using Double-Slit experiment since λ , q , and u are known. If we plot λ against $1/qu$, the gradient is the parameter ζ , the proportionality factor. The wavelength of the radiation must be independent of the mass of the particle. Irrespective of the mass of the particle M , the mass of electron may be intrinsic to the parameter

- ζ since there is no existence or motion of a charge without the mass of an electron. The mass of an electron m_e is ingrained in the radiation parameter ζ .
7. Mass of a particle is simply the carrier of a charge in the Double-Slit experiment or in Particle Microscopes. Smaller the mass higher the speed and hence higher the radiation frequency or lower the wavelength. This is the reason for choosing smallest charge particles, electrons, in Particle Microscopes. Electron Microscopes provides higher resolution compared to any other Particle Microscope.
 8. If deBroglie waves are responsible for generating an image in a Particle Microscope, we could be able to increase the resolution by using a beam of particles with higher mass since wave length is inversely proportional to mass in the deBroglie waves, $\lambda=h/(mu)$. This is an indication that deBroglie conjecture is incorrect. There are no particle waves. It is moving charge that generate radiation wave, not a moving mass.
 9. Larger the charge q to mass m ratio, q/m , smaller the wavelength. If microscope is designed using a beam of particles, the resolution of the microscope can be increased by choosing particles that have higher charge to mass, q/m , ratio. Particles with the highest charge to mass ratio are the electrons.
 10. A beam of neutrons will generate an interference pattern since neutrons are unstable; they disintegrate into charge particles while releasing electromagnetic wave bursts.
 11. A beam of neutral and stable particles does not generate an interference pattern in the Double-Slit experiment.
 12. A beam of neutral and stable particles does not generate an image in a Particle Microscope.
 13. If a beam with heavier particles of mass M at speed u is used, the wavelength λ_M observed in the double slit experiment will be longer than the wavelength λ_m observed for a beam with lighter particles of mass m at the same speed u , $\lambda_M > \lambda_m$. This is complete contradiction to the deBroglie wavelength. Observed wavelength is not inversely related to the mass as it is conjectured in the deBroglie wavelength $\lambda=h/(mu)$, where u is the speed. Decrease of wavelength with increase of speed is intuitive and practically real. Decrease of wavelength with increase mass is against our intuition, and practically impossible. You cannot increase a resolution of a Particle Microscope by increasing the mass of the particles. DeBroglie wavelength conjecture is false.
 14. The invalidity or the error of the deBroglie wavelength is clear since there is no interference pattern in the Double-Slit Experiment when a beam of neutral and stable particles is used. It is an indication that the momentum of a particle does not generate waves. Momentum does not generate interference pattern.
 15. The wavelength for a beam of particles of mass m and charge q with momentum p in the Double-Slit experiment will not be the same as the wavelength for a beam of particles of mass M with the same charge q and momentum p . This is a direct contradiction to the deBroglie wavelength.
 16. According to deBroglie wavelength $\lambda=h/p$, wavelength depends only on the momentum p . Debroglie wavelength is independent of the charge of the particle. In fact, the wavelength of the interference pattern in the double slit experiment depends on the chomentum, the product of the charge and the speed of the particles used, not the momentum of the charge particles.
 17. It is only when a beam of electrons is used in the Double-Slit experiment that the deBroglie wavelength gives the false impression that it is right. The observation will not support the deBroglie wavelength for any beam of particles except a beam of electrons. We will consider the derivation in a later section.
 18. If two particles of different mass have the same momentum, deBroglie wavelengths of the particles will be the same. However, a Particle with smaller mass has higher speed than the particle with higher mass, and hence a smaller mass carries the same charge faster resulting in higher radiation frequency compared to the particle with higher mass even though they have the same momentum. DeBroglie wavelength conjecture is incorrect.
 19. If two particles have different charges but the same mass and the same speed, then the particle with higher charge will generate higher frequency radiation than the particle with lower charge. This is a contradiction to the deBroglie wavelength conjecture where frequency is independent of the charge of a particle.
 20. Wavelength of the interference pattern in the Double-Slit experiment depends on the charge of the particle, not the mass of the particle. Wavelength is independent of the mass of the particle.
- F. The Effect of Observation of Slits in the Double-Slit Experiment When a Beam of Light is Used**
- When the Double-Slit Experiment is carried out with a beam of light, interference pattern appears on the screen indicating that light is a wave. When a detector is placed near the slit to observe what is going through slits, the interference pattern disappears depending on position of the detector. Instead of the detector, if you place any reflector, that will also annihilate the interference pattern. It is not the act observation that makes the interference pattern disappear from the screen.

Lemma:

Irrespective of whether it is a beam of particles or beam of light that is used in the Double-Slit experiment, it is the electromagnetic waves that generate an interference pattern. The process of interference pattern generation is the same. The only difference is the source of the electromagnetic waves. In one, the source is a beam of electromagnetic waves, while in the other electromagnetic waves are generated by colliding fast moving charge particles on a barrier.

Lemma: Observer Independent Interference Pattern

The act of observation does not annihilate the interference pattern. Whether it is a beam of particle or beam of light that is used in the Double-Slit experiment, what annihilates the interference pattern in the Double-Slit experiment with the placement of a detector is the superposition of reflected waves from the surface of the detector with the interference pattern on the screen. Not the act of observation itself.

When you place a detector or a reflector at the slits, it will reflect a part of the light from the slits back onto the screen. Since the detector is active, it also generates waves that will propagate directly onto the screen. Now, with placement of a detector near the Double-Slit experiment, what is on the screen is not just the waves that pass through the two slits that generated interference pattern. On the screen, interference pattern is in superposition with the reflected waves from the detector as well as the waves generated by the detector. All the waves travel on different path with different time delays meet on the screen annihilating the interference pattern.

The act of observation itself does not make the interference pattern disappear. Why did we make such a preposterous and false claim that the act of observation makes interference pattern disappear in the double-slit experiment? This non-sensical claim is simply ridiculous. The sustenance of such a false and meaningless claim to this day is an indication that there is something wrong with the guardian of science, journals, and academia. You cannot maintain fallacy by rejecting publications that threaten the status quo of science. Religions could not make the sun to orbit the earth by prohibiting to believe it in any other way. How did the people in twentieth century make such a claim that the act of observation itself make the interference pattern disappear from the double-slit experiment? Incomprehensible.

On the other hand, it should not be that puzzling since majority of people are still believing flat-earth and earth-centric era meaningless self-serving religious dogma. We still have people praying several times a day for imaginary higher being looking for solution to their problems; what a waste of life. When you see the actions and behaviors of the countries that run by religious doctrines, and how the gender discrimination is carried out openly by religious doctrines, you can see the mockery of religious

ideology itself. It is a perfect petri dish environment for voodoo-physics to take foot hold. On top of that we also have dinosaur journals and education system dedicated to maintaining the status quo of religious dogma run by voodoo-science priests as editors and reviewers to maintain scientific fallacy perpetually.

Noteworthy:

- The act of Observation does not destroy the Interference pattern in the Double-Slit Experiment.
- It is the reflected wave from the detector/reflector that destroy the interference pattern.

Corollary:

If the Double-Slit Experiment is carried out with a beam of light, the interference pattern on the screen disappears if a detector/reflector is placed near the slits. This disappearance has nothing to do with observation itself since the light passes freely through both slits whether it is being observed or not.

Corollary:

If a beam of light is used in the Double-Slit experiment, the interference pattern on a phosphor screen will appear as ridges of bright spots.

It is only when non-phosphor screen is used, the ridges appear as bright lines as in the Thomas Young experiment. If Thomas Young had used a phosphor screen, he would have observed the ridges of bright spots instead of solid lines.

Bright spots are a result of the inherent characteristic of a phosphor screen when it is exposed to electromagnetic waves; brightness at any point is proportional to the strength of the electromagnetic waves at that point. The points corresponding to the peaks of the waves appear the brightest. The points corresponding to the troughs of the waves appear the darkest.

G. Bending of Light Near a Gravitational Object has Nothing to do with the General Relativity.

Another similar bogus experiment is the use of the diffraction of light near the sun to substantiate the General Relativity. The General Relativity itself is utter nonsense. There is no spacetime [4]. If there is space-time, space-time function must be unique. If light is relative as it is assumed in relativity, the space-time function cannot be unique, a contradiction. General Relativity is false. Light is not Relative. If light is relative, time cannot be unique. If the light is relative, time will be directional. Time cannot be directional. Gravity cannot bend light. If gravity bends light, light cannot have a constant speed in a vacuum, yet the General Relativity requires speed of light to be a constant in a vacuum.

Property:

If gravity bends light, light cannot have constant speed in the presence of gravitational object even in a

vacuum. If the speed of the light is a constant in a vacuum, the path must be linear irrespective of gravity.

Bending of light cannot take place if the speed of light is a constant. Constant speed of light and gravity bending light cannot co-exist.

The diffraction of light near the sun is not a result of gravity bending light. Gravity cannot bend light. Gravity creates a density gradient of the medium near the sun. It is the density gradient of the medium near the sun that diffracts the light [5, 4]. You cannot use the diffraction of light near a gravitational object to substantiate General Relativity unless you can demonstrate bending of light in a vacuum near a gravitational object, which is impossible. Gravity does not bend light in a vacuum. If gravity bends light in a vacuum, the speed of light cannot be a constant in a vacuum. If there is a bend in the path of light, that means speed of light is not a constant. You cannot have constant speed of light on a non-linear path.

Lemma:

Bending of light in a vacuum in General Relativity is self-contradictory. If gravity bends light in a vacuum, the speed of light cannot be a constant in a vacuum, without which neither Special Relativity nor the General Relativity has an existence.

Corollary:

There is no bending of light near a gravitational object in the absence of a medium surrounding the gravitational object. It is the density gradient of the medium that bends light, not the gravity itself. General Relativity has no validity.

H. Fundamental Elements of a Particle cannot be Discovered by Colliding Charge Particles in a Particle Collider such as Large Hadron Collider (LHC)

If you want a billion-dollar blunder, Large Hadron Collider is one such blunder [6, 9]. You cannot generate mass by colliding particles. When you collide charge particles at high speed, they generate radiation extraneous to particles themselves. This extraneous radiation has nothing to do with the constituents of the particles themselves. If you want to find the elementary components of a particle, the electromagnetic radiation generated by the stopping of the charge particles in a crash must be removed from the crash site. This extraneous radiation is not a product of the disintegration of the particles themselves. This extraneous radiation is non-separable from the crash site. It is the interpretation of this extraneous radiation as new particles generated by collision that led to the false impression of mass generation.

When fast moving charge particles are brought to a sudden stop by a collision, the deceleration of the charge particles generate radiation bursts. These

radiation bursts are contaminant at the site of collision. These extraneous radiations are not a result of the disintegration of the particles themselves. It is this extraneous radiation that gives different result for every collision. If this extraneous radiation is not there, you do not have to keep colliding particles thousands of time. In the absence of extraneous radiation, every collision should give the same result. This extraneous radiation has turned the Large Hadron Collider into another 8th ball; you can use it to prove anything you want; you can see in it what you want to see. If you keep colliding particles, you may get lucky occasionally and find the right mixture of extraneous radiation to prove whatever you want, just like so-called Higgs Boson. There are no mass generating or mass giving particles. There are no special field generating particles unto themselves.

There are no force carrying mysterious particles. Field is not an exchange of particles. Electromagnetic field is not an exchange of particles. There are no light particles; it is a misnomer. Gravitational force is not an exchange of particles. You do not need another mass giving particle for particle to have a mass. Life giving particle is not required to have a life. There are no life-carrying souls or spirits. There are no gravity carrying particles or gravitons. There are no light carrying particles or photons. There are no mass giving particles or Higgs Boson. There are no Bosons since there are no integer Spins. There are electromagnetic wave bursts. There are no Fermions since there are no Spin 1/2. There are electrons and protons. If it is a particle, it has a mass. There are no massless particles. A wave is a wave, not a particle. A particle is a mass, not a wave. There are no fractional Spins. There are no integer Spins. Spin cannot be quantized since there are no Spin Monopoles. Electromagnetic field and gravitational field are not a result of a particle exchange. It cost energy to exchange particles. It cost energy to exchange a mass. There are no photons. In the presence of spatially random photons, there cannot be coherent light. Mass and associated gravitational field are a single entity.

Corollary:

There is no mass without a gravitational field, and there is no gravitational field without a mass. Mass of an object and its gravitational field of infinite span are a single entity.

Path to Enlightenment:

- Collision of Particles does not generate mass.
- Collision of charge particles generates extraneous radiation. It is the invalid representation of the extraneous radiation as particles that gave the impression of mass creation in charge particle colliders. Electromagnetic Radiation is not relative and hence has no effective mass [4]. Electromagnetic Radiation is not particles.
- Outcome of colliding charge particles is not the same as the outcome of colliding neutral stable

particles; outcome is completely different.

- Fundamental Elements of a Particle cannot be obtained by colliding charge particles since the radiation due to the stopping of the particles cannot be separated from the radiation due to the disintegration of the particles in the collision.
- By colliding neutral stable particles, it is possible to unravel constituent elements of the neutral particles. However, particle accelerators are useless for colliding neutral particles. It is not possible to accelerate neutral particles in accelerators.
- Large Hadron Collider is a Billion-Dollar Blunder Hidden in the Swiss Alps. A CRAP generator.

If you want to find the elementary components of a particle you cannot discover them by colliding charge particles. You must collide neutral and stable particles. You cannot accelerate neutral particles in an accelerator. A particle accelerator is useless in finding elementary particles of nature.

Colliding charge particles in an accelerator in the hope of discovering the fundamental elements of nature is simply a useless costly exercise. Large Hadron Collider (LHC) is a billion-dollar blunder. All the particle accelerators are useless, unless a mean to separate the extraneous radiation due to the stopping of charge particles in a collision from the crash site is found. This an impossible task since extraneous radiation is non-separable from the electromagnetic burst due to the disintegration of the particles [9].

There may be a way out of this dilemma if and only if the extraneous electromagnetic waves generated by the stopping of charge particles are in a different frequency band from the frequency band of the electromagnetic waves generated by the disintegration of the particles into their constituent elements. The frequency of the extraneous radiation is determined by the charge of the particles and the speed of the charge. However, the non-overlapping frequency bands cannot be guaranteed.

We cannot expect the two frequency bands to be non-overlapping. If the two frequency bands are non-overlapping, in order to isolate the extraneous radiation, all we need to know is the frequency of the extraneous radiation. The calculation of the frequency of the extraneous radiation due to the stopping of a charge particle of charge q and mass M is considered in a later section. As you might have already guessed, it has to do with the change of chomentum, not the momentum.

The momentum only has an indirect effect on the radiation since it determines the speed of charge, which is the same as the speed of the particle. Finding a way to Filter out the extraneous radiation is the only possible way we can turn around the useless Particle Colliders such as Large Hadron collider as is into a something useful; it is worth the try since we have already spent billions of dollars and years on it.

If there is no separation between the frequency bands, it is not possible to separate the extraneous electromagnetic waves from the crash site. Without separating extraneous radiation, you cannot discover the elementary particles of nature by colliding charge particles and hence LHC will be useless. Today, what Large Hadron Collider producing is simply garbage. You can go on colliding mindlessly since the extraneous radiation is different in each collision hoping to find the data to prove whatever you want; magician's or soothsayer's 8th ball.

XVI. ENTANGLEMENT AND ACTION AT DISTANCE (NOTHING SPOOKY HERE)

A change of one object at one location cannot affect another object at distance location unless there is some coupling between them. There is no mysterious voodoo connection between distant particles. If some changes in one particle affect another particle at distant, they must be coupled gravitationally, electrically, magnetically, or electromagnetically. There are no magical voodoo connections in between particles in the nature. There are no voodoo spirits flying around, they only exist in human mind stuck in the outdated religious doctrines or in human insanity.

Property:

Change of orientation of one magnet affects another magnet at distance. Atoms are magnets due to their Spin Magnetic Moment (SMM) and they are magnetically coupled. The change in the orientation of one Atom affects the orientations of the other Atoms that are magnetically coupled.

There is nothing spooky about action at distance. You press a button on your remote, garage opens; you click a mouse, money transfers from one country to another; they work because these entities are coupled. When you make some changes to an Atom X situated here, if it affects the Atom Y there at a distance, then those Atoms X and Y are magnetically coupled since each Atom consists of its own Spin Magnetic Moment due to the Spin of the nucleus. The entangle particles are magnetically coupled particles. There is no other voodoo connection between particles. You do not need to evoke a hypothetical mysterious voodoo connection to explain the action at distance.

All atoms are orbiting systems. Every orbiting system has a Spin. In the case of atoms, the Spin of atom also generates a Spin Magnetic Moment μ . Every atom, irrespective of whether it is electrically neutral or charged, has its own Spin Magnetic Moment μ that results from the atomic spin. Because of this Spin Magnetic Moment of an atom, every atom is a little magnet that is free to orient itself subjected to the magnetic forces of the environment the Atom is in. As a result, nearby Atoms are magnetically coupled.

Corollary:

Entangled particles are magnetically coupled. There is nothing spooky about action at distance between Magnetically Coupled Particles.

Lemma:

Spin of a particle cannot be measured using Stern-Gerlach Device. Stern-Gerlach Device is not a Spin measuring Instrument. This device forces a single Atom to always orient in the direction of SGMF (Spin-Up) while it is in the SGMF. If there are two Atoms, the orientation of the following Atom is always against the previous Atom (Spin-Down) while they are in the SGMF. This forced orientation by SGMF is volatile.

Corollary:

The outcome of the Stern-Gerlach Experiment cannot be used to substantiate spooky probabilistic entanglement of particles since the outcome of the Stern-Gerlach Experiment is deterministic; there is no probability here.

Nature's Abhorrence:

Nature abhors the probability. Human embraces probability only for the purpose of exploiting the planet to the maximum. Nature may start to abhor human as well if we consider ourselves above the nature, not as a part of the nature.

Corona Virus December-2019 (COVID-19) can be one of the signals by the nature to put us in our rightful place for our treatment, rather mistreatment, of animal species and nature, for our arrogant presumption that everything that moves are given to us for our consumption by a creator. COVID-19 certainly demonstrated who is the boss.

It is insane that there are some of us who consider hunting as a sport. Hunting is considered an entertainment for some ignorant hereditary heads of states; then again, they are there for their genes, not for anything else. The choice of the head of a state based on the gene is an insult to the humanity and the human intelligence. Even more disturbing is our inability to realize that. There are no royal genes. The main requirement for a head of the state should be the brain not the genes. To become a janitor you require qualifications, yet no qualification is required for the job of head of the state, what a joke. It looks like the head of the state is a job that does not require any brain. Their hunting grounds are a testimony towards their attitude, or rather lack of it, and lack of respect for the other species and the nature. So-called her majesty has all the luxury paid by the public purse, yet she looks so bitter and unhappy. Nobody is born royal. Nobody is born majestic. Everybody, from janitor to king or queen to founders of religions to white to black to brown to yellow to in between is descendent of naked apes, which is undeniable. Either everybody is equally royal and majestic, or none is royal or majestic; that is the reality.

Ancient romans considered bringing down animals

in arenas as entertainment. Today, we consider it as ancient disrespect for the nature, arrogance, ignorance and own right stupidity. However, it is impossible to comprehend that there are some of us even today who consider bullfighting as an entertainment. Who thought some of us would be having such a mind set in these days and age? We are in dire need of mental awakening and rehabilitation; we need to leave the ancient mythical baggage we are carrying, behind. If any right-minded person points out the harmfulness of some of our customary actions in today's environment, we label that person as racist; we cannot avoid that since every cruel activity has become a custom of some group.

There are people who still carry out barbaric act of offering animals to a non-existent creator in the name of barbaric religious doctrines. Why do you offer a goat to a guy who create goats? What is the logic? If there is a creator he/she/it must be thinking, "I am the creator, I can create whatever I want. Why do I need goat carcass? All I see is some stupid person destroying a beautiful animal for no reason. Where did I go wrong in creating these idiots?" These selfish, blind and dumb individuals who have no respect for life always ready to sacrifice another life blindly for the hope of gaining hypothetical, imaginary, non-existing credits. Goats and other species are not there for our use; they are not here to do whatever we want to do with them. If there is a creator capable of creating the universe, that creator will not be so dumb to not to see our selfish intentions of those cruel offerings. Human cruelty has no bounds. Four barbaric individuals in uniform in Minnesota clearly demonstrated how cruel human can be toward fellow human beings today, May 27, 2020 in front of a live audience on the street in a disgraceful and disturbing act of racial hatred; an animalistic act.

Bringing the awareness of the dangers and inappropriateness of some ancient customs and activities into the focus is not being anything against the group that practices that activity. If we have foreseen the dangers of vet-markets, world would not have been in a lock-down today due to animal to human transferred virus, COVID-19, and we would not have lost so many lives for no fault of their own. It is time to re-think our action and establish sustainable harmony with the nature and other species instead of looking at every moving species as a potential meal for us, and looking for ways to exploit all the resources to the maximum without paying no attention to the unexpected consequence.

COVID-19 shows the danger of the vet-markets; it provides easy link for the animal to human virus transfer. Some activities that would have been acceptable when the world is less crowded and travelling around the globe is not that efficient may not be acceptable when the world is as crowded and travelling around the world is fast an easy and accessible to many as it is today. Whether the vet-markets are in America, Europe, Asia, Africa or

anywhere else, it does not matter, voicing the opinion about the dangers of vet-market is not racism. If the planet to remain livable without becoming as useless as the rest of the planet, our activities must adopt with the changing environment with ever increasing population. Customs have to adopt and must change. Archaic religious doctrines have to change. We cannot continue to carry out some ancient practices such as vet-markets in an era that links the world communities with airplanes and bullet trains. With the availability such efficient transport modes, localization of virus or bacterial spread is nearly impossible today as we have witnessed with COVID-19 pandemic.

Now that we are in unimaginable numbers dominating the planet, if we consider every species as a meal, our immense ever increasing number, voracious appetite, and lack of respect for the wellbeing of the other species and the planet in general will bring them into extinction just like what happened in Ester Island. All the living species are not in this planet for our consumption. Other species also have all the right we enjoy. If creator entity had created all these living species in a way one has to each the other to survive as that was suggested by religious doctrines, that creator entity must have been brainless, heart less, and pure evil for creating species in a way one species has to consume others exploiting every opportunity. Not a praiseworthy work by any mean if it is a work of a creator. It is a work that deserves condemnation, not a praise. It appears as work of a dark and gruesome character. If an Engineer had created it, he/she would have lost his/her head in the town square deservingly. Why would anybody with a right mind create so much junk planets and galaxies that has no use. Any creation must have a purpose.

By the way, are you planning to take pesticide and herbicide when you go to Mars? I am sure you are not going to forget to take dandelion spray when you go to Mars. How can anybody live in Mars if there are dandelions?

Universe is not a creation of a purpose. Universe cannot be a result of a creation. Any creator capable of creating the universe cannot be that ignorant. There is no creator. The creation theory is an archaic concept that has arisen from our inability to explain why we are here. Some had used this human ignorance for personal gain by claiming themselves as messengers of a creator and enforcing their authority militarily on others making it a religion that the rest had to follow unquestionably. What we have today as religions are the blind followers of non-sensical archaic doctrines that explains nothing. Religions turn people with ability to think into non-thinking zombies looking forward to another life with some better benefits that they do not possess in this life. Flat-earth and earth centric doctrines have no place today.

Interaction of Atom at Distance:

If there are two atoms, X and Y, next to each other,

their orientations, i.e. the directions of the Spin Magnetic Moments (SMM) of Atoms, will always be opposite to each other due to the attraction of the opposite and the repulsion of the alike. If atom X has its Spin Magnetic Moment oriented in one direction Spin-Up (\uparrow), then, the other atom Y is going to have its Spin Magnetic Moment oriented in the directly opposite direction, Spin-Down (\downarrow). This is simply due to the attraction of the opposite and the repulsion of the alike polarities. There is nothing spooky here.

When atoms X and Y are next to each other, atoms X and Y will be magnetically coupled or entangled:

[X \uparrow] [Y \downarrow]

Now, let us move the particle Y into a different location at distant while maintaining the magnetic coupling,

[X \uparrow] ...separated but still coupled ... [Y \downarrow]

Particle X and Y are not in the vicinity of each other. Or, perhaps, they are separated by a wall too. But they are still magnetically coupled nevertheless or entangled.

Now let us manually rotate the particle X by 180° degrees.

Original: X and Y are Magnetically Coupled

[X \uparrow] ...separated but still coupled ... [Y \downarrow]

Rotated: X rotated by 180 Degrees, X and Y are still Magnetically Coupled

[X \downarrow] ...separated but still coupled ... [Y \uparrow]

Now, after the rotation, the particle X is in Spin-Down (\downarrow) orientation. If you check the orientation of the distant particle Y, you will notice that it is now in Spin-Up (\uparrow) orientation. The distant particle Y has changed from Spin-Down (\downarrow) orientation to Spin-Up (\uparrow) orientation when we change the particle X from Spin-Up (\uparrow) orientation to Spin-Down (\downarrow) orientation. It does not matter how far the particles are apart, if they are still magnetically coupled and free to orient themselves, any change we make to the particle X will be reflected in the distant particle Y in the opposite; there is nothing spooky about it.

If you turn the orientation of particle X to be along the vertical axis +z, then the orientation of the particle Y will be in the -z direction, the direct opposite,

[X \uparrow] $\theta=0$... separating distance [Y \downarrow] $\theta=\pm 180^\circ$

If you explain the real reason for the action at distance between particles in a book and try to sell it, nobody is going to buy it, because it is the boring truth that has no entertainment value. However, if you write a book mystifying and spookifying the action of the particles at distance with some sprinkling of broom-riding Harry-Potterization and Houdinification, you got a winner; it suddenly got the entertainment value required for public consumption; millions and millions of copies will be sold easily; you are a millionaire. There is no other possible reason for University Professors to practice voodoo-physics. In fact, it is the only reason. They also have to prevent the interruption of the flow of funds for the voodoo-physics

by condemning and immediately rejecting any opposite views that might demystify the physics. Dinosaur-Journal editors and reviewers are there on guard to do that job and maintain status quo. I am sure we all have experienced arrogance the nastiness of the editors and reviewers of dinosaur journals, not an experience anybody wants to re-live. It is interesting that people who become editors and reviewers of dinosaur-journals are the people who have no clue about the subject. In one way, it is understandable since anybody who is intelligent and knowledgeable have more important things to do than becoming editor or reviewer of a dinosaur-journal.

It is interesting that if you lie down on couch or under the stars with a glass of wine and spent few minutes writing a fantasy song, you are paid handily to publish. Not only that, based on the number of times a song is played, the author received a check every year for eternity. If you spend years working on a scientific problem and come up with a paper, you have to pay and surrender the copyright to get it published. Not only that, you also have to go through rejection after rejection with demeaning verbal harassment by editors and reviewers in addition to the similar treatments by supervisors and bosses whoever you come along the way. Reviewers and editors treat authors like criminals if the content does not agree with their cult ideology. Some brutish and heartless reviewers reject papers claiming mockingly that this guy deserve -- prize. They are so ignorant to realize the impact such a statement has on a person. Some bullish and ignorant editors even send emails asking to stop coming up theories. What is wrong with this picture? This is the scientific reality. Everybody is on the wing to condemn you, there is never sole to give you a hand. That is the dirty reality of scientific discovery, so called higher education.

Research considered to be something people do when they cannot get a real job. Teacher is something you become when you cannot do anything else. It does not matter how many degrees you have, if you are a researcher at a university, the first question you get is "which professor are you working for".

Now, in the internet information age, we have many new journals with editors and reviewers that are more open to new directions; they do not carry an ancient baggage and they do not charge exorbitant sums of money those dinosaur journal publishers demand.

Dinosaur journals have become just dust collectors that nobody reads or cares. Has anybody read a dinosaur journal lately? Nobody expects to find anything new there. Reading those dinosaur journals is just like reading an ancient religious text, simply a waste of life. You will not find anything worthwhile there. You will not learn anything from that. Have you seen how much they charge for a publication? Why do they charge that much to stick a file of few kilo-bites in a server; it is outrageous. What more can you expect from a breed who are trying to sell the bogus ideas

that particles can be at multiple places at the same time, and mass can be generated by colliding particles; not that different from snake-oil salesmen. Next time if you come across anybody talking about voodoo-physics, just ask them to prove light is relative; nobody will be able to. Einstein did not prove it [4, 5]; he just proclaimed it; his apostles spread the word; this Crafted Prophecy (CRAP) became to be known as modern physics, it is in fact voodoo-physics.

XVII. QUANTUM SUPERPOSITION

Property:

Spin-Up and Spin-Down are non-separable Spin bi-poles, and hence cannot be in a superposition. There is no existence of Spin-Up without Spin-Down and vice versa. Spin-Up and Spin-Down are mutually dependent and hence cannot be represented by orthogonal vectors.

It has been claimed that a particle is in both Spin-Up state and Spin-Down state at the same time until it is observed. It has also been claimed that the wavefunction collapses when an observation is made. If this holds true, every wavefunction should always be in a collapse state since every event and every particle is always observed by other events and particles. Because observation is observation whether the observation is being made by another event, another particle or human observer.

The talk about Schrodinger's cat being both alive and dead at the same time until it is observed also stemmed from this idea of states being in a superposition until an observation is made. The talk about the Schrodinger's cat has been the pass time for physicists almost a century. However, there is a big difference between the Spin being Spin-Up or Spin-Down and a cat being both alive and dead. Spin-Up and Spin-Down resides in the same particle relative to an observer. A particle that is Spin-Up for an observer from one position or direction can be Spin-Down from a different position or direction for the same observer. Similarly, a particle that is Spin-Up for one observer at one location can be Spin-Down for another observer at different location at the same time. Spin-Up and Spin-Down are Spin Bi-Poles, not monopoles. Spin-Up and Spin-Down have no independent existence of their own; one cannot exist without the other.

However, it does not matter from which direction, from which place the observation had been made, cat is either dead or alive for all observers. Cat cannot be alive for one observer and dead for another observer. Cat cannot be alive for an observer relative to one location and the same cat cannot be dead for the same observer at different location. The state of a cat is observer independent. Unlike a Spin of a particle, dead and alive does not reside in the same cat. Dead and alive are not Bi-Poles. Dead and alive are Monopoles. Spin-Up and Spin-Down are Bi-Poles.

On the other hand, a particle can be Spin-Up for one observer while the same particle can be Spin-

Down for a different Observer at the same instant. Further, if a particle appears as Spin-Up for an Observer from one direction, the same particle appears as Spin-Down for the same Observer from different direction. Spin-Up and Spin-Down are not states of a particle. Dead and alive are states of a cat. There are no Spin-Up particles or Spin-Down particles. There are dead cats and live cats. Spin-Up and Spin-Down are observer dependent.

Unlike Spin-Up or Spin-Down, there are dead cats and live cats. If you see a cat that is dead when you observe from one direction, the same cat is dead for the same observer in any other direction. Unlike Spin-Up and Spin-Down, no cat can be dead and alive at the same instant for two Observers irrespective of where the Observation is made from. Dead Cat is dead whether it is observed from South pole or North Pole. State of a cat is Observer independent; however, this is not the case with Spin of a particle. The Spin of the earth is different for Observers in South Pole and the North Pole. Spin is Observer dependent.

Orbiting systems Spin. Atoms are orbiting systems. Atoms spin. Spin-Up and Spin-Down resides in the same particle. Spin-Up or Spin-Down do not exist in a particle itself without an observer. It is only with relative to an Observer Spin-Up and Spin-Down have an existence. Take the observer out of the scene, and then Spin-Up and Spin-Down disappears from existence. To say there are Spin-Up particles is equivalent to saying that there are Magnetic Monopoles. There are no Magnetic Monopoles and hence there cannot have any Spin-Up or Spin Down atoms.

Whether a particle is Spin-Up or Spin-Down depends on the Observer. Ask someone in Canada whether the earth is Spin-Up or Spin-Down. Ask the same question somebody down under, in Australia. The answer you get will be completely opposite. If earth has unique state of a Spin, how can the Spin be observer dependent? Direction of Spin is not a state of a particle. Spin-Up and Spin-Down are not a state of a particle. Whether a particle is Spin-Up or Spin-Down depends on the observer. Particles spin. Particles do not have Spin-Up or Spin-Down orientation. Nature does not have Ups or Downs.

The reason for the non-existence of Spin-Up particles and Spin-Down particles is the fact that there cannot be an Up without a Down and vice versa. Up and Down resides in the same particles. Magnetic fields are in loops. Magnets are Bi-Polar. Spinning Atoms are Bi-Polar. Spin Magnetic Field of an Atom is Bi-Polar. Any Magnetic Field is Bi-Polar. One person's clockwise spin is another person's anti-clockwise Spin. Since the Spin-Up and Spin-Down reside in the same atom; you may be inclined to claim that an atom is in the Superposition of Spin-Up and Spin-Down orientations; this is incorrect.

Entities in superposition must be able to be separated into individual entities. However, Spin-Up

and Spin-Down cannot be separated. Spin-Up and Spin-Down do not exist as separate entities since there are no Spin-Monopoles. As a result, Spin-Up and Spin-Down are not in Superposition. You cannot separate North Pole from South Pole. You cannot separate Spin-Up from Spin-Down. You cannot separate Magnetic North from Magnetic South. You cannot separate Clockwise Angular Momentum from Anti-Clockwise Angular Momentum. In each of these, one has no existence without the other.

On the other hand, Dead and Alive do not have mutual existence; they only have separate existence. Dead and Alive are mutually Exclusive. A cat cannot be dead and alive at the same time. State of a Cat is independent of an Observer. State of a particle is independent of an Observer.

Spin-Up and Spin-down are not states since Spin-Up and Spin-Down are observer dependent; they have no existence without an observer. State of a particle or an atom is observer independent. Observer dependent parameters cannot describe a state of a particle. Nature cannot quantize Spin-Up or Spin-Down since nature has no idea what Observers see. Spin cannot come in Quanta. Angular Momentum cannot come in Quanta. Vectors are observer dependent and cannot come in quanta. Vectors can be in one direction for one observer and can be in completely opposite direction for another observer. Vectors cannot be quantized.

Although Spin-Up and Spin-Down reside in the same particle, you cannot say that they are in Superposition. Unlike the superposition, you cannot separate Spin-Up and Spin-Down from a particle to obtain Spin-Up particles and Spin-Down particles; that is prohibited by nature of the Magnetism and the very nature of Spin. There are no Magnetic Monopoles. There are no Spin-Up particles. No Spin-Down particles. Spin-Up and Spin-Down are the labels that do not stick, and they are assigned to a particle by Observers; they differ from Observer to Observer.

Corollary:

Both dead and Alive do not reside in the same object at the same time, and hence they are monopoles, not Bi-Poles. Both Spin-Up and Spin-Down reside in the same particle at the same time relative to observers and hence they are Bi-Poles.

Properties: Dead and Alive Cat

1. They are Monopoles.
2. They are separable.
3. Not a vector.
4. Alive Cat is alive from any direction for any observer. Dead cat is dead from any direction for any observer.
5. They have no existence concurrently.
6. They only have separate existence. Their existence is independent of an observer.
7. They do not exist in superposition. Cat either Alive or Dead.

8. A cat cannot be both Alive and Dead for any observer at the same time.
9. Cat is alive if and only if it is not dead.
10. Cat is dead if and only if it is not alive.
11. They are observer independent.
12. They are ingrained states of an object, the cat.
13. They are observer labels that do stick on an object.
14. They are inherent characteristics of an object, the cat.

Properties: Spin-Up and Spin-Down Atom

1. They are Bi-Poles.
2. They are non-separable.
3. A vector.
4. For an observer, seen from one direction along the vector, if it is Up, and the same seen from opposite direction it is Down.
5. They co-exist in the same object. Their existence is only relative to an observer.
6. Spin-Up has no existence without Spin-Down and vice versa.
7. They are not in a superposition since they are non-separable. However, a particle can be Spin-Up for one observer and Spin-Down for another observer at the same time.
8. Particle cannot be both Spin-Up and Spin-Down for the same observer at the same time.
9. Particle is Spin-Up if and only if it is Spin-Down from the opposite direction.
10. Particle is Spin-Down if and only if it is Spin-Up from the opposite direction.
11. They are observer dependent.
12. They do not represent states of an object.
13. They are observer labels that do not stick to an object.
14. They are not inherent characteristics of an object.

Corollary:

State of a cat is observer independent. Spin-Up and Spin-Down are observer dependent. There is simply no comparison between the Schrodinger-cat and the Spin of a particle. Schrodinger cat experiment is simply nonsense. There is no possible reason for this to be the talk of the physics community for a century.

Corollary:

Whether a cat is Alive, or Dead is not determined by an observer. Whether a particle is Spin-Up, or Spin-Down is determined by an observer.

Take Home Message:

Alive or dead State of a cat is not comparable to the Up or Down Spin of a particle. Your observation does not determine the state of a cat since the state of a cat is a monopole. It is either alive or dead irrespective of the observer's present.

On the other hands, Spin-Up or Spin-Down has no existence until an observer comes and decides what it

supposes to be. If an observer decides a particle to be Spin-Up, then, and only then, Spin-Down come into existence, and vice versa.

Consider an arrow as a vector. If you stay alone the arrow and observe it from the side of the tip of the arrow, it appears to be coming down on you and hence vector is Spin-Down for you. If you observe it along the arrow from the tail side of the arrow, it appears as if it is going away from you and hence the vector is Spin-Up. Spin-Up and Spin-Down are different perspective of the same object by observers. If you consider Atom to be Spin-Up, the label does not stick to the Atom, it is for your reference only, for your eyes only. Another observer may see it as Spin-Right. That does not stick to the Atom either. Spin Up, Down, Right, Left, In, Out, etc. are for observer's eyes only.

No observer can see an arrow going out and coming in at the same time. That is not possible. Spin of an Atom cannot be both Spin-Up and Spin-Down for the same observer. Tip of an arrow does not exist without the bottom of an arrow. You cannot separate Spin-Up and Spin-Down. Spin-Up and Spin-Down of an Atom are not in a superposition. You may have to rethink and reformulate your Q-Bit gismo to find out the real reason for its working. If your Q-Bit gismo is working, why it is working is not what you think it is.

XVIII. OBSERVING A PARTICLE AS SPIN-UP DOES NOT MAKE SPIN-DOWN DISSAPPEAR

Lemma:

There is no Spin-Up without a Spin-Down. The observation of particle as Spin-Up relative to an observer brings Spin-Down into existence and vice versa.

If a Canadian observes the earth as Spin-Up, that does not make Spin-Down to disappear. Earth is still Spin-Down for an Observer in Australia. If you shrink down the earth to microscopic level, this observation is still the same; enlargement factor does not change the outcome. The claim that once a particle is Observed as Spin-Up, the Spin-Down ceases to exist and vice versa is incorrect. No particle can be Spin-Up without its counterpart Spin-Down. As soon as you demarcate something as Up, the Down is automatically there in it whether you like or not; you cannot get rid of it; it is like a shadow; it is a shadow. If there is a clockwise Spin, then, there will be a counter-clockwise Spin in the same particle at the same time. If a particle is a Spin-Up particle from one direction for an Observer, the same particle is a Spin-Down particle from the opposite direction for the same Observer, just like our earth's magnetic field.

It is the Observer that defines what is Up and what is Down, not the particle itself. Particles do not come with Spin-Up and Spin-Down labels attached to them. When an observer sees a particle as Spin-Up, it simply means that the Observer labels that polarity as Spin-Up, a reference direction. Spin-Up and Spin-Down are not properties of particles themselves; they

are Observer references. Is there an 'Up' side to the earth's magnetic field? No. Not everybody has the same Ups and Downs. Nature does not have dichotomies, up and down, rich and poor, ugly and beautiful, short and tall, thin and fat, good and bad, peace and conflict, dumb and smart etcetera; they exist only for human eyes as well as for some other living species.

North Pole has no existence without South Pole, and vice versa. Spin-Up has no existence without Spin-Down and vice versa. Clockwise has no existence without anti-clockwise. They exist in the same particle at the same time relative to an observer. They are non-separable. You cannot say Spin-Up and Spin-Down are in Superposition since you cannot separate them. They are non-separable since there are no Spin monopoles. Only the separable entities can be in superposition. Observation that a particle is Spin-Up is not going to eliminate Spin-Down from existence. In fact, it is quite contrary. The observation that a particle is Spin-Up brings Spin-Down into existence since Spin-Up has no existence without Spin-Down. It is only for an observer Spin-Up and Spin-Down appears as distinct, not to the particle itself.

Atomic Computer:

You can use individual Atoms to store and manipulate digital information by controlling the orientation of an Atom using an external magnetic field. Orientation of an atom can be coded to carry digital information in blocks. Orientation of an Atom can be changed by an external magnetic field. Since there are infinite spatial directions, orientation of a single Atom can be coded to represent bit stream of immense length using orientation lockup. An atom can also replace a Flip-Flop in a digital computer.

There is no limit to the digital memory that can be achieved using the orientation lock up of an Atom, the Orientation Lockup Atomic Memory (OLAM). The difficulty with the OLAM is its sensitivity to external magnetic fields. The data will be lost if the OLAM is exposed to an external magnetic field. OLAM memory must be shielded from the external magnetic fields. This shortcoming can be overcome using magnetic lock up key.

The magnitude of Spin Magnetic Moment (SMM) depends of the atomic number. Atoms with the same atomic number have the same constant magnitude of the Spin Magnetic Moment $\pm\beta$, not $\pm 1/2$. β depends on the Atomic Number.

Unlimited Memory:

There is no limit to the non-volatile digital memory that can be achieved using the orientation locks up of an Atom, Orientation Lockup Atomic Memory (OLAM)

XIX. UNSEEN REALITY

Quantum Mechanics (QM) was founded on the conjecture that particles are waves of deBroglie

wavelength. DeBroglie wavelength is incorrect since no particle has the energy required to be at deBroglie wavelength. No genuine experiment can substantiate deBroglie wavelength except a double-slit blunder. Spin-1/2 is the direct manifestation of the incorrect wavelength. Spin-1/2 disappears when the correct wavelength that the energy of a particle can support is used.

Moving mass or particles do not generate waves. Momentum does not generate waves. When a moving particle is stopped, it does not generate waves. Accelerating, or decelerating speed neutral masses or particles do not generate waves. Particles or masses moving at uniform speed do not generate waves. Neither constant momentum nor change in momentum generate waves. Then, what generates the waves when a particle or mass on the move?

What generate waves is moving charges, momentum. Mass is just a carrier of charges since charges have no existence or motion without a mass. The smallest charge carrier is the mass of an electron. As a result, the wavelength is related to the mass of electron independent of the mass of the charge particle that is in motion. It does not matter what the mass of the charge particle is, the conversion factor between the wavelength of radiation at the stopping or collision of a particle and the momentum qu of the particle depends on the mass of an electron, not the mass of the particle that is being stopped or in collision.

The frequency of the radiation cannot be increased by increasing the mass of the particle, which is a direct contradiction to the deBroglie wave conjecture and Quantum Mechanics. According to the deBroglie wave, frequency is directly proportional to the mass of the particle, or wavelength is inversely proportional to the mass of a particle. The frequency of the wave for a beam of protons travelling at speed u in the Double-Slit experiment cannot be higher than the frequency for a beam of electron travelling at the same speed u in the Double-Slit experiment. Yet according to deBroglie wavelength, higher the mass higher the wave frequency for the same speed, which is impossible. It lacks not just the common sense; it lacks all the senses, a pure non-sense. Just pluck a string of a guitar if you want a further proof.

Spin Magnetic Moment (SMM) of an Atom is not due to the Spin of electrons since SMM due to the Spin of electrons is proportional to the surface area of the electron, which is negligible. Further, the SMM of two neighboring electrons are one against the other and hence the net Spin Magnetic Moment of an Atom due to the Spin of electrons is zero for an Atom with even number of electrons.

Spin is an inherent characteristic of any Orbiting System. Atoms to planetary systems to galactic systems onward, every orbiting system spins. When an Orbiting System such as an Atom spins, the spinning nucleus takes all the bound electrons in a Merry-Go-Round ride creating circular current loops,

which generates Merry-Go-Round Spin Magnetic Moment (SMM) of an Atom. Orbiting electrons also generate Orbiting Magnetic Moment of an Atom. Orbiting Magnetic Moment of an Atom is equal and opposite to the Merry-Go-Round Magnetic Moment and hence they cancel out.

The Spin Magnetic Moment of an Atom due to the spin of electrons is zero. The Spin Magnetic Moment due to Merry-Go-Round spin cancels out with the Orbit Magnetic Moment of an Atom. What is left is the Spin Magnetic Moment due to the spin of the nucleus itself. So, the Spin Magnetic Moment of an Atom is due to the spin of the nucleus. You can also say that the Spin Magnetic Moment (SMM) of an Atom is due to the spin of the Atom itself on its own axis. Spin Magnetic Moment of an Atom is orthogonal to the plane of spin of the Atom, which is also the orbiting plane of all the electrons in the Atom.

Orientation of neighboring Atoms are not random since they are magnetically coupled. If you change the orientation of one Atom, the rest of the Atoms follow suite. Irrespective of the direction of the Stern-Gerlach Magnetic Field (SGMF), when the first Atom in a beam of Atoms enters the strong SGMF, its SMM aligns with SGMF instantly, and the rest of the Atoms reorient themselves due to magnetic coupling while they are still outside the SGMF so that no two neighbors have the same orientation.

With the entrance of just the first Atom into the SGMF, half of the Atoms in the beam are oriented towards the SGMF while the other half of the Atoms are oriented against SGMF. Since all the Atoms, after the first Atom, are arriving at SGMF already aligned with or against SGMF, they will be deflected toward or against SGMF splitting the beam into two separate beams of equal number of Atoms. State of a Particle is unique, and hypothetical wavefunction or probability has no place in it. The direction of Spin relative to an observer is not a state of an Atom.

The orientation of an Atom in a SGMF says nothing about the orientation of an Atom prior to its entering the SGMF. Stern-Gerlach Device may be a good toy for children, nothing else. Even as a children's toy it is not suitable since it is a health hazard. There is no practical use of a Stern-Gerlach Device.

If you rotate SGMF in any direction, Split beams will also rotate by the same angle in-phase; everything else remain the same. After the split, each beam remains in Spin-Up or Spin-Down orientation as long as they are still in the SGMF. The orientations of Split beams Spin-Up and Spin-Down have nothing to do with the orientations of original Atoms; that information is completely erased by the SGMF. Atoms in Split-Beams are on a forced orientation by SGMF. Spin-Up and Spin-Down are not intrinsic to an Atom; they are intrinsic to Stern-Gerlach Magnetic field. It is just like entering a country. You just follow the rules of whatever the country you are in. Once you leave a country, you do not carry those rules, you have nothing to do with them anymore. When you enter a

new country, you follow the new country's rules. You only have to follow the rules of a country only as long as you are in that jurisdiction. What is legal (in phase) in one jurisdiction (one SGMF) can be illegal (out of phase) in another jurisdiction (another SGMF).

Stern-Gerlach Device cannot be used to measure or to prepare the Spin of a particle. Spin components of a particle along x, y, z axes cannot be measured or set using Stern-Gerlach Device. If you send the Spin-Up Split-beam through a Second SGMF placed in the same direction as the first SGMF or in phase, beam will pass through without a split since atoms are pre-aligned with the second SGMF; no hypothetical wavefunction collapse or Berlin-Hagen Interpretation is at work here. Placing two Stern-Gerlach Devices next to each other in phase, or in the same orientation, in series is simply equivalent to the extension of the length of the SGMF.

If the second SGMF is at any non-zero angle to the first SGMF or out of phase, the Spin-Up split beam will split again into two beams with equal number of atoms in each; it is the same for Spin-Down split beam. When both split beams are out of the SGMF, atoms in Spin-Up and Spin-Down beams realign so that no two neighbors have the same orientation, just like the original beam of Atoms.

Spin is Bi-Polar, and hence Spin-Up and Spin-Down are not independent or orthogonal; they are perfectly correlated negatively. Spin-Up and Spin-Down are non-separable due to the absence of Spin Monopoles and hence they are not in a superposition. Spin-Up and Spin-Down are Observer dependent, and hence neither Spin-Up nor the Spin-down a state of particle. Spin-Up and Spin-Down are not parameters of a particle or states of a particle. Spin-Up for one Observer is Spin-Down for another. Nature has no Ups and Downs. Nature cannot quantize Observer dependent entities. It is an observer who defines Spin-Up and Spin-Down, which varies from observer to observer for the same particle. Particles do not have any knowledge of what observers have in their mind.

No two Neighboring electrons have the same Spin solely due to the attraction and repulsion of magnetic polarities, not an Exclusion Principle. Vectors do not come in Quanta. Vectors cannot be quantized. Eigenvalues of the square of the Angular Momentum Operator is not the same as the eigenvalues of the square of the Spin Matrix for the eigenvalues of the 2-Dimensional Spin Operators. In addition, spin of a particle cannot take place in 2-Dimension, and hence 2-Dimensional Spin Matrices cannot exist; there are no Pauli Matrices.

Operators of Observables must be Invertible. Spin Matrices are non-invertible and hence cannot represent Operators of Observables; Although the self-cross-product of angular momentum operator vector is the Plank constant times the rotated angular momentum operator vector by 90 degrees, matrices that satisfy this condition are not angular momentum operators. Matrix operators cannot exist in QM. Even

the Matrices of infinite order cannot exist in QM since matrices of infinite order cannot be square matrices and hence cannot be Hermitian.

SGMF is neither a filter that blocks out Atoms of different orientation to its own, nor a Spin measuring or Spin setup device. Irrespective of the actual orientation of an Atom, first Atom that goes through SGMF is almost always Spin-Up; only time it is Spin-Down is if its actual orientation is against SGMF. The orientation of the following magnetically coupled Atom is always against the orientation of the preceding Atom due to magnetic coupling. If SGMF records an Atom as Spin-Up, it only means that the original Spin of the Atom was not against SGMF, nothing else; actual orientation of the Spin can be at any other angle. SGMF is blind to the orientation of an Atom.

It does not matter what the actual orientation of an Atom and the direction of SGMF are, any Atom in the SGMF is either aligned with or against SGMF.

Surprising but True: Atoms in an External Magnetic Field is Governed by Bushism (Worth Repeating).

You are either with us or against us, the Bushism; if you are not totally against us, we will torque you Up to our side, Spin-Up; if you are totally against us, you are our enemy, we see to your Downfall, Spin-Down.

This is the operation principle of Stern-Gerlach Device. It is simply a useless device. It has no use for anything except to demonstrate that an Atom has a Spin Magnetic moment (SMM), and Atoms in a population are magnetically coupled. It has no use even as a children's toy since it is a health hazard.

An Atom in the SGMF is just like toddlers under parental or teacher supervision; they behave according to the instructions given if parents or teachers are in the vicinity. As soon as they are out of the sight of the parents and teachers, they do what they want to do. They have no memory of what they were being told. However, they will remember through repetition.

In the case of an Atom, no matter how many times an Atom had been there in a SGMF, it will never learn to remember the direction of SGMF. As soon as Atoms are out of SGMF, they are back at their prior orientation, like nothing happened. External magnetic field cannot alter the Spin of an Atom permanently.

Presence of Atomic SMM is an indication that Atom is an orbiting system. Spin is a Bi-Polar vector and hence Quantization of Spin is not possible since there are no Spin Monopoles. The representation of Spin-Up and Spin-Down by orthogonal vectors cannot be done without Magnetic-Monopoles.

Entanglement is magnetic coupling, which is real. There is nothing spooky about action at distance between magnetically coupled particles. Atomic Spin Magnetic Moment (SMM) can be used for unlimited digital data storage and information processing, an Atomic Computer (ATOC) based on Space Locked Atomic Memory (SLAM).

Fictional Spin-1/2, which has spookified the nature, is merely a result of a theoretical blunder wrapped in bogus interpretation of the Stern-Gerlach Experiment. Quantum Mechanics mantra "Shut Up, Compute, and publish (SUCp), you will get the tenure" is no different from Religious mantra "Shut Up, Donate to us, and pray (SUDp), you will get an admission ticket to the paradise for the next life." The only difference is that the tenure is given in this life, whereas whatever given by a religion is always for the next life that does not exist. In religion, it does not matter what you do, you don't get reward until you exit this life and start whatever comes next, if the next exists; nobody knows what that next is; nobody knows what is waiting after the exit, not even the priests who make that phony claim for their selfish gain. Have you ever questioned where the priests get funds to support their fancy lifestyle? What a way to stop questioning. Interestingly, there are people who believe in these Crafted Prophesies (CRAP). You may wonder where the money comes for building palaces for the top echelons of the religions; they get to enjoy this life to the fullest from your donations, while you have to wait until the exit to collect your reward.

Another similar class of predators is the executives of charity organizations. We all know what is going on there. When a disaster struck, they are there in full force on fund raising for disaster relief. Their only concern is not the victim of the disaster, but to make sure they have enough funds to pay their million-dollar salaries and bonuses until the next disaster struck. If those charity organizations can initiate a natural disaster, they certainly will since their bank accounts get multi-billion dollar boost every time a disaster struck. Money sits in their bank accounts to pay for million-dollar executive salaries, yet disaster victims are still living rundown tent cities as in the case of Haitian earthquake victims. They collect billions of dollars and deposit them in their bank accounts, distribute few water bottles and few tents, and they move on to the next fundraising venture. If you want to get a glimpse into the so-called charity organizations, look at the lifestyle of executives of the charity organizations. They build million-dollar mansions for themselves from the money that is raised for disaster victims; decades passed, yet Haitian earthquake victims are still in temporary shacks.

Nature does not normalize. QM has no existence without wavefunction normalization. For a function to represent a probability distribution, function must be static and the area under the function must be unity for the entire range of the function. Wavefunctions are not static functions. Wavefunctions have no existence without propagation. Propagating wavefunctions cannot be normalized for the area under it to be unity for the entire range. Wavefunction normalized for the area under it to be unity just for the range of wavelength cannot represent a probability distribution. Propagating wave cannot be a probability distribution and probability distribution cannot be a propagating

wave. Probability wave is an oxymoron.

Quantum Measurement Problem is a human folly, a result of several theoretical and experimental blunders. Microscopic particles themselves do not have an uncertainty. Uncertainty is not free. Uncertainty cost energy. There is no measurement problem associated with microscopic particles. There is nothing preventing the measurement of both the position and the momentum of a particle concurrently. To measure both the position and the momentum of a particle simultaneously, all you need is a single electromagnetic radar pulse. The time delay of the radar pulse provides the position information, while the frequency shift of the radar pulse provides the momentum information.

Irrespective of size, state of a particle is unique. Mathematical representation of state of a particle must be unique. You cannot use a non-unique mathematical model for modelling the state of a particle; model must be unique. You cannot model the state of a particle using a non-unique mathematical model and force your intentional or no-intentional modelling error on the nature and falsely claim that a particle can be at multiple states at the same instant. State of a particle cannot be represented by eigenvalues of operators since eigenvalues are not unique.

The Position and the Momentum of a particle must be unique at any time. Momentum has no existence without change of position. Position of a particle must change for it to have a Momentum. If position is fixed, there is no momentum. If momentum is fixed, the path is either linear or circular, not a wave. The momentum determines the position of a particle and the change of the position determines the momentum of a particle. Position and momentum are mutually dependent. Position and Momentum cannot be independent. If Momentum cannot even exist when position is fixed, there is no way for the Position and Momentum pair to be a Fourier Transform Pair. Position and the momentum of a particle must be independent in order for them to be a Fourier Transform pair; this is impossible. As a result, Position and Momentum cannot be a Fourier Transform Pair.

Momentum is time dependent and hence Function $\exp[(i/\hbar)\mathbf{p}\cdot\mathbf{r}]$ is not time independent. Heisenberg's Uncertainty Principle has no existence without Position and Momentum of a particle being a Fourier Transform Pair. Position and Momentum pair of a particle is not a Fourier Transform pair. Heisenberg Uncertainty Principle is invalid.

Schrodinger equation was founded upon the invalid representation of the state of a particle as eigenvalues of operators. Schrodinger equation also incorrectly assumes that the mechanical energy is quantized. In addition, Schrodinger equation also assumes that the function $\exp[(i/\hbar)\mathbf{p}\cdot\mathbf{r}]$ is time independent, which is completely incorrect. Function $\exp[(i/\hbar)\mathbf{p}\cdot\mathbf{r}]$ is time dependent since position \mathbf{r} and momentum \mathbf{p} , are time dependent. At any given time,

there is a one position and one momentum for any particle irrespective of its size. The position and the momentum of a particle are unique at any given time. Mechanical energy is continuous, not quantized. You cannot replace mechanical energy by hf . It is only the electromagnetic energy that is quantized, not mechanical energy. State of a particle cannot be modeled as eigenvalues since eigenvalues are not unique and hence Schrodinger equations does not hold true. Probability-waves, Particle-waves, and wave-particles are oxymorons. Reality does not depend on Observers; it is the Observers who misrepresented the Reality and turned physics into voodoo-physics.

Corollary:

No matter how many times an Atom is placed in an external magnetic field, you cannot alter the Spin of an Atom permanently. Atoms do not have a memory of its Spin since the Spin is not a state of an Atom. Spin or the orientation of an Atom is determined by the population of Atoms.

Corollary:

Stern-Gerlach Device is simply useless. It can neither measure nor set the spin of an Atom. It is even useless as a children's toy since it is a health hazard.

First Law of Mathematical Modelling:

It does not matter what you are modelling, the model that is used for representing any real system must be unique.

Second Law of Mathematical Modelling:

The observables of a model must be real.

XX. INVALID OPERATIONS IN QUANTUM MECHANICS

1) DeBroglie Wavelength is Incorrect:

The genesis of Quantum Mechanics is the invalid assumption that a particle with momentum \mathbf{p} behaves as a wave of wavelength λ given by deBroglie wavelength $\lambda=h/p$, where $p^2=\mathbf{p}\cdot\mathbf{p}$ and h is the Plank constant. DeBroglie wavelength is incorrect. No particle has the energy required to be at deBroglie wavelength.

There are no massless particles. A particle by definition is an entity with a mass. Any entity that has no mass is not a particle. Particles do not behave as waves. If you are religiously inclined to consider the behavior of a particle as a wave, you should at least use the wavelength that the energy of a particle can support. Religions are orthogonal to science. Religion is not the reality. Reality is not a religion. Religious belief is not a realistic belief. We do not have a causal understanding of all that surround us. Religion is there to fill that void of our ignorance, just fast food for hunger. We just go with it since it is there for taking for some donation for instant gratification. You have to pay to enter Vatican.

2) Correct Wavelength:

The correct wavelength is given by $\lambda = 2h/p$. DeBroglie wavelength is off by a factor of 1/2, which is a crucial ubiquitous factor in Quantum Mechanics. Without deBroglie wavelength error, this factor 1/2 would not have even appeared in Quantum Mechanics. If you love the sound of Quantum 1/2 Spin, then, you may want to thank deBroglie and the gang (cool and the gang) for making this theoretical blunder because without it you wouldn't have come across such a bizarre meaningless thing as Spin 1/2. Although talking about "Spin 1/2" may sound brainy, the reality, in fact, is complete opposite. Even though nobody may want to hear it, it is a proven fact.

This reminds me a British professor who appeared on a television program and claimed that spin can be either Up or Down to an interviewer who appeared to be puzzled; she used her thumb to indicate the direction. It clearly showed that she had no idea of what she was talking about. Surprisingly, nobody does when it comes to Spin 1/2. Because there is no Spin 1/2. There are no Spin-Up and Spin-Down particles.

If you need a direction of a finger to make a point, you are talking about a mental state, not real state; you are talking about something that is observer dependent. State of a particle cannot be observer dependent. You do not need a direction of a finger to represent a state of a particle. However, you cannot blame the professor, the preacher. Preacher's job is to preach what is in the religious text like a parrot; that is exactly what is in the text.

Lemma:

If particle is assumed to behave as a wave, the wavelength λ that the energy of a particle can support is, $\lambda = 2h/p$. Particles do not behave as waves and hence this wavelength is hypothetical.

3) DeBroglie Wavelength is Not Unique and It Poses a Self-Contradiction:

The wave representation of a particle is incorrect even with the correct wavelength. If a particle behaves as a wave, the wavelength of a particle must be unique. Otherwise, wavelength says nothing about the particle. We gain no information about a particle by knowing the wavelength of a particle unless it is unique. If the wavelength of a particle is dependent on the momentum of a particle, $\lambda = 2h/p$, then, λ will not be unique since the momentum is not unique. Given momentum p can be a result of microscopic particle of very high speed or macroscopic object of very low speed since they both can be at the same momentum.

If the position of a fastmoving microscopic particle of momentum p is uncertain, then, the position of near standstill macroscopic particle of the same momentum must be equally uncertain since deBroglie wavelength is determined by the momentum alone, which are equal in this case. This is a contradiction since slow moving macroscopic object cannot be as uncertain as

a fastmoving microscopic particle. There is no uncertainty in position when we have a massive object that is at near standstill. DeBroglie conjecture cannot hold true.

If two free-moving particles of same momentum behave as waves, they both have the same wavelength.

If we have two particles of mass m and M with same momentum p , they both have the wavelength $\lambda = 2h/p$. If the speed of the mass m is u_m and the speed of the particle of mass M is u_M , we have,

$$u_m = \lambda f_m \text{ and } u_M = \lambda f_M,$$

Multiplying each with respective masses m and M , we have,

$$mu_m = \lambda m f_m \text{ and } Mu_M = \lambda M f_M.$$

Further, if both particles have the same momentum, $mu_m = Mu_M$.

We now have,

$$Mf_M = mf_m$$

$$\text{or } f_M = (m/M)f_m.$$

This indicates that the frequency is decreased by the increase of mass, or wavelength is increased by the increase of mass. However, according to the deBroglie wavelength, $\lambda = h/Mu$, wavelength decreases with the increase of mass, or frequency increases with the increase of mass, which is a contradiction. DeBroglie wavelength is a self-contradiction. Particle cannot behave as a wave of wavelength described by deBroglie wavelength. DeBroglie wavelength is meaningless.

4) Momentum Does Not Generate Waves:

It is not the momentum or moving mass that generates waves. What generates wave is moving charges or chomentum. When moving charge is stopped, it generates electromagnetic radiation waves. The frequency of the generated radiation is proportional to the chomentum, charge times the speed, qu . Proportionality factor of the Radiation Parameter can be obtained using a beam of electrons or protons in the Double-Slit experiment. The gradient of the curve of wavelength against chomentum, the charge times the speed, is the proportionality factor or the Radiation Parameter. Momentum is just a chauffeur for a charge. Momentum does not generate waves, a charge carried by a mass does. The theoretical determination of the Radiation Parameter is considered later.

The optimal radiation energy is generated when the charge to mass ratio of the particles is maximum. The charge to mass ratio is maximum when a beam of electrons is used. As a result, the highest frequency of the radiation waves is achieved when a beam of electrons is used in the Double-Slit experiment or in Charge-Particle Microscopes. When a beam of electrons is used in a Charge-Particle Microscope, it is an Electron Microscope. An Electron Microscope is optimal; it is the highest resolution that can be achieved in any Charge-Particle Microscope.

5) Wavelength Cannot be Inversely Related to Mass:

According to deBroglie wavelength, wavelength is inversely proportional to the mass of a particle; higher the mass, the lower is the wavelength. If this is the case, why are we using charge particles with smallest mass, electrons, in Particle Microscopes? Should we not have gotten better resolution choosing heavy particles if the deBroglie wavelength is correct? The fact is that the smaller is the mass of the particles, higher is the resolution in Particle Microscopes. That is why we have Electron Microscopes, not Proton Microscopes. The resolution of Proton Microscopes will be inferior to the resolution of Electron Microscope by a factor of 2000.

Wavelength of a particle cannot be inversely proportional to the mass of the particle and hence DeBroglie wavelength is incorrect. The fact is, it is the moving charges that generates waves, not the moving masses. The job of the mass in Particle Microscopes is to bring charges into motion. Momentum of a particle gives the charges the momentum; it drives the charges. Smaller the mass, higher the speed, and hence higher the frequency of the generated wave, and hence higher the resolution of the Particle Microscope. What is at work in Particle Microscopes is electromagnetic waves generated due to the stopping of the charges by the specimen that is used for imaging, not particle waves of deBroglie wavelength. There are no particle waves of deBroglie wavelength.

In fact, contrary to the deBroglie wavelength, higher the mass of the particles used in a Charge-Particle Microscope, lower is the resolution. Neutral stable beam of particles does not generate an image in a Charge-Particle Microscope, which indicates that there are no particle waves of deBroglie wavelength.

Corollary:

What generates an image in a Charge-Particle Microscope or Electron Microscope is the electromagnetic waves generated by collision of charge particles. A beam of neutral stable particles does not generate an image.

6) Smaller the Mass Higher the Resolution of a Particle Microscope:

What generates an image in Particle Microscopes is the electromagnetic waves generated by the collision of charge particles with the specimen used for imaging, not the mass of the particles. Mass here is just a chauffeur, taxicab. Unlike a [chauffeur and a patron] or a [taxicab and a traveler], a charge has no existence without a mass; that is why charge particles with smallest mass is used.

If you have access to Double-Slit Experiment, use a beam of electrons and a beam of protons separately with same momentum and use the interference pattern to get the wavelength for both beams. According to deBroglie conjecture they both should give the same wavelength since the momentum of

both beams is chosen to be the same. However, you may find that the wavelength for beam of electrons is much smaller than the wavelength for a beam of proton because it is not the momentum that determines the wavelength, it is the momentum, qu that determines the wavelength, where q is the charge and u is the speed of the particles.

In an electric field, speed of a charge particle depends on the mass of the charge particle. Smaller the mass higher the speed. Higher the mass smaller the speed. It is only in a gravitational field that the speed of an object is independent of the mass. Gravitational effect on microscopic particles is negligible.

Lemma:

Smaller the mass of a charge particle, higher the acceleration of the charge, and hence higher the frequency of the generated radiation waves in a collision.

Corollary:

The generated electromagnetic radiation frequency due to the stopping of a moving charge particle is determined by the charge to mass ratio of a particle. The higher is the charge to mass ratio of a charge particle, higher is the radiation frequency or shorter is the wavelength. The highest achievable radiation frequency or the shortest achievable wavelength by a moving charge particle is given by moving electrons since it is the minimum mass required for the existence of a charge. Frequency of radiation can be increased, or wavelength can be made shorter by increasing the speed of electrons. The separation between two adjacent frequencies, or the separation between two adjacent wavelengths is limited by the speed of light since the speed of a mass cannot exceed the speed of light. We will consider this in a later section.

7) DeBroglie Conjecture is False:

DeBroglie wavelength conjecture is false; in fact, it is the biggest theoretical blunder next to relativity and relative time since it is the relativity that lead to the deBroglie conjecture. Without Relativity, there would not be a deBroglie conjecture. Both Special Relativity and the General Relativity are false since light is not relative [4, 5]. If light is relative, time is directional. Further if light is relative, time is not unique. Time must be unique and non-directional, and hence Special Relativity and General Relativity are false.

DeBroglie conjecture is a result of misinterpretation of the electromagnetic waves generated by the collision of a charge particle as particle waves. There are no particle waves. If there are particle waves, when a moving neutral and stable particle or a mass is stopped, it should generate waves according to the deBroglie conjecture. However, when a moving neutral stable particle or a mass is stopped, it does not generate waves. The change of momentum of a

neutral stable particle does not generate waves. It is the stopping of a charge, the change of momentum, that generates electromagnetic radiation waves. It is these electromagnetic waves that had been misinterpreted as particle waves or deBroglie waves in the Double-Slit experiment. There are no deBroglie wave or particle waves. Impossible.

DeBroglie conjecture came out as a direct extension of wavelength of hypothetical light particles or so-called photons to particles of mass. There are no photons. Light is never a particle. Light is not relative [4] Light cannot be spatially random particles [7]. When there are no photons, there is nothing to extend to. DeBroglie conjecture fails where it originated.

8) Particle Wavelength is Time-Varying:

If the wavelength of a particle is dependent on the momentum of the particle, the wavelength will be varying continuously since particles are under constant influence of gravitational and electromagnetic forces, as well as, due to the frequent collisions that microscopic particles undergo. Charge particles are under the continuous influence of electromagnetic forces, and hence the momentum of a particle is varying continuously, not a constant. The position and momentum of a particle is determined by the external forces the particle is subjected to, not the chance or the probability. The wavefunction of a particle is determined by the position and the momentum. As a result, the wavelength of a particle is determined by the external forces a particle is subjected to, and hence it is deterministic. There is no probability here. There are no particle waves. There are no wave functions. There is nothing waving in a mass or a particle.

9) There are No Spin Matrices:

We can find matrices that satisfy the auto cross-product relationship,

$$\mathbf{S} \times \mathbf{S} = j\alpha\hbar\mathbf{S}$$

$\alpha=1$ for deBroglie wavelength that no particle has the energy required to be at,

$\alpha=2$ for correct wavelength that the energy of a particle can support,

where, $\mathbf{S}=[\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z]$, $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z \in \mathbb{C}^{M \times M}$, $M \geq 2$.

Knowing fully well that no particle behaves as a wave, if you still want to hypothesize particles to be waves of certain wavelength, you must make sure that the particles have the enough energy to be at that wavelength. Otherwise, whole endeavor will turn into a big fat Joke. In fact, Quantum Mechanics itself is a big fat joke.

Spin matrices of order (2×2) are given in the Box below.

$$\mathbf{S}_x = \eta\hbar \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} \quad \mathbf{S}_y = \eta\hbar \begin{bmatrix} 0 & -j \\ j & 0 \end{bmatrix} \quad \mathbf{S}_z = \eta\hbar \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

$\eta=1/2$ for deBroglie wavelength [11], incorrect
 $\eta=1$ for correct wavelength

$$\mathbf{S}^2 = [\mathbf{S}_x^2 + \mathbf{S}_y^2 + \mathbf{S}_z^2]$$

$$\mathbf{S}^2 \boldsymbol{\varphi} = 3\eta^2 \hbar^2 \boldsymbol{\varphi} \quad (\eta=1/2 \text{ under deBroglie wavelength})$$

$$\mathbf{S}_z \boldsymbol{\varphi} = s\hbar \boldsymbol{\varphi}$$

where, $\mathbf{S}^2 \in \mathbb{C}^{2 \times 2}$, $\boldsymbol{\varphi}$ is a 2-dimensional Eigenvector, $\mathbf{S}^2 = \mathbf{S} \cdot \mathbf{S}$.

$$\mathcal{L}^2 \boldsymbol{\varphi} = (\ell+1)\hbar^2 \boldsymbol{\varphi}$$

$$l_z \boldsymbol{\varphi} = (-\ell+n)\hbar \boldsymbol{\varphi}, \quad \forall n, n=0, 1, 2, \dots$$

where, $(-\ell+n) \leq |\ell|$, n is a positive integer.

These relationships do not hold since Orbit Angular Momentum and Spin angular Momentum are Bi-Polar. Bi-Polar quantities cannot be quantized. Vectors cannot be Quantized. Observer dependent quantities cannot be quantized. Time dependent quantities cannot be quantized.

Lemma:

Spin Matrices cannot exist.

The eigenvalues of \mathbf{S}_z are $\pm 1/2$ for deBroglie wavelength. When $s=1/2$, then, $3\eta^2=s(s+1)$, where $\eta=1/2$ for deBroglie wavelength. Since $s \leq |\ell|$, if s is quantized and goes from $-1/2$ to $+1/2$ in steps of 1, there are two values of s , $s=-1/2$ and $s=+1/2$; both values are eigenvalues of \mathbf{S}_z . However, when $s=-1/2$, then, $3\eta^2 \neq s(s+1)$. Both Eigenvalues of \mathbf{S}_z can never satisfy $3\eta^2=s(s+1)$. As a result, $\mathbf{S}_x, \mathbf{S}_y, \mathbf{S}_z$ matrices cannot be angular momentum operators.

When (2×2) Spin matrices with deBroglie wavelength are used, only the Spin $+1/2$ exists, which is a Spin monopole. There is no Spin $-1/2$. When deBroglie wavelength is used, if Spin matrices exist, then, it is only the Spin $+1/2$ that is present; this is a contradiction since there are no Magnetic Monopoles. No Spin $+1/2$ can exist without Spin $-1/2$ since Spin is Bipolar. There are no Spin Monopoles and hence Spin matrices cannot exist.

There are only two s values that satisfy $3\eta^2=s(s+1)$ when deBroglie wavelength is used, i.e. when $\eta=1/2$; they are $s=1/2$ and $s=-3/2$. Since Spin matrices are symmetric, $s=1/2$ and $s=-3/2$ cannot be the only Eigenvalues of any Spin Matrix Operator. If there are Spin Matrix Operators, they should only have two Eigenvalues and they should be $s=1/2$ and $s=-3/2$, which is impossible since Spin Matrix Operators must be Hermitian. Matrix Operators cannot represent Spin.

When correct wavelength is used, Spin $1/2$ ceases to exist; abracadabra, Spin $1/2$ disappears. With the correct wavelength $\lambda=2h/p$, Spin matrices do not exist. It is only the Spin Monopoles that can be represented by Spin Matrices, not Spin Bi-Poles. With the use of Spin Matrices what exists are Spin monopoles. No Bipolar Spins can be represented with Spin Matrix Operators. As a result, Spin matrices have no existence.

Nature has no Ups and Downs, no Lefts and Rights, no Ins and Outs, no Norths and Souths; they only have an existence relative to an observer. Observer dependent entities are not properties of

particles. Spin-Up and Spin-Down are not states of particles. Spin Up and Spin Down are Observer dependent. Spin matrices cannot exist.

Corollary:

Spin cannot be quantized. Spin is Bi-Polar. Bi-Polar Entities cannot be Quantized without Monopoles. There are no Spin-Monopoles.

Corollary:

Spin-Up and Spin-Down are Observer dependent. Observer dependent entities cannot be quantized.

10) There are No Spin $\pm 1/2$ Operators:

There are no Spin $\pm 1/2$ operators. Spin $1/2$ is a prolific paper mill for academia, the only thing they care about. No openminded person cares about or glance at those dinosaur journal publications run by narrow minded, egotistical, and nasty dinosaur editors and reviewers. Most of dinosaur journals are not worth the wood-pulp that is being wasted, trees that are being cut down. If you need something new that is worthwhile to read outside the old journals that have reached the stature of ancient non-sensical religious text, and a worthwhile place to publish, find an internet journal of twenty first century origin; leave the rest to rot in museums of history with their old guard editors and nasty reviewers who want nothing more than to stick to the teaching of ancient religious texts. These reviewers do not even seem to know the basic steps of reviewing a paper. When you reviewer a paper, you must clearly indicate why a paper is accepted or rejected. Any pathetic creature who does not know how to do that should not become a reviewer. It is interesting that the people who become reviewers of dinosaur journals are not just the creatures who are ignorant about the subject, they appeared to be senile too. The editors of dinosaur journals somehow manage to choose the dumbest and nastiest people as their reviewers. On the other hand, it is understandable since anybody who understand the subject has better thing to do than becoming reviewers for religiously guarded old school journals that are trying to hold on to false theories in religious zealous to keep the funding from drying out, which would indeed happen if the fallacies of the long held theories are exposed. Fallacies of long held theories are real and they are going to be out in the open sooner or later, not preventable.

There is no Spin $1/2$. Spin $1/2$ is simply meaningless nonsense. Nobody understands it. Only thing that is there to understand is the fact there is no such thing. People who write about it do not seem to have a clue. People read about it textbooks just the way they read an ancient Crafted Prophesies (CRAP) such as religious texts, which has nothing realistic or meaningful, just a waste of time. Spin $1/2$ only appears with the use of deBroglie wavelength $\lambda=h/p$, which is obviously incorrect since no particle has the energy to be at that wavelength. With the use of the

correct wavelength $\lambda=2h/p$, Spin $1/2$ disappears from existence in Quantum Mechanics. Spin $1/2$ is a manifestation of deBroglie wavelength being off by a factor of one half. No particle has the energy required to cook up a deBroglie wavelength, what you got is half baked. Those unexpected side effects, such as particles appearing in different places at the same time and multi-worlds, are human hallucinations that resulted from consuming half-baked goods such as Quantum Spin $1/2$. If you are feeling uneasy about Quantum Mechanics, it is time to open the eyes and consult the reality.

Nirvana: Enlightenment in Physics

Spin $1/2$ is a result of deBroglie wavelength error, the Genesis of voodoo-physics. Realization of this is the Nirvana. No meditation, no fasting in a cave for 40 days, or no sitting under a tree thinking about inhaling and exhaling on a meditation posture is required. Instead of sitting under a tree thinking about inhaling and exhaling, or fasting to hallucination in a cave waiting for some creator entity to transfer a message in hallucination, think about a way to understand the working of the universe using the basic mathematical principles. It is little harder than meditation and reaching hallucination by fasting since it requires real work, gaining insight into mathematical principles, which is hard because nobody can teach that.

If some guy appears today claiming he is a messenger of a creator and go on enjoying a marriage buffet including the underage, he will definitely end up in a mental asylum, unlike in the past. If a man can go on a marriage buffet without even any regard to the minimum age, why can women not go on a similar marriage buffet. It is interesting, they could get messages from a creator only when they are in hallucination under starvation, or false pretended hallucination in the normal state of mind. When you are in hallucination, it is not possible to separate what is real from what is manufactured in the mind. If there is a creator, and the so-called founders of religions in a state of hallucination have obtained messages from a creator, one thing is clear, no real creator would have given messages to keep more than half the population in enslavement under wrap and to allow a marriage buffet only for a one group. Those messages are nothing more than human fabrications and self-serving human prophesies of hallucinations or false and pretended hallucinations. Twenty first century earth is not the time and place for human Crafted Prophesies (hCRAP). Ancient religious texts are an insult to human intelligent. You cannot find truth in a flat-earth or earth-centric era religious text.

Dinosaur Journals got stuck in religious doctrines accept complicated mathematical voodoo solutions to simple problems while rejecting simple real solutions to complicated problems claiming that the contribution is minor for publications, yet these are the problems they have been publishing voodoo solutions for many decades without a real solution. The acceptance of a

paper for these ignorant and arrogant reviewers and editors depends on how complicated pages look rather than what is really in it. They are either too lazy to read or not smart enough to understand it. If you are in the cult of editor's ideology, it is accepted, otherwise rejected. It is clear that the reviewers are overdosed with jealousy rather than the duty. Reviewers should not have gotten their head swollen for being asked to review because the only reason they were chosen as reviewers is that all the real experts with any common sense were busy. When reviewers and editors receive a manuscript, it appears that they just turn the pages of a manuscript to see if it has complicated mathematics that they cannot understand; if there are and confirms to the religious doctrine of the society, it is accepted, otherwise rejected. We need editors who are smart enough and courageous enough to teach reviewers that the reviewers job is not just rubber stamp accept or reject but to show why a paper can or cannot be accepted and what has to change in order for a not acceptable paper in the presence form to be acceptable. In any case, I do not even touch those cookie-cutter dinosaur journals and useless websites such as arxiv, simply waste of time. They are hindrance to the progress and their extinction is a necessity, a benefit to the society at large.

11) Angular Momentum is Not Unique:

For any quantity to come in quanta, that quantity must be unique. Angular momentum of a particle is not unique. For a particle with momentum \mathbf{p} and position \mathbf{r} , the angular momentum $\mathbf{\ell}$ is given by,

$$\mathbf{\ell} = \mathbf{r} \times \mathbf{p}$$

where $\mathbf{r} = (x, y, z)$, $\mathbf{p} = (p_x, p_y, p_z)$, $\mathbf{\ell} = (\ell_x, \ell_y, \ell_z)$.

We can write this as,

$$\mathbf{R}\mathbf{p} = \mathbf{\ell}$$

where, $\mathbf{R} \in \mathbb{R}^{3 \times 3}$,

$$\mathbf{R} = \begin{bmatrix} 0 & -z & y \\ z & 0 & -x \\ -y & x & 0 \end{bmatrix}$$

Matrix \mathbf{R} is always singular, $|\mathbf{R}|=0$, and hence \mathbf{p} is not unique. Angular Momentum $\mathbf{\ell}$ is not unique for a given particle.

12) Angular Momentum is Time-Varying:

Although the angular momentum of an Orbiting System is time-invariant, angular momentum of an Orbiting Object in a Multi-Object Orbiting System is not time-invariant [6]. Hence, angular momentum cannot come in quanta. Angular momentum cannot be quantized. Although angular momentum can vary with time, there is no mechanism to adapt the angular momentum quanta with time. Time-varying quantities cannot come in quanta. Time varying quantities cannot be quantized.

13) Angular Momentum Cannot Come in Quanta

Angular momentum must have a rightful owner. As a result, if angular momentum come in quanta, these quanta should know who they belong to. Angular momentum quanta cannot just hang around wherever with whoever since angular momentum is there for a purpose with a belonging.

Angular momentum quanta do not have identifiers indicating which objects they belong to. If angular momentum come in quanta in a soup without identifiers to find their rightful object or without knowing how to stick to their owners, there would not be orbiting systems. Unlike data packets on the Internet, angular momentum quanta do not have identifiers. Any quantity that has a rightful owner, such as angular momentum, cannot come in quanta.

If angular momentum can come in quanta, how an angular momentum quantum of one orbiting object can be distinguished from an angular momentum quantum of another orbiting object? What keeps angular momentum quantum belonging to one object stuck to it, not to another? How does one angular momentum quantum know it belongs to this object, not to that object? If angular momentum come in quanta, angular momentum of a multi-object orbiting system would be a jumble of angular momentum quanta soup that have no way of discriminating which quantum belong to which object, without which orbiting system cannot hold together.

Angular momentum cannot come in quanta. If angular momentum come in quanta, orbiting systems cannot be held together. If data packets on the Internet comes without headers to identify themselves, we will not have an Internet. If angular momentum comes in quanta without way to identify themselves, there would not be orbiting systems. We would not be here either.

If angular momentum come in quanta, these quanta should be able to assemble themselves in a certain direction for an orbiting system to work. Angular momentum quanta do not have direction information to do that. If angular momentum come in quanta, the direction information is lost. Without direction information, angular momentum is useless. Without the true magnitude and direction information of an angular momentum, orbiting system cannot be held together.

14) Not Everything Can be Quantized:

For a quantity to come in quanta or to be quantized, that quantity:

- Must be unique
- Must be a Monopole
- Not Bi-Polar
- Must be Scalar
- Not a vector
- Time-invariant.
- Position invariant (Space invariant)
- Not Observer Dependent
- No specific belonging

Spin and Orbit angular momentum do not satisfy these conditions, and hence cannot come in quanta.

Lemma:

Any quantity that has specific belonging cannot come in quanta without identification headers. Nature does not produce identification headers. Angular momentum does not exist without an owner, and hence cannot be quantized.

15). Angular Momentum of an Electron Cannot be Quantized:

Angular momentum of an electron in a multi-electron atom is time-varying [6, 9], not conserved. It is the total angular momentum of an atom that is conserved, not the angular momentum of an electron. Angular momentum of an electron is a vector. The direction of Angular Momentum is Observer Dependent. Angular momentum of an electron is not unique. Angular momentum of an electron is not time-invariant. Angular momentum of an electron is Bi-Polar. Angular momentum of an electron is not position invariant, not space invariant. Above all, every angular momentum has an owner. Angular momentum has no existence without an owner. Nature cannot quantize an entity that belong to another thing since nature's quanta do not come with identification headers attached. As a result, angular momentum of an electron does not come in quanta. Bohr Atom is invalid.

Corollary:

If angular momentum come in quanta, there is no way do determine which angular momentum quantum belongs to which electron in an Atom. Unlike data packets on the Internet, natural quanta do not come with identification headers.

Corollary:

Any quantity that has a specific distinct ownership cannot come in quanta. No quantity with ownership can be quantized since quantum ownership itself cannot be specified in it. The data on the Internet can be in quanta since the belonging information of each data quantum is in the header. There is no such ownership identification information is present in natural quanta. Since, angular momentum and Spin have no existence without belonging to an orbiting system, they cannot come in quanta; they cannot be quantized.

Lemma:

Nothing in nature can be quantized except electromagnetic energy. Nothing in nature can come in quanta except electromagnetic energy.

Assume there a several people and each person put specific number of marbles into a basket. All the marbles are the same; there is no way to distinguish one from the other. The number of marbles put into

the basket by one person is unknown to others. In this situation, there is no way to know which marbles belong to whom since all the marbles are the same. If a bully claim that all the marbles are his and none of the others put any marbles, the rest will be empty handed. There is no way a person to prove that some of the marbles in the basket are his/hers. All though somebody losing his/her marbles is not life threatening here, it is a different story for an orbiting system.

In the case of an orbiting system, the existence of an orbiting system depends on having the right amount of marbles and there must be natural safeguards to prevent that kind of bully situation. So, if angular momentum is quantized, each quantum has to carry identification tag. If Angular momentum is quantized, each quantum must have the ownership information as well as how to put the quanta together to bring the total Angular Momentum to life in order to carry out its duty.

Quantization in nature does not facilitate carrying ownership information as a part of quantum. Quanta of any entity in nature cannot exist without ownership information unless that entity is sovereign or free moving. Angular momentum and Spin have no existence without an owner. As a result, Angular momentum and Spin cannot be quantized. Angular Momentum and Spin cannot come in quanta. In fact, nothing in nature can be quantized except electromagnetic energy. Nothing in nature can come in quanta except electromagnetic energy. Electromagnetic energy does not come with belonging. As soon as electromagnetic wave bursts are out of a source, wave bursts are free moving, sovereign, answer to nobody, not attachment, an ideal hippy. What happen to the 1970s hippy movement? They had solutions to every problem. We all thought we had solution to every problem then. Decades later it is a different story.

16) Spin-Up and Spin-Down Cannot be in a Superposition:

There are no Magnetic Monopoles. Spin-Up has no existence without Spin-Down; they are non-separable. Non-separable entities cannot be in a superposition. Entities in superposition must be separable. Spin-Up and Spin-Down cannot be in superposition since they are non-separable. Whether a particle is Sip-Up or Spin-Down is determined by an observer. Spin-Up and Spin-Down are observer dependent. Observer dependent entities cannot be states of a particle. As a result, there is no Spin-Up state of a particle or Spin-Down state of a particle. Spin-Up and Spin-Down have no existence without an observer. Spin is always Bi-Polar. Spin cannot be separated into Spin Monopoles.

Corollary:

Spin-Up and Spin-Down cannot be in superposition, impossible.

17) Spin Matrices Cannot be Operators:

Almost all the Spin Matrices are singular, non-invertible; the only lonely exception is the two-dimensional Spin Matrix S_z , $|S_z| \neq 0$, $|S_x| = 0$, $|S_y| = 0$. As a result, Spin Matrices cannot represent Spin Operators. For an Operator to be a Spin Operator, the Operator must be invertible.

Corollary:

Operators Must be Invertible. Spin Matrices are Not Invertible, and hence, Spin Matrices do Not Represent Spin Operators.

18) Spin Cannot Take Place in 2-Dimension:

Spin takes place in 3-dimension. Spin cannot take place in 2-dimension and hence (2×2) Spin Matrix operators cannot exist. Particles cannot even exist in 2-Dimensional space. How can there be 2-Dimensional Spins when particles cannot exist?

19) Spin-Up and Spin-Down are Not Orthogonal:

Spin-Up and Spin-Down are perfectly correlated negatively. As a result, Spin-Up and Spin-Down cannot be represented by orthogonal vectors. If Spin-Up is represented by vector ϕ_U and Spin-Down is represented by vector ϕ_D , then,

$$\phi_U = -\phi_D \text{ (Equal and Opposite)}$$

$$\phi_U \cdot \phi_D = -1 \text{ (Perfectly Correlated Negatively)}$$

$$\phi_U \cdot \phi_D \neq 0. \text{ (NOT Orthogonal)}$$

The representation of Spin-Up and Spin-Down as orthonormal basis vectors is incorrect. To represent Spin-Up and Spin-down as Orthonormal vectors, Spin-Up and Spin-Down must be independent from one another, or mutually independent. Spin-Up and Spin-Down cannot have independent existence since there are no Magnetic Monopoles. To say Spin-Up and Spin-Down are orthogonal is to say there are Magnetic Monopoles, which is impossible.

20) Spin-Up and Spin-Down are Observer Dependent:

The orientation of a particle is determined by the environment a particle is in. It is the population of particles, and any other external magnetic field that a particle is in, that determines the orientation of a particle. The orientation of a particle is not an intrinsic property of a particle. The orientation of a particle is not a state of a particle. Whether a particle is Spin-Up or Spin-Down is determined by an Observer. Without an observer, there are no Ups or Downs, Left or Rights, Ins or Outs. There cannot exist an Up without a Down, and there cannot exist Up or Down without an observer. Observer dependents cannot be Quantized. Observer dependent do not come in Quanta.

21) Spin Matrices do Not Satisfy Both Necessary and Sufficient Conditions to be Operators.

Any operator that represents an observable must

also be Hermitian or conjugate symmetric. Although an Operator being Hermitian is necessary for an Operator to be an Operator of an observable, it is not sufficient. Operator must also be Invertible. All the Spin Matrix Operators are singular and hence non-invertible. Spin Matrix Operators cannot represent Spin of particles, or operators of observables.

Lemma:

All the infinitely many Spin Matrixes are singular and hence non-invertible. Non-Invertible Operators cannot represent unique Observables. Representations of observable must be unique.

22) State of a Particle is Not Probabilistic:

State of a particle cannot be described by Quantum Mechanics. Irrespective of the size of a particle, the state of a particle must be unique. Our ignorance of the state of a particle does not make the state of a particle probabilistic or random. It is we who pays attention to the nature of particles. Particles pay no attention to us. Particles are not going to change the behavior just because we look at them. Particles do not know that human exist. There is no particle intelligence. Intelligence is what immerges from a collection of particles in a living cell.

If there is a wave function, that wavefunction is not going to collapse just because some human that is unknown to it had a peek. If a wavefunction of a particle collapses just because another entity had a peek, then, all the wave functions of the particles must always be at collapse state since every particle is always watched by other particles.

The most bizarre human Crafter Prophecy (hCRAP), of course next to all the weird religious Crafted Prophecies (rCRAP), must be the strange and invalid claim that a particle can be at many states at the same time. Even more bizarre is that there are people who think it is the case, and these people are from so-called prestigious universities, who consider archaic dinosaur junk-journals dedicated to maintaining status quo or false ancient belief system as prestigious journals. How did we lower ourselves into such a base level in our thinking? They even think that you can generate mass by colliding particles. You cannot generate mass by colliding mass [6]. Try colliding stable and electrically neutral particle and see if you can generate mass. It is only when you collide charge particles you get the impression of generating mass because you are falsely represented extraneous radiation due to the collision of charges as particles. Electromagnetic radiation is not particles. There are no wave particles. There are no particle waves either. Electromagnetic radiation has no mass. You cannot find fundamental particles of nature by colliding charge particles.

Then again, when we see the ancient religious Crafted Prophecies (rCRAP) we are adhering to, it is not that much of a surprise why we are thinking particles can be many places at the same time. Not

only that, we are paying good money to learn those Crafted Prophecies (CRAP), and all this is happening in twenty first century. How can a professor teach students that a particle can be in many places at the same time and charge a tuition fee, and go home and look into the mirror? What do you see, do you see a teacher?

23) There is No Wavefunction Vibration:

There is another bogus new mantra in town. It is a bogus claim that “everything is an outcome of a vibration of a wavefunction” [3]; a vibration of a vibration, a strangest vibration. Nobody has any idea to what a wavefunction of a particle is, yet there comes wavefunction vibration. Particles do not have wavefunctions. Particles do not emerge from a vibration of a wavefunction. Objects do not emerge from a vibration of a wavefunction. Fields do not emerge from vibration of wavefunctions. Space, time, and the Universe itself cannot emerge from vibrations of wavefunctions. Time is a definition. Without living species to define time, there is no time. There is no spacetime.

What is waving in a wavefunction anyway? What is the vibration of a wavefunction? The phrase “vibration of wavefunction” is itself meaningless. Wavefunction, even as a definition, cannot even exist without space, time, and motion of particles. The claim that the Universe itself can emerge from the vibration of a wavefunction [3] is meaningless; simply preposterous. What does the vibration of a wavefunction mean? What is vibrating in a wavefunction?

Probability distribution does not vibrate. Probability distribution does not propagate. Probability distribution is static. If it vibrates, it is not a probability distribution. If it is a propagating wave, it is not a probability distribution. This is another way to Harry-Potterize or voodooify the physics; it certainly sells books. In that sense, there is nothing wrong with that. Although the book [3] I recently came across, “Something Deeply Hidden” is a Crafted Prophecy (CRAP) that has no realistic value, it is a well written fiction book by a gifted writer, a talented teacher teaching nonsense. It is a good fictional novel, an enjoyable read. If I have had bit of his writing skills, I should have conveyed the message like a Smooth Operator instead of antagonizing the reader. If you had been around in 1980s, you are familiar with Smooth Operators. Then again, Smooth Operators are fake, just like Quantum Mechanics Operators.

Undoubtedly, the idea of wavefunction vibration is a prolific paper mill for the academia, whose only interest is counting publications while safeguarding the status quo of voodoo-physics to prevent flow of funds from drying up. They are very proud of number of papers as if it is a great achievement; it is not. As long as they can manage to keep fallacy under cover, the flow of funds is safe at least for time being. No one wants to hear that the Large Hadron Collider is a billion-dollar blunder hidden in the swiss alp [9] when

they are dreaming up building particle colliders in space; it will be a trillion-dollar blunder open in the space.

Some of the voodoo-physicists even claim, “everything that could be discovered have been discovered, and all there is to do be done is some fine-tuning, refinements.” According to them, anybody who says otherwise would be nuts; you might have come across someone who says that if you have seen some physics videos by GC. It is no surprise since this come from the kingdom across the pond. Up there they are under the impression that if there is any valuable contribution that is worthy of her majesty's attention, it has to comes from the kingdom itself since there is nobody in their former colonies who is capable of producing anything worthy of her majesty's attention. After all, how can anybody whose main job was to be at her majesty's servants can possess the brain to produce anything worthwhile? Point well taken, that is why royalties everywhere have become a big joke, nothing more. Nobody can become royal by gene. Nobody can become majestic by gene. Choosing ae head of state based on genes is an insult to the human intelligence. It is hard to imagine why this non-sensical practice is still with us, although it has become a laughingstock today. There are no royal genes. They even need a government-paid servant to tie their shoes too in addition to hundreds of government-paid servants to attend to every whim while many people are sleeping on streets without a shelter or a meal. Running countries by kings, queens, military-dictators, Autocratic systems that controls every move, archaic discriminatory religious regimes that are repulsive even on the surface to any freedom loving person is an insult to humanity. We are debasing ourselves by embracing those systems.

The motto of the voodoo-physics cult is “anything that contradicts the status quo of voodoo-physics must be rejected”, the same utterance practiced by silly third-class website, arxiv. They have fleets of conventional dinosaur journals dedicated to this motto guarded by bullish reviewers and editors who are clueless about the subject at large.

24) State of a Cat is Unipolar, Not Bi-polar:

Schrodinger's cat either dead or alive at any instant of time, not both, not in a superposition. Alive and Dead are monopoles. A cat is Alive if and only if it is not Dead and vice versa. Unlike Alive and Dead, Spin-Up and Spin-Down are Bi-Poles. There is no Quantum Superposition since Spin-Up and Spin-Down are non-separable. Only the events that are separable can be in a superposition.

If you find cat is alive, that does not mean the same cat is found dead in another parallel world. Every observation we make here does not result in all the other possible observations happening in parallel worlds. Every time when we make an observation, there will not be parallel worlds popping up with all the other possible observations we did not make. The

states of wavefunctions that are not observed here in this world will not be popping up in parallel worlds.

If parallel worlds pop up every time an observation is being made, the energy is going to stretch thin sooner or later; after all, we only have limited energy to go around in all those hypothetical parallel worlds. Even talking, reading, or writing about many-world is simply a waste of time, in fact, the waste of life. Then again, reading voodoo-physics is much better than reading broom-riding Harry-Potter books and wasting life by watching professional sports and reality shows. What is there to gain by watching professional sports and reality shows? Even though the voodoo-physics fiction book [3] entitled "Something deeply hidden" is another Crafted Prophecy (CRAP) of Many-Worlds, it is quite entertaining read. It is interesting that these preposterous, non-sensical many-world and multi-verse Crafted Prophecies (CRAP) come from institutions that used to produce meaningful work once upon a time; what went wrong? How did they become CRAP generators? The concepts of Many-World and Multi-Verses are simply preposterous voodoo science that even surpasses the nonsense in religious texts.

What is the purpose of reading religious texts? They do not even have an entertainment value, waste of life. How many trees have we cut down for printing Quantum Mechanics and Religious texts, Crafted Prophecies (CRAP)? Unthinkable. Instead of living the life we got, if we spend every waking hour of life praying several times a day for a next life, why should we be given another life; to pray more for another life? We see professional sport teams go on a prayer before a game. Why should a hypothetical creator favor one professional team over the other? Watching professional sports is not just waste of life, but also hazardous to life in every imaginable way; it is especially bad for the pocket too. What is interesting is that the promises made by religions are always for the next life, never for this life. It is only the founders of religions or the self-proclaimed messengers of a creator entity, and their apostles that get to enjoy palaces and whatever they want in this life all at the expense of followers. For the followers, they must wait for the next life that never comes to reap any benefits.

Look at the living quarters of the head of the religions; they need places covered in golds. It is hard to comprehend why they are so attracted to gold. The only other use of gold is for jewelry, something that makes one more beautiful without. Gold has no use other than in jewelry and fill the space in bank vaults for no apparent reason except that it offers a guard a job. If the creator is so fond of gold, why did that creator entity not create more of it? Why does a creator require prayers of people occupying a negligible real estate in a negligibly small planet in the infinitely vast universe? If earth and its species are a creation, it certainly does not look like any creator entity had paid any attention or any significant time in

creating earth and its species. Why did a creator create so much useless junk real estate? If a creator entity has created the universe, that creator entity must have been so incompetent at the job. Otherwise, why should anyone create so many useless junk real estate, planets, and galaxies. Why does one create living species in such a way that one has to eat the other? Cannot see any other reason than downright cruelty. Not a praiseworthy job. If you are praying toward a black box, ask yourself, what is in the black box? As long as you do not get to see what is inside the black box, you may be intrigued. If you get to peek into it, you may ask yourself, why am I praying toward this? That is when you reach enlightenment! Nirvana. Why does anybody consider some space junk sacred?

25) Quantum Mechanics is Invalid, a Result of Both Theoretical and Experimental Blunders:

Spin Mechanics in Quantum Mechanics is COMPLETELY INVALID in every sense. Quantum Mechanics is INVALID in its very Foundation. There is no basis to the Classification of waves and particles using Spin. Waves cannot be characterized as Spin ± 1 . There are no wave particles. Waves have no Spin. Direction of electromagnetic field is not a Spin. Only the Orbiting Systems have a Spin. Matter particles are not Spin $\pm 1/2$ particles. Spin $1/2$ is a result of wavelength error. Particles cannot be characterized by their Spin since the Spin is observer dependent. There are no fractional Spins or integer Spins. Spin of a particle is not quantized. Spin of an Atom is a constant for given atomic number and it can be positive or negative. There are no Bosons and Fermions since Spin is not quantized. There are waves (mass-less). There are no wave-particles. There are no mass-less particles. There are masses (particles). There are no mass-waves or particle-waves. Particle, by definition, is a mass. Mass is not a wave. Wave is not a particle.

26) Mechanical Energy is Continuous, Not Quantized:

Light or Electromagnetic Waves come in bursts. Wave Bursts are not Particles. There are no photons. Electromagnetic waves have no mass, and no momentum. The representation of electromagnetic energy as a particle of momentum, p travelling at the speed of light, c is invalid since electromagnetic wave is not associated with a mass. Momentum is associated with mass and mechanical energy, not electromagnetic energy.

There is no momentum without a mass. Moving particles cannot generate electromagnetic energy without a charge. There is no charge without a mass. There is no momentum or motion of charge without a momentum. However, electromagnetic energy is not associated with a mass. It is the mechanical energy that is associated with a mass. Electromagnetic energy is associated with a motion of a charge. Frequency of the electromagnetic waves generated

when a moving charge particle is stopped is proportional to the energy of the charge or electrons, not to the mechanical energy of the mass of the particle. Electromagnetic energy and mechanical energy are not the same. Light is not relative [4]. Mechanical energy has a belonging or an owner. Nothing with an ownership or belonging can come in quanta. Mechanical energy owns to a particle or a mass, and hence cannot come in quanta. Electromagnetic energy is free and has no belonging and hence can come in quanta, can be quantized.

27) Probability Distributions are Static, Propagating Waves Cannot be Probability Distributions:

Probability distribution is static. Probability distribution is not a wave. The area under probability distribution is unity for the entire range. Wave has no existence without propagation. The area under a propagating wave cannot be normalized to be unity for the entire range since the range is varying. A wave normalized for a range of wavelength does not represent a probability distribution. Wave cannot be a probability distribution. Probability distribution cannot be a wave.

28) Nature Does Not Run on Quantum Mechanics:

Nature does not Normalize. There is no existence of Quantum Mechanics without Normalization. Particles do not behave as waves. Waves are not particles. Momentum does not generate waves. Position and Momentum of a particle is time dependent. Position and Momentum are mutually dependent. Particles cannot be in multiple places at the same time. Spin and angular momentum are observer dependent. Observer dependent quantities cannot be quantized. As a result, Quantum Mechanics is not natural; not real. Theoretically invalid QM that exists only on paper had been incorrectly validated by bogus interpretation of Stern-Gerlach and Double-Slit experiments. Nature does not run on QM.

29) Operators have No Place in State of a Particle:

State of a particle is unique. Representation of the state of a particle in a mathematical model must be unique. Although eigen vectors or eigen functions of an Operator are unique, the eigenvalues of an operator are not unique. State of a particle cannot be modelled as eigen values of operators since eigenvalues are not unique. Unique states of a particle cannot be modelled using non-unique eigenvalues of Operators. Operator based Quantum Mechanics have no place in states of particles.

XXI. ELECTRON MICROSCOPE: A MISNORMER Property:

If a beam of electrically neutral particles is used in place of the beam of electrons in an Electron Microscope, there will be no image.

Accelerating electrically neutral particles must be done by some other mean since they cannot be

accelerated using an electric field as it is done in Electron Microscope.

Electron Microscopes have been built and in use for high resolution imaging successfully. However, the claim that particle waves generate an image in Electron Microscope is incorrect, simply nonsense. It is not the particles that generate an image in Particle Microscopes. It is not particle waves that generates an image in Electron Microscope. It is not electrons passing through a target specimen and colliding them on the phosphor screen that generate an image of the specimen in the Electron Microscope.

Particles are particles, not waves. Electrons are particles, not waves. The working of Electron Microscope has nothing to do with non-existent hypothetical particle waves, or in this case nothing to do with or any association with non-existent electron waves. There are no electron waves. There are no particle waves as such. The image in an Electron Microscope is not generated by particles or particle waves or Quantum Mechanics, in contrary to what is mention in physics test books. Momentum of a mass does not generate waves.

If a beam of electrically neutral particles is used in place of the beam of electrons in the Electron Microscope, there will be no image. What is responsible for generating an image in the Electron Microscope is the moving charges. Moving charges do not have to be electrons. Any beam of charge particles will work fine. However, the resolution of the image can be increased by choosing particles that have highest charge to mass ratio. The reason for choosing a beam of electrons in the Microscope is the highest charge to mass ratio of electrons e/m , where, e is the charge of an electron and m is the mass of an electron. The charge to mass ratio, e/m is smaller for any other particle.

When a beam of electrons collides with a specimen or a target, it generates electromagnetic radiation. The frequency of the electromagnetic radiation is determined by the speed of the electrons and the electron charge. Image in an Electron Microscope is generated by these electromagnetic radiation waves due to the collision of electrons with a target, not by the electrons themselves as particles or particle waves.

What is going through the target is not electrons. Almost all the electrons are stopped by the target, although, some might penetrate through at lesser speed. The change of the speed of the charge or the change of momentum by the specimen generates electromagnetic waves. What penetrates through the specimen on to the screen is electromagnetic radiation waves generating an image of the specimen or the target on the screen. Faster the speed of the electrons, higher the frequency or smaller the wavelength of the electromagnetic radiation by the collision, and hence higher the resolution of the Electron Microscope. We can increase the resolution by increasing the charge as well as the speed of charge. If a beam of electrons is used, the charge is

fixed and hence the resolution can be increased in an Electron Microscope by increasing the speed of electrons. This can be done simply by increasing the electric field that is used to accelerate the charge.

Definition: Chomomentum

For a particle of electric charge q and speed u , the chomomentum of the particle is defined as the product qu .

The frequency f of the electromagnetic wave generated by the collision of an electron with the specimen or the target in an Electron Microscope is proportional to the chomomentum eu , where e is the charge of an electron and the u is the speed of the electron [2]. The wavelength λ of the electromagnetic radiation is inversely proportional to chomomentum eu . So, we can increase the resolution of Electron Microscopes by increasing the speed of the electron beam since the wavelength of the electromagnetic radiation decreases with the increase of the speed of the charge. Everything in the Electron Microscope deals with the charge of a particle and the speed of the particle; it has nothing to do with the mass or the momentum of the particle.

If a beam of protons is used in the Microscope, the resolution of the image will not be as good as using a beam of electrons since the charge to mass ratio of protons is less than the charge to mass ratio of electrons. Higher is the mass of the particles, the slower is the speed and hence lower is the product of charge and the speed, or the chomomentum. It is the chomomentum that determines the frequency of the radiation generated by the collision, not the momentum of a particle. Smaller the mass, higher the speed for given energy and hence higher the frequency of the radiation and higher the resolution of image.

Corollary:

Image resolution of Particle Microscopes decreases with the increase of particle mass due to the decrease in speed, increases with the increase of charge and speed, and no image is generated if particles are neutral and stable, which are direct contradictions to deBroglie wavelength and QM. What generates an image in Electron Microscopes is the electromagnetic waves generated by the change of the motion of charges or the change of chomomentum, not the motion of mass, momentum, or particle waves.

Negative Aspects of Electron Microscopes in Biological Specimen Imaging:

Property:

The specimen under view in an Electron Microscope is physically bombarded by fast-moving electrons in the process of generating an image. Observed image is the image of the altered specimen due to the bombardment of it by the fast-moving electrons.

In the Electron Microscope, image is generated by electromagnetic waves. The electromagnetic waves are generated in the microscope by colliding electrons with the specimen or the target. The frequency of the electromagnetic wave is controlled by changing the speed of the electrons, which could be done simply by applying an electric field. The downside of using an electron Microscope is that all the highspeed colliding electrons are absorbed by the specimen or the target, although some may penetrate through at low speed if the thickness of the specimen is not large. If the specimen or the target is biological, the highspeed collision and absorption of electrons can damage biological specimen. Therefore, what is given by an Electron Microscope is an image of the altered specimen due to the beating by the high-speed particles. There is no way of knowing for sure that the any abnormalities observed in the image were present in the original specimen or they are a result of damage from the attack by high speed particles.

These side effects of specimen damage might not have been anticipated by the designers of the Electron Microscope since it was incorrectly considered that the image generation process of Electron Microscopes was due to the particle waves of deBroglie wavelength. If it had been known that it is, in fact, the electromagnetic radiation that generates an image, Electron Microscopes might not have used for biological specimens, because the same thing can be achieved by using separate electromagnetic source that has no highspeed particle collisions with the specimen. The use of Electron Microscopes can lead to false diagnosis. If a cell damage is observed in the image, that cell damage could also be an unexpected effect of the image generation process itself. False positives should be very common in Electron Microscopes.

Corollary:

What generates an image of a target in an electron microscope is the electromagnetic radiation generated by the collision of electrons with the target, not particle waves. There are no particle waves.

Corollary:

Faster the electrons, shorter the wavelength of the radiated electromagnetic waves and hence higher the resolution of the electron microscope. However, it is more damaging for the specimen, especially a biological specimen is imaged.

Corollary:

False positives must be a common phenomenon in medical diagnosis based on images from Electron Microscopes.

Corollary: wavelength

The wavelength of the electromagnetic radiation that generates an image in the Electron Microscope is inversely proportional to the chomomentum, eu of the electron, where e is the charge of an electron and u is

the speed of an electron. Frequency of the radiation is directly proportional to the chomentum.

Corollary:

Smaller the mass of charge particles used in the Microscope, faster is the speed for a given momentum and higher the chomentum and hence higher the frequency of radiation by the collision and sharper the image. Higher is the mass of charge particles, lower is the chomentum and hence lower is the frequency of radiation and lower is the resolution of the image.

This is in a direct contradiction to the hypothetical deBroglie wavelength conjecture, where wavelength decreases with the increase of the mass, which is incorrect in every sense.

Corollary:

The image of a specimen in an Electron Microscope can be misleading if the target is a biological specimen due to the highspeed collision and the absorption of electrons by the specimen tissues. In the Electron Microscope, the image is from a specimen that is damaged in the process of producing the image.

You cannot bombard a specimen with highspeed electrons and expect it to be not damaged; that is exactly what is done in the process of generating an image in the Electron Microscope. In medical diagnosis, images from Electron Microscopes may provide higher rate of false positives leading to surgeries that may not be warranted.

Corollary:

Electron Microscopes should never be used as the only source or primary source of diagnosis in medical treatment, especially in cancerous tumor diagnosis in human tissues.

XXII: WAVELENGTH λ OF RADIATION DUE TO SUDDEN STOP OF A CHARGE PARTICLE

Lemma: Frequency of Radiation Due to the Stopping of a Charge Particle,

When a particle of any mass M and charge q moving at speed u is stopped, the frequency of the generated electromagnetic wave is given by,

$$f = \chi n u$$

where, χ is the radiation constant determined by the mass of the smallest charge carrier or electron,

$$\chi = (c/\sigma), \sigma = h/m_e, q = ne,$$

c is the speed of light, h is the Plank constant, e is the magnitude of the charge of the smallest charge carrier or electron, m_e is the mass of electron, u is the speed of the charge particle.

Momentum of an electrically neutral particle does not generate waves. If a beam of electrically neutral particles is used in the Double-Slit experiment, there will not be any pattern on the screen. If a beam of electrically neutral and stable beam of particles is used in a Particle Microscope, there will not be an

image. Motion of an electrically neutral particle does not generate waves or behave as a wave.

However, the motion of a charge particle will generate electromagnetic radiation waves if that particle is suddenly stopped. It is not the momentum that generates waves. It is the change of chomentum, qu , the product of the charge q and the speed u , that generates radiation waves when a moving charge is stopped.

In the case of the Double-Slit experiment, a beam of charge particles is stopped by the double-slit barrier, which result in electromagnetic radiation waves. Similarly, in the case of Electron Microscope, a beam of charge particles, in this case electrons, is stopped by the specimen use in the imaging resulting electromagnetic radiation waves that generate an image of the specimen on the screen; some electrons may pass through the specimen at lower speed if the specimen is thin. If any device relies on generating a wave by the collision of charge particles, operation of that device is based on electromagnetic radiation and the process is completely deterministic.

When a moving charge particle of mass M is stopped, it generates electromagnetic radiation. The frequency of the radiation is proportional to the chomentum. Frequency of the radiation has no direct dependence on the mass of the particle M . A mass M is required to carry a charge. The speed of the charge is determined by the mass M . As a result, mass M only has an indirect influence on the frequency of radiation through the speed since speed of the charge q is the same as the speed of the mass M . Speed of a particle depends on the mass M .

If the mass is higher, the speed will be lower, and as a result, the chomentum will be lower. When the chomentum is lower, the radiation frequency will be lower, or the wavelength of the radiation will be higher. Similarly, when the mass of the particles is lower, the speed is higher, and hence the chomentum is higher and the frequency of the radiation wave is higher, or the wavelength of the radiation wave is shorter.

If a charge particle of charge q and mass M moving at speed u is stopped suddenly, the wavelength of the radiation λ can be written as,

$$\lambda = 2\zeta(1/qu) \quad (22.1)$$

where ζ is the radiation constant.

The radiation constant ζ can be determined experimentally. Theoretical derivation is given in the next section.

The wavelength λ can be determined using interference pattern of the Double-Slit experiment for given q and u . We can easily determine ζ since it is the gradient of the curve λ versus $2/qu$. However, we can determine with the current knowledge of the Double-Slit experiment without carrying out the experiment.

It is well known that when the Double-Slit Experiment was carried out with a beam of electrons, the wavelength of the interference pattern agrees the deBroglie wavelength λ given by,

$$\lambda = h/(m_e u) \quad (22.2)$$

where, m_e is the mass of an electron, u is the speed of the electron, and h is the Plank constant. If this experimental observation that has been reported everywhere is correct, we can use this observation to determine the radiation constant ζ .

This wavelength agreement with deBroglie conjecture is only for electrons, not for any other mass M . Wavelength cannot be inversely proportional to the mass M of a particle in general; this is impossible. If the Double-Slit experiment is performed for a beam of particles with mass M , $M > m_e$, for the same momentum, the wavelength of the interference pattern of the beam of particles of mass M will not be the same as the wavelength of the beam of electrons. In fact, the wavelength for a beam of particles of mass M must be larger than the wavelength for a beam of electrons for the same momentum in practice.

We also know that the only waves that generates interference pattern when moving electrons are stopped at the Double-Slit barrier are the electromagnetic radiation waves due to the stopping of charge particles. There are no particle waves. In Quantum Mechanics, electromagnetic radiation has been misinterpreted as particle waves of wavelength given by deBroglie wavelength. If the mass of an electron appears in the wavelength relationship, it is simply because mass of an electron is a fundamental parameter of nature and a charge has no existence without the mass of an electron.

However, wavelength is independent of the mass M of a particle in general. When we use electron as particles, the mass of charge is the same as the mass of the particle. A charge has a mass, it is the mass of an electron. Without the mass of an electron, a charge has no existence. If a particle of mass M with a charge of q is moving at speed u , what generate radiation is the rate of change of qu , not the momentum Mu .

So, the wavelength of the same radiation waves for a beam of electrons is inversely proportional to the change of chomomentum eu ,

$$\lambda = 2\zeta(1/eu) \quad (22.3)$$

where, e is the charge of electrons.

Since the charge is stopped, the change of chomomentum is also the cbomomentum. Now, we can compare this with the experimental deBroglie wavelength observation for a beam of electron in eqn. (22.2) to obtain the radiation constant ζ .

From eqns. (22.2) and (22.3), we have,

$$2\zeta/e = h/m_e \quad (22.4)$$

$$\zeta = (h/2)(e/m_e) \quad (22.5)$$

Here, h is the plank constant and e/m_e is the charge to mass ratio of an electron. The ratio e/m_e is not the charge to mass ratio of any particle. Radiation constant ζ does not depend on the mass of the charge particle M . Radiation constant ζ only depends on the mass that is required for the existence of a charge, the mass of electron m_e . Without mass of an electron, a charge has no existence.

Since $h = 6.626(10^{-34})$ (Jouls)(second),

$e = 1.602(10^{-19})$ Coulombs, $m_e = 9.109(10^{-31})$ kg, we have,

$$e/m_e = [1.602(10^{-19})]/[9.109(10^{-31})] = 1.759(10^{11})$$

$$\zeta = [6.626(10^{-34})][1.759(10^{11})] = 1.166(10^{-22})$$

$$\zeta = 1.166(10^{-22}) \text{ (Ampere)(meter}^2\text{)} \quad (22.6)$$

ζ has the same units as the Spin Magnetic Moment (SMM).

The wavelength of electromagnetic radiation waves due to the stopping of particle with charge q at speed u is given by,

$$\lambda = 2\zeta(1/qu) \quad (22.7)$$

where, $\zeta = 1.166(10^{-22})$ (Ampere)(meter²).

If $q = ne$, where e is the magnitude of the charge of an electron, and n is an integer, the wavelength is given by,

$$\lambda = 2\zeta(1/neu) \quad (22.8)$$

where n is an integer.

We define σ as,

$$\sigma = \zeta/e \quad (22.9)$$

Since, $\zeta = h(e/m_e)$, we have,

$$\sigma = h/m_e \quad (22.10)$$

Then, we have,

$$\sigma = [6.626(10^{-34})]/[9.109(10^{-31})]$$

$$\sigma = 7.274((10^{-4}). \quad (22.11)$$

Now, we have the wavelength λ , given by,

$$\lambda = 2\sigma(1/nu) \quad (22.12)$$

For a particle of charge q , $q = ne$, e is the magnitude of the charge of an electron, u is the speed of the charge particle, $\sigma = 7.275((10^{-4})$, and n is an integer.

Lemma: Radiation Wavelength λ of a Charge Particle

If a moving charge particle of charge q at speed u is stopped suddenly, wavelength λ of the generated electromagnetic radiation is given by,

$$\lambda = 2\sigma(1/nu)$$

where, $q = ne$, e is the magnitude of the charge of an electron, $\sigma = 7.275(10^{-4})$, n is an integer.

Assume we perform the Double-Slit experiment with a beam of electrons as well as with a beam of protons. When a beam of electrons with momentum p is used in the Double-Slit experiment, we observed an interference pattern of wavelength λ_e . When a beam of protons with the same momentum p is used, we observe the wavelength λ_p . Even though the momentum of both beams is the same, the chomomentum are different since masses of the particles in both beams are not equal. Mass of the protons are many times heavier. The speed of the electron beam, u_e and the speed of the proton beam, u_p are given by,

$$u_e = p/m_e \quad (22.13)$$

$$u_p = p/m_p \quad (22.14)$$

We have, $p_e = p$, $p_m = p$, $m_e \ll m_p$, $u_e \gg u_p$

Since $n = 1$, for both beams of particles, wavelengths are given by,

$$\lambda_e = 2\sigma(1/u_e) \quad (22.15)$$

$$\lambda_p = 2\sigma(1/u_p) \quad (22.16)$$

Since $u_e > u_p$, when a moving electron of momentum p is stopped suddenly, the generated electromagnetic radiation wavelength λ_e is smaller than the generated

electromagnetic radiation wavelength λ_p when a moving proton of the same momentum p is stopped, $\lambda_e < \lambda_p$.

The wavelength of the interference pattern of the beam of electrons will be smaller than the wavelength of the interference pattern of the beam of protons.

If deBroglie wavelength is correct both beam of electrons and beam of protons should produce an interference pattern of the same wavelength since they both have the same momentum. However, momentum cannot generate waves, this is not possible. It is the change on momentum of a moving charge that generates electromagnetic radiation waves resulting in an interference pattern in the Double-Slit experiment.

If the deBroglie wavelength satisfies the wavelength of the interference pattern for a beam of electrons in the Double-Slit experiment, as it has been reiterated over and over again in the literature, the reason for satisfying deBroglie wavelength with the wavelength of the interference pattern of the Double-Slit experiment for a beam of electron is not a result of the dependence of the wavelength on momentum. In fact, wavelength has nothing to do with the momentum. It is because the existence of electron charge requires the mass of electron. Existence of charge does not require a mass of a particle. The smallest mass of a charge carrier, which is an electron mass that is a constant, can be incorporated into the proportionality constant.

The wavelength is inversely proportional to the number of electron charge that the charge of the particle is equivalent to, $n=q/e$ and the speed of the particle u . The proportionality constant is $\sigma=h/m_e$ and the wavelength $\lambda=2\sigma(1/nu)$. This is of course provided that the experimental claim that the wavelength of the interference pattern for a beam of particles agrees with the deBroglie wavelength is correct. Every physics textbook on this subject seem to claim this is the case. We will demonstrate later it is indeed the case theoretically.

The mass of an electron is a universal parameter and it is intrinsic to the radiation constant since charge has no existence without the mass of an electron. This wavelength satisfies with the experimental observation of the Double-Slit experiment. What generate the interference pattern in the Double-Slit experiment is electromagnetic waves. There is no such thing as particle waves.

Since the waves that generate the interference pattern is electromagnetic waves, they travel at the speed of light $c=3(10^8)$ (meters/second). So, having the wavelength λ for a particle of any mass M with charge q moving at speed u , we can obtain the frequency f ,

$$f=c/\lambda \quad (22.18)$$

Substituting for λ , we have,

$$f=(c/2\sigma)nu \quad (22.19)$$

where, $\sigma=h/m_e$.

Radiation frequency f is independent of the mass of

the particle M . Here, m_e is not the mass of the particle, it is the mass of the smallest charge carrier, electron, which is a constant.

$$c/\sigma=[3(10^8)]/[7.275(10^{-4})],$$

$$c/\sigma=2.183(10^{13}).$$

The frequency of the radiation f is independent of the mass of the particle as it should be. Mass does not generate waves. Momentum does not generate waves.

Mass just provides a home for charges. Mass is also the chauffeur for charges.

If a moving particle is neutral, it does not matter what speed the particle is moving, when the particle is stopped, it does not generate radiation. From eqn. (22.19), $f=0$, when $q=0$ since $n=0$. There are no particle waves when a moving neutral particle is stopped. There are no radiation waves when a neutral particle is moving either. It is only a moving charge that generates electromagnetic radiation waves when the charge is stopped, accelerating or decelerating. No moving neutral mass generate waves when it is stopped, accelerating or decelerating. Momentum of a particle does not generate waves.

Corollary:

Smaller the mass of a charge particle, smaller the wavelength of the electromagnetic radiation waves it generates when the particle is stopped. As a result, smaller the mass of the particles in a beam, higher the resolution of a Particle Microscope.

In the case of Particle Microscopes, mass is only required as a mover of charges. In essence, mass is hindrance to generating radiation waves, although it is essential for the motion of the charge since charge cannot exist without a mass. Mass is required to build a ship, yet the mass of the ship is a hindrance to the motion of maximum cargo in shortest time. Mass of a particle is just the carrier of the charge in generating radiation waves when the charge is stopped because of the mass being stopped. Smaller the mass, higher the speed of charge and hence higher the momentum qu , smaller the wavelength λ of the radiation waves at the stop of the charge particle, and as a result higher the resolution of the Particle Microscope.

In fact, there are no Particle Microscopes, unless the particles are electrically charged. Electron Microscopes generate an image of a specimen because electrons are charged. There are no Particle Microscopes. What we have are Charge-Particle Microscopes. Electron Microscope is a Charge-Particle Microscope. Electron Microscope provides the highest resolution that can be achieved by any Charge-Particle Microscope.

A. DeBroglie Wavelength is False:

DeBroglie wavelength defies the reality in every possible way. If deBroglie conjecture is true, we could increase resolution of a Particle Microscope by increasing the mass of the particles used in a beam of

particles. This is not possible, counterintuitive even. That is why we have Particle Microscopes that use charge particles with smallest mass, electrons, Electron Microscope. DeBroglie conjecture is incorrect.

DeBroglie conjecture defies the reality by the introduction of hypothetical particle waves. DeBroglie conjecture also defies the reality by making the wavelength inversely proportional to mass of a particle, or the frequency of the wave directly proportional to mass of the particle, which is indeed false. In a guitar, which string produces higher frequency waves, lighter mass string or higher mass string? Which person can swing swiftly, heavy person or lighter person?

Lighter the mass is, higher is the frequency or smaller is the wavelength. The higher the mass, the lower the frequency or larger the wavelength. This is the reality. DeBroglie conjecture that defies the reality is false. There are no particle waves. Momentum does not generate waves. It does not matter what momentum particles consist of; neutral particles do not generate waves.

If momentum generates waves, then a neutral particle should also generate waves. Neutral particles do not generate waves if the particles are stable. However, neutrons generate waves since neutrons are unstable. Unstable neutrons break down under a collision generating electromagnetic wave bursts. It is these wave bursts that generate interference pattern when a beam of neutrons is used in the Double-Slit Experiment [2]. It is only the moving charges that generate waves due to electromagnetic radiation when the charges are stopped as it happens in the Double-Slit experiment and Electron Microscopes.

Corollary:

If a moving stable particle is neutral, charge $q=0$, no waves are generated when the particle is stopped, accelerated, decelerated, or moving at constant speed.

Corollary:

A beam of neutrons generate electromagnetic waves on a collision since neutrons are unstable. Unstable neutrons break down on an impact releasing electromagnetic waves. Particles that are electrically neutral and stable do not generate waves.

Property:

Particles or masses are chauffeurs for charges. Charges have neither existence nor movement without masses or particles.

Corollary:

The frequency of radiation is independent of the mass M of charge particles. It is only the radiation constant between the wavelength and momentum that depends on the mass of the smallest charge carrier, electron.

Corollary:

A charge has no existence without the mass of an electron. Hence, the mass of electron is ingrained in the Radiation Constant.

B. Experimental Determination of σ using Double-Slit Experiment:

Moving neutral stable particles cannot generate waves. Momentum is not a wave generator. The interference pattern generated by the Double-Slit experiment is due to the electromagnetic radiation. Electromagnetic radiation is generated when a moving charge particle of charge q is stopped. The wavelength λ is inversely proportional to the speed of the charge particle,

$$\lambda = 2\sigma(1/nu)$$

where, n is the number electron charges that the charge q of a particle is equivalent to, σ is the Radiation Parameter, u is the speed of the particle, $q=ne$, e is the charge of an electron, the smallest charge.

Estimating σ Experimentally:

If we run the Double slit experiment for different speeds, u_i , $i=1,2, 3, \dots$, we get corresponding wavelengths λ_i , $i=1,2,3, \dots$. By plotting λ_i against $1/u_i$, $i=1,2, 3, \dots$, we will get a linear curve. The gradient of the curve is σ/n . If we use a beam of electrons or beam of protons, for both cases $n=1$ and hence the gradient of the graph is σ . The value of σ should be around, $\sigma=7.275(10^{-4})$. The graph must be linear for the relationship $\lambda=\sigma(1/nu)$ to hold true.

For $\sigma=7.275(10^{-4})$ to hold true, the experimental claim that the wavelength of interference pattern for a beam of electron satisfies the deBroglie wavelength for electrons must be genuine. DeBroglie wavelength cannot hold true for a particle of any mass M since the frequency of waves cannot increase with the mass. If frequency increases with the mass, we should be plucking heavy strings in a guitar for high notes.

C. Demonstrating the Mass Independence of Wavelength λ Experimentally:

We can use the Double-Slit experiment to demonstrate that the radiation wavelength is independent of the mass of the particles. For a beam of electrons at speed u , obtain the wavelength λ_e using the Double-Slit experiment. Also, for a beam of proton at the same speed u , obtain the wavelength λ_p using the same Double-Slit experiment. These two wavelengths must be equal,

$$\lambda_e = \lambda_p.$$

If you have access to a Double-Slit experiment, you can verify easily.

Corollary:

If the Double-Slit experiment is run using two beams of charge particles with the same momentum and the same charge but different masses, the

wavelength of the particles with larger mass is longer than the wavelength of the particle with smaller mass. Radiation wavelength is shorter for the charge particles with smaller mass.

This is a direct contradiction to deBroglie wavelength conjecture. DeBroglie conjecture is false.

Property:

Two beams of particles of the same mass and the speed, but two distinct charges do not generate the same wavelengths in the Double-Slit experiment. This is a contradiction to the deBroglie wavelength.

Corollary:

Wavelength is not inversely proportional to mass of a particle as suggested by deBroglie wavelength. There are no particle waves. Waves generated by the motion of a charge particle is electromagnetic; it is not a probability distribution.

Wavelength is inversely related to the speed of a charge or chomomentum, not to the momentum. Wavelength has no direct dependence on the mass of the particle.

Wavelength is indirectly proportional to the mass through the speed of the charge since speed of a charge is inversely related to the mass of a particle.

XXIV. WAVELENGTH λ IS MASS INDEPENDENT

Neutral moving particle of mass M does not generate waves when the particle is stopped, moving at constant speed, or particle is accelerating or decelerating. Neutral particles cannot generate an interference pattern in the Double-Slit experiment. Neutral particles do not generate an image in a Particle Microscope. Electron Microscope generate an image for a beam of electron due to the charge an electron consists of, not due to the moving mass.

In both Double-Slit experiment and the Electron Microscope, the underline principle is the same. A charge particle is accelerated using electrical voltage V and then let it collide with a barrier. In the case of Double-Slit experiment, charge particles collide with the Double-Slit barrier, whereas in the case of Electron Microscope charge particles collide with the specimen that is subjected to imaging.

Assume we have a particle of mass m with charge q is accelerated through a voltage V . Then, the charge particle gains an electrical potential energy qV . The electrical potential energy of the charge particle is independent of the mass m of the particle. Whether we use a particle of mass m with charge q or particle of mass M with charge q , the energy of the particles will be the same. This electrical potential energy gives a particle speed and the speed of the particle depends on the mass of the particle.

For a particle of mass M and charge q accelerated by a electrical voltage V to a speed u , we have,

$$qV = (1/2)Mu^2 \quad (24.1)$$

The speed of the charge q depends on the mass of the particle M . Higher the mass, lower is the speed of

the particle, and hence longer the wavelength or lower the frequency of radiation. Smaller the mass, higher is the speed of the particle, and hence higher the frequency or shorter the wavelength of the radiation waves. The effect of the mass of a particle on radiation wavelength is indirect and it is through the speed of the particle. There is no direct inverse relationship of mass M to the wavelength as it is suggested by deBroglie wavelength.

If the charge q of the particle is equivalent to n electrons, we have,

$$q = ne \quad (24.2)$$

where, e is the charge of an electron and n is an integer.

The whole mass M is not associated with the charge q . The mass associated with the charge q , M_q is equal to the n times the mass of an electron m_e ,

$$M_q = nm_e \quad (24.3)$$

Therefore, when a moving charge particle of mass M is stopped, it is not the energy of the whole particle that is converted to electromagnetic waves. It is the energy of the mass, nm_e associated with the charge q that is converted to the electromagnetic radiation waves. If the collision of the charge particle with the Double-Slit barrier generates electromagnetic radiation waves of frequency f , we have,

$$(1/2)nm_e u^2 = hf \quad (24.4)$$

where, h is the Plank constant, $q = ne$, q is the charge of the particle, n is an integer, m_e is the mass of an electron, u is the speed of the charge, which is the same as the speed of the particle that carries the charge.

Now, we have,

$$f = (1/2h)nm_e u^2 \quad (24.5)$$

Since the mass of an electron m_e is a universal constant,

$$f = (1/2\sigma)nu^2 \quad (24.6)$$

where, $\sigma = h/m_e$

Since $h = 6.626(10^{-34})$ (Joules)(second),

$m_e = 9.109(10^{-31})$ kg, we have,

$$\sigma = [6.626(10^{-34})] / [9.109(10^{-31})]$$

$$\sigma = 7.274((10^{-4}) \text{ (meter}^2\text{/second)}) \quad (24.7)$$

$\sigma = 7.274((10^{-4}) \text{ (meter}^2\text{/second)})$ is a universal constant.

When a moving charge particle of charge q is stopped, the frequency of the generated radiation is proportional to the number of electrons in the charge of the particle and the square of the speed of the charge, which is also the speed of the particle. The frequency of the radiation is independent of the mass of the particle. The mass M of the particle has an indirect effect of the radiation since it affects the speed of the particle. The higher the mass, the slower the speed for a given accelerating voltage.

It is under gravitational force that the speed of a particle is independent of mass. In the case of microscopic particles, the gravitational effect is negligible. It is an electric field that is used in accelerating a charge particle. When a charge particle is accelerated in an electric field, the speed of the

particle depends on the mass of the particle. Higher the mass lower is the speed and hence lower is the chomentum of the charge, and longer is the wavelength or lower the radiation frequency when the charge is stopped.

Lower the mass of the particle, higher is the speed of the particle and hence higher is the chomentum and hence shorter is the wavelength or higher is the radiation frequency when the charge particle is stopped. DeBroglie wavelength is a complete contradiction to this fact. Frequency cannot increase with the mass of a particle as it is suggested by deBroglie wavelength.

When particles reach the Double-Slit barrier, they are stopped at the barrier. When a moving charge particle of mass M is stopped, it is the kinetic energy associated with the mass, nm_e of the charge $q=ne$ that is converted to electromagnetic radiation energy, not the kinetic energy associated with the mass M of the particle. Mass M here is just a chauffeur giving a ride for the charge q with mass nm_e .

This electromagnetic wave burst of frequency f travel at the speed of light c . So, the wavelength of the wave burst is given by,

$$c=f\lambda \quad (24.8)$$

Substituting for f from eqn. (24.6), we have,

$$\lambda=2\sigma c/nu^2 \quad (24.9)$$

where, $\sigma=h/m_e$, charge $q=ne$, n is the number of electrons in the charge, e is the charge of an electron, u is the speed of the charge, which is also the speed of the particle of mass M .

If we have a particle travelling close to the speed of light, we have,

$$u\approx c \quad (24.10)$$

Substituting in eqn. (24.9), we have the wavelength λ for electromagnetic radiation waves generated when a particle travelling close to the speed of light is stopped, given by,

$$\lambda=2\sigma/nu \quad (24.11)$$

The frequency f is given by,

$$f=(c/2\sigma)nu \quad (24.12)$$

Since the charge $q=ne$, and $\sigma=h/m_e$, we can also write this as,

$$\lambda=2h(e/m_e)/qu \quad (24.13)$$

where, q is the charge of the particle, e is the charge of an electron, h is the Plank constant, m_e is the mass of an electron, u is the speed of the charge.

The product qu is the chomentum of a charge. The wavelength of the radiation is inversely proportional to the change of chomentum qu . Since particles are stopped at the Double-Slit barrier, the change of chomentum is also the chomentum itself.

We can also write eqn. (24.13) as,

$$\lambda=2\zeta/qu \quad (24.14)$$

where, $\zeta=h(e/m_e)$.

Since $h=6.626(10^{-34})$ (Joules)(second),

$e=1.602(10^{-19})$ Coulombs, $m_e=9.109(10^{-31})$ kg, we have,

$$e/m_e=[1.602(10^{-19})]/[9.109(10^{-31})]=1.759(10^{11})$$

$$\zeta=[6.626(10^{-34})][1.759(10^{11})]=1.166(10^{-22})$$

$$\zeta=1.166(10^{-22}) \text{ (Ampere)(meter}^2\text{)} \quad (24.15)$$

ζ has the same units as the Spin Magnetic Moment (SMM).

Wavelength is independent of the mass of the charge particle. Here, c , e , m_e and h are universal parameters that are constants, So, if the electric voltage V that is used for the acceleration of the charge particle is constant, the wavelength of the electromagnetic radiation waves inversely depends only on the chomentum qu of charge the particle. The wavelength is inversely proportional to the charge q and the speed u of the particle. If the speed of a particle is not close to the speed of the light c , then, the wavelength of radiation is inversely proportional to the square speed of the particle as given in eqn. (24.9).

The wavelength is also inversely proportional to the electrical potential V that is used for the acceleration of the particle. Higher the charge higher the wavelength of the radiation wave and smaller the wavelength. Higher the voltage V that is used to accelerate the charge, the higher the speed and hence higher the frequency of the radiation wave and smaller the wavelength. Wavelength is independent of the mass of the particle M .

Where deBroglie Wavelength Went Wrong:

If we accelerate a particle of mass M and charge q through an electric potential V to a speed u , then, the kinetic energy of the particle will be approximately equal to the potential energy qV ideally, and hence we have,

$$qV\approx(1/2)Mu^2 \quad (24.16)$$

DeBroglie disregarded the factor $1/2$, which is a mistake that lead to all other mysterious problems. The factor $1/2$ must be there for any mass.

Then, deBroglie incorrectly assumed that the kinetic energy is quantized and present in the form of a wave of frequency f so that,

$$hf\approx(1/2)Mu^2 \quad (24.17)$$

It is only the kinetic energy of an electron that is quantized, not a kinetic energy of a mass M .

If the momentum of the particle is p , for a particle of mass M moving at speed u , we have,

$$p=Mu \quad (24.18)$$

Now, from eqn. (24.17), we have,

$$f\approx(1/2h)pu \quad (24.19)$$

Now, under the various assumptions, according to deBroglie, the kinetic energy of the particle of mass M is present in the form of a wave of frequency f and travel at the speed of u . So, the wavelength of the wave λ is given by,

$$\lambda=u/f \quad (24.20)$$

Substituting for f from eqn. (24.19), we have,

$$\lambda=2h/p \quad (24.21)$$

$$\lambda=2h/Mu \quad (24.22)$$

This is the deBroglie wavelength without the factor 2. If the kinetic energy of a particle is incorrectly assumed to be present as a wave of DeBroglie wavelength $\lambda=h/p$, the DeBroglie wavelength is

incorrect by a factor 2. Kinetic energy is not quantized and cannot be represented as a wave of frequency f . Particles do not behave as waves. Motion of a mass does not generate waves. It is the motion of electrical charges that generates electromagnetic waves.

The dependence of the wavelength inversely on the mass M appeared due to the invalid assumption that the speed of the particle is approximately the same as the speed of light, and the assumption that the total kinetic energy of the mass appears as a wave that is quantized. If these assumptions have not been made, the energy of a particle will be independent of the mass of the particle when a charge particle is accelerated through voltage V if the charge q is the same. Whether we accelerate a particle of charge q and mass m or a particle of charge q and mass M through voltage V , the kinetic energy of the mass will be the same ($m \neq M$). As a result, the wavelength will be independent of the mass of the particle. Momentum of a particle does not generate waves. It is the moving charge that generates waves, not the mass. Wavelength is independent of the mass of a particle. Wavelength depends on the momentum, not on the momentum.

DeBroglie wavelength does not represent a wavelength of a particle. DeBroglie wavelength is a result of misrepresentation of the radiation wavelength under invalid assumptions. There are no particle waves of deBroglie wavelength. In the Double-Slit experiment as well as in a Charge-Particle Microscope, there will be no kinetic energy if particles have no charge. If $q=0$, we have particles with potential energy $qV=0$. And hence $u=0$, and wave frequency $f=0$. Double-Slit experiment cannot produce an interference pattern if the particles are electrically neutral. You cannot accelerate electrically neutral particle using an electric voltage.

You can throw neutral particles at any speed you want onto the Double-Slit barrier by any mean if you want, it does not matter how hard you throw it, you will not get an interference pattern. It is the same with neutral particles in Particle Microscope. You can throw electrically neutral particles at any speed you want on to a specimen in a Particle Microscope, you will not get an image; only thing you are doing is damaging the specimen. You can collide two electrically neutral particles by throwing them at each other at any speed by any mean you want and break them up to pieces, but it is not going to generate mass.

If you collide charge particles, in addition to breaking up the particles, you are also generating electromagnetic radiation waves by stopping the moving charge particles in a collision. This electromagnetic radiation energy resulted from stopping the moving charge particles in a collision cannot be represented as a mass creation. Electromagnetic energy has no mass. Particle accelerators do not generate mass. Large Hadron Collider does not generate mass [9]. Light is not relative [4] and hence $e \neq mc^2$.

There are no particle waves. A mass does not behave as waves. Mechanical energy e_M of a particle is not quantized and hence cannot be represented as waves, $e_M \neq hf$. A charge particle moving at constant speed does not generate waves. When a moving neutral particle is stopped, accelerated, or decelerated, it does not generate waves. It is a charge particle that generates waves when it is stopped, accelerated, or decelerated. It is the momentum, qu that generates electromagnetic radiation waves when a moving charge particle of mass M and charge q is stopped, accelerated, or decelerated, not the momentum, Mu .

Theorem:

If a beam of particles of charge q and mass M moving at speed u is stopped, the wavelength of the generated electromagnetic radiation is given by,

$$\lambda = 2\sigma c / nu^2.$$

The frequency f of the electromagnetic radiation wave is given by,

$$f = (1/2\sigma) nu^2$$

where, $\sigma = h/m_e$, n is an integer, $q = ne$, e is the charge of an electron, m_e is the mass of an electron, c is the speed of light, and h is the Planck constant, $\sigma = 7.274 \times 10^{-4}$ (meter²/second) is a universal constant.

Lemma:

If a beam of particles of charge q and mass M moving at speed u that is close to the speed of light c is stopped, the wavelength of the generated electromagnetic radiation is given by,

$$\lambda = 2\sigma / nu$$

The frequency f of the electromagnetic radiation wave is given by,

$$f = (c/2\sigma) nu$$

where, $\sigma = h/m_e$, n is an integer, $q = ne$, e is the charge of an electron, m_e is the mass of an electron, c is the speed of light, and h is the Planck constant, $\sigma = 7.274 \times 10^{-4}$ (meter²/second) is a universal constant.

Corollary:

When a moving charge particle is stopped, accelerated, or decelerated, the frequency and the wavelength of radiation waves are independent of the mass of the particle.

Corollary:

For a fixed electrical potential V used for accelerating particles, smaller the mass of the particle higher the speed it achieves. As a result, smaller the mass of the particles, the higher the resolution in Charge-Particle Microscopes, and higher the mass of the particles lower the resolution, which is a direct contradiction to the deBroglie wavelength.

Corollary:

There are no Neutral-Particle Microscopes. We

cannot generate an image of a specimen by shooting neutral particles in a Particle Microscope. If there were particle waves, this should not have been the case.

Corollary:

There are no Neutral-Particle Double-Slit experiments. We cannot generate an interference pattern by shooting neutral particles in a Double-Slit experiment. If there were particle waves, this should not have been the case.

Electromagnetic Spectrum is Quantized, Not Continuous [8]:

We have seen that the electromagnetic radiation frequency f and the wavelength λ are given by,

$$\lambda = 2\sigma c / nu^2$$

$$f = (1/2\sigma) nu^2$$

where, $n=1, 2, 3, \dots$, u is the speed of the electrons, c is the speed of light, and $\sigma = h/m_e$, m_e is the mass of the electron, and h is the Plank constant.

So, the electromagnetic spectrum comes in discrete frequencies. We know that the charge q of a particle comes in discrete quantities, $q=ne$. The smallest charge e is the charge of an electron. Any other charge is an integer multiple of the charge of an electron. As a result, electromagnetic spectrum is discrete, it cannot be continuous [8].

Since the maximum speed of an electron is always less than the speed of light, $u < c$, if the frequency separation between two adjacent frequencies is Δf , and the wavelength separation is $\Delta \lambda$, then, we have,
 $\Delta f < (1/2\sigma)c^2$
 $\Delta \lambda > 2\sigma/c$.

Corollary:

It does not matter what the size of a mass is, if the momentum is a constant, the path of the particle is either linear or circular, not a wave.

XXV. CONCLUSIONS

There is no quantum Spin 1/2. Quantum Spin 1/2 is a result of deBroglie wavelength that Quantum Mechanics is founded upon. DeBroglie wavelength is incorrect. Not too surprisingly, deBroglie wavelength is incorrect exactly by a factor of one-half. Just because a particle is assumed to behave as a wave of certain wavelength, the particle is not going to be a wave of that wavelength. If you want to assume the behavior of a particle to be a wave of certain wavelength, at the very least, you must make sure that the particle has the energy required to be at that wavelength. If particles do not have the energy required to satisfy the assumptions, the whole theoretical foundation is going to collapse; deBroglie wavelength in Quantum Mechanics is one such assumption. If you are able to demonstrate that a particle behaves as a wave of deBroglie wavelength using Double-Slit Experiment, that experiment is undoubtedly a double-slit blunder [2] since no Particle has the energy to be at deBroglie wavelength. It is very clear that the misinterpretation

of the Double-Slit Experiment is one of the reasons that led to the Quantum Mechanics [2, 7]].

The bright spots on the screen in the Double-Slit Experiment are not a result of particles colliding with the screen. Particles cannot reach the screen in the Double-Slit Experiment. Double-Slit barrier does not have a hole along the beam for the particles to go through; two slits are off to the sides. Particles never reach the screen; they were stopped at the double-slit barrier [2]. It is the electromagnetic waves resulted from the collision of charge particles with the double-slit barrier that generate the interference pattern on the screen in the Double-Slit Experiment.

If a detector is placed at the Double-Slit experiment, part of the wave through the slits will be reflected on to the screen. Since the detector is active, waves from the detector also reach the screen directly. All these waves travel on different path and meet on the screen with different time delays; it is this superposition that make the interference pattern disappear in the Double-Slit experiment when a detector is placed. The disappearance of interference has nothing to do with the act of observation itself.

Any particle has a mass. There are no massless particles. Massless particle is an oxymoron. No particle (mass) has the energy required to be a wave of deBroglie wavelength even if particles want to. No mass can start at constant momentum or at constant speed. It is only a wave that starts at constant speed and remains at the same speed. Wave has no mass and hence contains no momentum [8, 5]. If light has a momentum, light cannot have a constant speed even in a vacuum in the presence of gravity. Light has no momentum. Light has no equivalent mass. Light has no acquired mass. Light has no Spin. Spin requires a mass. It is the Orbiting Systems that spin naturally.

No particle can travel at constant speed from the start. There is no particle without a mass. No mass can have a constant speed under gravity. It is only the electromagnetic waves that can travel at constant speed from the start under gravity in a vacuum, not the particles. In the presence of a medium, speed of the light decreases as light approaches a gravitational object, due to the increasing medium gradient, resulting in a diffraction of light near a gravitational object. There is no diffraction of light near a gravitational object in the absence of a medium. There is no gravitational lensing in the absence of a medium.

In the presence of a medium, gravity generates a gradient in the medium and hence speed of light cannot be a constant under gravity in the presence of a medium. It is this gradient of the medium that deflects light near the sun, not some hypothetical space-time in General Relativity. General Relativity does not hold true [5]. No charge particle can have constant speed in the presence of other charge particles. No atom can have a constant momentum in the presence of other atoms or an external magnetic field even though atoms are neutral. A particle must gradually gain the speed from standstill. Only a

particle that start and remains at constant speed has the energy require to be at deBroglie wavelength; there no such particles or masses.

Even though no particle is a wave, if you still want to consider particles as waves, then, the correct wavelength of any particle that the energy of a particle can support is twice the deBroglie wavelength. When correct wavelength is used, Spin 1/2 disappears. In fact, with the correct wavelength, no such thing as Spin 1/2 appears in Quantum Mechanics. If we had started Quantum Mechanics with the correct wavelength that the energy of a particle can realistically support, we would have never come across such a meaningless and unexplainable term such as Spin 1/2. Spin 1/2 is utter nonsense. This is one of the things that one must be blind to understand what is proclaimed as reality just like religion because both are meaningless and baseless.

A Particle is not a wave, and a wave is not a particle. There is no wave-particle and particle-wave duality. A Particle is not something that immerges from a wavefunction vibration that some books claim out to be [3]. What is a vibration of a wavefunction anyway? Hypothetical wavefunction was derived for a particle. Hypothetical human-crafted wavefunction has no existence without a Particle. Wavefunction of a particle is hypothetical since there is nothing waving in a particle. Probability distribution is static, not a wave. Propagating wave cannot be a probability distribution. There is no probability without conscious beings who have studied probability. Probability is a human invented tool for gambling in its origin. Probability is not a part of nature. Probability stems from our ignorance about the working of the nature. Particles do not behave as waves. State of a particle is real, not probabilistic.

However, if you still want to consider particles to be waves, you should at least use the correct wavelength that the energy of a particle can support. Just because you assume a particle of momentum p is at deBroglie wavelength $\lambda = h/p$ does not mean a particle of momentum p can be at that wavelength. Before you make such assumption, you must make sure particles have the sufficient energy to be at that wavelength. You must derive the wavelength of a particle for the energy contained in a particle, not by some ad hoc assumption.

If an experiment has demonstrated that a particle behaves as a wave of deBroglie wavelength, it must be an experimental error or misinterpretation of experimental data or downright experimental blunder. Most certainly a Double-Slit blunder [2]. It is no surprise since experiments are design to support a theory, not to disprove them. As a result, experimenters only see what they want to see. Experimenters can easily overlook what they do not want to see; they fail to see the real picture in the haste of proving what they intended to prove. After all, there is no glory in disproving. There is no glory in disproving anything whether it is relativity, Quantum

Mechanics, or anything else. No real genuine experiment can prove that the deBroglie wavelength is right without making an experimental blunder. We already know double-slit experiment using a beam of particles is an experimental blunder [2]. Since it is the same experiment that had been used to substantiate the deBroglie wavelength, we have no doubt about the outcome. If there is an experiment that shows a theoretical blunder to be correct, then that experiment itself must also be an experimental blunder.

It is the moving charges that generate electromagnetic radiation waves when the charge is stopped, accelerated, or decelerated. In Double-Slit experiment and Particle Microscopes, it is the stopping of charges that generate waves that travels at the speed of light. It is motion of charge, chomentum that generates waves, not momentum. Mass of a particle here is just a carrier of charges since a charge has neither existence nor motion without a mass. Smaller the mass higher the speed and hence higher the chomentum and the frequency of the wave generated. It is only the radiation constant, the proportionality factor between the frequency and the chomentum, that depends on the mass of the smallest charge carrier, electron, which is a universal parameter. Wave generation with the motion of charge particles have nothing to do with the motion of the particle mass or the momentum, and everything to do with the motion of charges or the chomentum.

The motion of electrically neutral particles or mases do not produce waves when they are stopped, accelerated, or decelerated since there cannot be waves when charge is zero. It is the acceleration and deceleration of charges that generate electromagnetic radiation waves, not the masses. That is why we cannot have Marble Microscopes. Smaller the mass of particles that carry charges, higher the speed and hence higher the frequency of radiation when they are stopped. That is why we have Electron Microscopes, not Proton Microscopes or Marble Microscopes. If deBroglie wavelength holds true, we should be able to increase the resolution of Particle Microscopes by using particles of bigger and bigger masses, utter nonsense. DeBroglie wavelength is counter intuitive since deBroglie wavelength is inversely proportional to the mass of a particle. Which strings in a guitar generates higher frequencies? The answer is obvious. The fact is that a beam of electrons travelling at the momentum p provides a much higher resolution than a beam of protons travelling at the same momentum p , this is a contradiction to deBroglie conjecture and Quantum Mechanics. Momentum does not generate waves. It is the chomentum that generates electromagnetic radiation waves when a charge is brought to collision with a barrier in the Double-Slit experiment or with a specimen that is under investigation in Electron Microscopes.

In orbiting systems such as Atoms, particles orbit a central mass, the nucleus. The angular momentum of

an orbiting particle in a multi-particle orbiting system is not conserved [6], not a constant. However, the total orbit angular momentum of an orbiting system is conserved, a constant. This non-zero constant angular momentum results in Spin angular momentum that is equal and opposite to counteract the orbital angular momentum of the orbiting system. The net angular momentum of the orbiting system, i.e. the vector sum of the orbital angular momentum plus the Spin angular momentum, is a null vector.

The Spin angular momentum of an atom is equal and direct opposite to the orbital angular momentum of an atom. Due to the negative charge of electrons, the direction of the Spin Magnetic Moment (SMM) is in the same direction as the Orbit Angular Momentum of the Orbiting System. The axis of Spin of an orbiting system is also the axis of Spin of the central mass. In the case of an atom, the axis of spin of an Atom is the same as the axis of spin of the nucleus. If there is no orbital angular momentum, there will not be Atomic Spin. Spin is an intrinsic property of an Orbiting System. Every orbiting systems from atoms to planetary systems to galaxies spin. Some of the planets with melting core such as earth generates Spin Magnetic Moment (SMM) due to the Spin. Since the motion of the core is restricted, not a free motion, the direction of earth's Spin Magnetic Moment is different from the Spin Angular Moment.

The orbiting electrons generate Orbit Magnetic Moment (OMM) that is orthogonal to the orbiting plane. The spinning nucleus takes the electrons in the Atom on a Merry-Go-Round generating Merry-Go-Round Spin Magnetic Moment. Merry-Go-Round Spin Magnetic Moment is orthogonal to the plane of spin, which is the same as the orbital plane. The Merry-Go-Round Spin Magnetic Moment is equal and opposite to the Orbit Magnetic Moment and hence they cancel out. The net Magnetic Moment due to the orbiting of electrons and the Merry-Go-Round-Spin of electrons is a null vector.

A particle spins on its own axis through its center of mass while orbiting another particle of bigger mass or bigger electrical charge that is opposite of the orbiting particle's charge. Both Spinning and Orbiting can take place only in 3-Dimensional space. No Spin of a mass can take place in 2-Dimension. Particles cannot even exist in 2-Dimension, not to mention the Spin. There are no 2-Dimensional Matrix Operators. Spin Matrix operators of order (2×2) cannot exist.

Both atomic spin and orbiting take place on the same plane. It is only when the Spin angular momentum of an orbiting object is negligible compared to the orbiting angular momentum of the orbiting system that the spin plane of an orbiting object can be deviated from the orbiting plane as in the case of an electron or some of the moons of heavier planets such as Jupiter.

The direction of the Spin angular moment of an orbiting system is orthogonal to the plane of spin, which is also the plane of orbit. The direction is given

by the righthand rule and it is neither Up nor Down as far as the atom is concerned. The direction of a Vector is always relative. The direction of Spin can be in one direction, positive (Spin-Up) or in the opposite direction, negative (Spin-Down) relative to an Observer. Both Spin-Up and Spin-Down reside in the same Particle. Spin-Up and Spin down are non-separable. There are no Spin-Monopoles, and as a result, there are no Spin-Up particles or Spin-Down particles. If a particle appears as Spin-Up for an Observer when the particle is observed in one direction, the same particle will be Spin-Down for the same Observer when the particle is observed from the opposite direction. Spin-Up is not a state of a particle. Similarly, Spin-Down is not a state of a particle. Spin-Up and Spin-Down are Observer dependent. Spin-Up and Spin-Down are not absolute, and hence cannot be Quantized. Spin cannot be Quantized without Spin Monopoles. There are no spin Monopoles.

In the case of an atom, the Spin angular momentum of electrons compared to the orbit angular momentum is negligible since the radius of electron mass is negligible compared to the orbit radii of electrons. Further, the contribution to the Spin Magnetic Moment of an Atom from the individual spin of electrons is negligible due to the magnetic coupling of the electrons in an Atom; no two neighboring electron pairs have the same Spin Magnetic Moment polarity. The Spin angular momentum of the nucleus itself is also negligible since the radius of the nucleus also negligible compared to the orbit radii of electrons. However, although the Spin Magnetic Moment (SMM) due the Merry-Go-Round motion of electrons as a result of atomic Spin or the Spin of the nucleus is significant, it is totally cancelled out by the Orbit Magnetic Moment (OMM) since it is equal and opposite of the Merry-Go-round Spin Magnetic Moment (SMM). Both orbit plane and the Merry-Go-Round Spin plane are the same; they coincide since one is a result of the other. The direction of the Merry-Go-Round Spin is always orthogonal to the plane of Spin, which is also the orbital plane. So, what is left is the Spin Magnetic Moment due to the spin of the nucleus itself on its own axis. As a result, the Atomic Spin Magnetic Moment (SMM) is due to the spin of the nucleus itself on its own axis.

Angular momentum operator $\mathbf{l} = (l_x, l_y, l_z)$ satisfies the self-cross-product, $\mathbf{l} \times \mathbf{l} = j(2\hbar)\mathbf{l}$. However, the reverse is not necessarily true. Any operator that satisfies $\mathbf{l} \times \mathbf{l} = j(2\hbar)\mathbf{l}$ does not represents angular momentum operators l_x, l_y, l_z . We can find (2×2) matrices S_x, S_y, S_z that satisfy $\mathbf{l} \times \mathbf{l} = j(2\hbar)\mathbf{l}$. The eigenvalues of S_z are $s = \pm 1$, not $\pm 1/2$. In order for S_x, S_y, S_z to be Spin Matrices, the minimum and the maximum eigenvalues of S_z must also satisfy $s(s+1) = 3$ for both eigenvalues, which is impossible with any symmetric matrix. When $s = \pm 1$, $s(s+1) \neq 3$. Further, starting from the minimum eigen value $s_{\min} = -1$ in steps of +1 to $s_{\max} = +1$, we have 3 steps, $s = \pm 1, s = 0$. The number of steps from s_{\min} to s_{\max} is different from

the number of eigenvalues of \mathbf{S}_z ; they must be the same for \mathbf{S}_z to exist. As a result, no 2-Dimensional Spin Matrices can exist when the correct wavelength is used.

If the deBroglie wavelength is used, the eigenvalues of \mathbf{S}_z are $s=\pm 1/2$. It has two eigenvalues. Starting from minimum eigenvalue $s_{\min}=-1/2$, increment of +1 gives one level +1/2, which is also the maximum eigenvalue $s_{\max}=+1/2$. In this case, ℓ can be both $s_{\min}=-1/2$ and $s_{\max}=+1/2$ and hence in order for (2×2) Spin matrices to exist, both $s_{\max}=-1/2$ and $s_{\max}=+1/2$ must satisfy $s(s+1)=3/4$; this is impossible with any symmetric matrix. It satisfies with $s_{\max}=+1/2$, but not with $s_{\max}=-1/2$. As a result, (2×2) Spin matrices only represent Spin-Monopoles, not Bi-Polar Spins. Since there are no Spin-Monopoles, Spin matrices cannot exist even when the incorrect deBroglie wavelength is used.

In addition, if there exists finite dimensional square matrix operators \mathbf{S}_x , \mathbf{S}_y , \mathbf{S}_z representing angular momentum operators \mathbf{L}_x , \mathbf{L}_y , \mathbf{L}_z , there must also exist finite dimensional position matrix operators \mathbf{R}_x , \mathbf{R}_y , \mathbf{R}_z and finite momentum operators \mathbf{P}_x , \mathbf{P}_y , \mathbf{P}_z . However, no finite matrix operators can satisfy the non-commutative relationship $\mathbf{R}_i\mathbf{P}_j-\mathbf{P}_j\mathbf{R}_i=j(2\hbar)\mathbf{I}$, $i=x, y, z$, and \mathbf{I} is identity matrix. No matrices of infinite order can satisfy the non-commutative relationship either since Matrix Operators must be Square Matrices, but no matrix of infinite order can be square. Matrices of infinite order cannot be Hermitian. Operators of observables must be Hermitian. As a result, Quantum Mechanics has no place for Matrix Operators. Matrix Operators cannot exist in Quantum Mechanics. You may find square matrix operators that satisfy $\mathbf{L}\times\mathbf{L}=j(2\hbar)\mathbf{L}$, but these Matrix Operators cannot be an outcome of Position and Momentum Operators that generate the parameters of so called Particle Waves. Angular Momentum Matrix Operators cannot exist without corresponding Position and Momentum Matrix Operators. Position and Momentum Operators cannot be Matrices in Quantum Mechanics. As a result, angular momentum matrix operators have no place in Quantum Mechanics.

Spin Matrix Operators do not generate Spin angular momentum since Spin Matrix Operators have nothing to do with Position and Momentum Operators. Spin Matrix Operators cannot exist without corresponding Position and Momentum Operators. Spin Matrix operators only represent Spin-Monopoles, not bipolar Spins. Spin Matrix Operators cannot exist without the existence of Spin-Monopoles; there are no Spin-Monopoles. Spin is Bi-Polar. Spin of a mass cannot take place in 2-Dimensional Space. There are no 2-Dimensional Matrix Spin Operators. No particle can even exist in 2-Dimensional Space. Observable Spin of a mass can only take place in 3-Dimension. There are no 3-Dimensional Bi-Polar Spin Matrix Operators.

Just because one can find matrices \mathbf{S}_x , \mathbf{S}_y , \mathbf{S}_z that satisfy $\mathbf{L}\times\mathbf{L}=j(2\hbar)\mathbf{L}$ does not mean that those matrices

represent observables. The so-called Spin Matrices do not represent Operators of Observables. For Operators to be Operators of Observables, Operators must be invertible. All the so-called Spin Operators are singular; they are not invertible. Any Operator that is singular does not have real existence. Operators that are singular are present only on paper.

Further, any Operator of an observable must also be Hermitian, so the outcome will be real. The traces of matrix operators, \mathbf{S}_x , \mathbf{S}_y , \mathbf{S}_z must also be zero. So-called Spin Matrices are indeed Hermitian, $\mathbf{S}_i=\mathbf{S}_i^H$, $i=x, y, z$, and traces of Spin Matrix Operators are also zero, Trace $(\mathbf{S}_i)=0$, $i=x, y, z$. However, although it is necessary for an operator to be Hermitian and zero-Trace, it is not Sufficient. Operators must also be Invertible. For Spin Matrix Operators to be invertible, they must be non-singular. All the Spin Matrix Operators are singular, $|\mathbf{S}_i|=0$, except for the (2×2) Matrix Operator \mathbf{S}_z . (2×2) Matrix Operators \mathbf{S}_x , \mathbf{S}_y are singular. Spin Matrices \mathbf{S}_x , \mathbf{S}_y , \mathbf{S}_z of order $(M\times M)$, where, $M>2$, are singular. As a result, Spin Matrix Operators cannot be Operators of Observable. When an Operator is non-invertible, the outcome is not unique. The outcomes of Spin-Matrices are not unique. There can be infinitely many input states that results in the same outcome. For an Operator to be Operator of an Observable, Operator must be invertible. The so-called Spin-Matrix Operators, \mathbf{S}_x , \mathbf{S}_y of order (2×2) are singular, not invertible, and as such, Spin Matrix Operators have no place in Quantum Mechanics.

An electron in an atom Spins on its own axis through the center of mass of the electron while orbiting the nucleus on its own orbit. The nucleus itself spins on its own axis through the center of the mass of the nucleus, which is also the center of the mass of the Atom. When nucleus spins, what Spins with it is the whole atom, the Atomic Spin. Spin Magnetic Moment due to the spin of an electron on its own axis is proportional to the square radius of electron mass or the surface area of an electron, which is negligible. In addition, since electrons in an Atom come in pairs and their orientations or the Spin Magnetic Moments are opposite to one another due to the repulsion of the alike and the attraction of the opposite; the net Spin Magnetic Moment of a pair of electrons is zero. As a result, spins of electrons do not have to coincide with the same plane as the orbital plane.

The Spin Magnetic Moment of nucleus due to the spin of the nucleus itself is proportional to the square radius of nucleus or the surface area of the nucleus. The Spin Magnetic Moment of electrons in an Atom due to the Spin of electrons themselves on their own axes is negligible compared to the Spin Magnetic Moment of the nucleus due to the Spin of the nucleus itself on its own axis. When nucleus spins, nucleus takes the electrons that are bound to it by their orbits on a Merry-Go-Round ride generating circular current loops for each electron. However, the Merry-Go-Round Spin Magnetic Moment of electrons due to the

Spin of the nucleus is equal and opposite to the Orbit Magnetic Moment due to the orbiting electrons in an Atom, and hence they cancel out. As a result, what is left is the Spin Magnetic Moment due to the spin of the nucleus itself. The Spin Magnetic Moment of an Atom is due to the spin of the nucleus. Atomic Spin is the Spin Magnetic Moment of an Atom due to the spin of the nucleus.

Any Atom, irrespective of it is electrically charged or electrically neutral, has an Atomic Spin Magnetic Moment orthogonal to the plane of Spin. The direction of Spin relative to an Observer is (+) in one direction and (-) against that direction, which we may label as (positive ↗, negative ↘), or (Spin-Up ↗, Spin-Down ↘). Spin-Up does not have to be ↑ and Spin-Down does not have to be ↓. Spin-Up can be in any direction and Spin-Down is against that direction. One can choose any direction as Up and then the opposite direction will be Down. If you choose Spin-Up as right →, then Spin-Down will be left ←. As far as Spin Magnetic Field of an Atom is concerned, it goes in orthogonal to the plane of Spin from one side and comes out from the other side; there are no Ups and Downs.

The Atomic Spin Magnetic Moment is constant in \pm direction orthogonal to the plane of Spin. The plane of Spin is the same as the Orbiting Plane of electrons. The Plane of Spin of the Sun is the same as the orbiting plane of the planetary system. The direction of Atomic Spin Magnetic Moment is determined by the Orbit angular momentum of an atom. Whether the Spin Magnetic Moment of an atom is positive (UP ↗) or negative (Down ↘) is determined by an observer. The Spin angular momentum of an Atom is always equal and opposite to the orbit angular momentum of an Atom since the net angular momentum on an atom must be zero. Since the orbit angular momentum of an atom is constant, the Atomic Spin Magnetic Moment is \pm Constant; it is not quantized. An atom that is free to rotate in any direction can have its Atomic Spin Magnetic Moment oriented in any direction when there are no nearby atoms or external magnetic fields.

However, in the presence of other atoms or an external magnetic field, no atom has the freedom to have any orientation. The Spin Magnetic Moments of atoms will be coupled to their neighboring atoms by the attraction of opposite poles and the repulsion of the alike. In the presence of an external magnetic field, the torque generated will align the Spin Magnetic Moment with the External Magnetic Field. The phenomenon, attraction of opposite polarities and the repulsion of the same polarities of neighboring atoms, is also the same as the alignment of Spin Magnetic Moment of atoms with an external field. The constant Spin Magnetic Moment of an Atom depends on the number of electrons in an Atom, charge of an electron, and the frequency of the Atomic Spin. The frequency of the Atomic Spin depends on root mean square (rms) orbit radius of all the electrons in the Atom. The net angular momentum of an Atom resulted from both

Spinning and Orbiting, must be zero, and hence the Spin angular momentum is equal and opposite of the orbit angular momentum.

Atomic Spin angular momentum is a vector. Any angular momentum, whether it is a Spin angular momentum or Orbit angular momentum, is a vector. Since the Spin angular momenta of electrons on their own axes are negligible and the net Spin Magnetic Moment due to the Spin of electrons in an atom is zero due to the attraction of opposite and the repulsion of alike, the plane of spin of electrons may or may not coincide with the orbital plane. Spin Magnetic Moment of an Atom is nearly unaffected by the Spin Magnetic Moment of electrons on their own axes.

Since the angular momentum and the Spin Magnetic Moment are vectors, they do not come in quanta or they cannot be quantized. Spin Magnetic Moment is not quantized. Orbit angular moment is not quantized. Spin is Bi-Polar. Orbit Angular Momentum is Bi-Polar. Angular Momentum in general is Bi-Polar. Spin Magnetic Moment is Bi-Polar. Bi-Polar entities cannot be Quantized. Bi-Polar entities do not come in Quanta.

In addition, orbit angular momentum of an electron in a multi-electron atom is time varying [6, 9]. Time-varying quantities cannot come in quanta. Time-varying quantities cannot be quantized. It is the angular momentum of an orbiting system that is time invariant.

The momentum of a particle is not unique to that particle. The angular momentum of a particle is not unique to that particle. The Spin Magnetic Moment of a particle is not unique to that particle. The quantities that are not unique cannot come in quanta. Non-unique quantities cannot be quantized. There is no way to find out if a given angular momentum quanta belongs to mass m or M , where $m \neq M$. It is not only that the vectors such as Angular Momentum and Spin Magnetic Moment cannot be quantized, but also it is meaningless to quantize non-unique and time-varying quantities such as Angular Momentum and Spin Magnetic Moment. It is only the electromagnetic energy that can be quantized naturally in the nature since electromagnetic waves comes in electromagnetic bursts. Electromagnetic energy is not the same as the kinetic energy. Kinetic energy is continuous. Kinetic energy does not come in wave bursts or quanta. Potential energy is continuous. Potential energy does not come in quanta irrespective of whether it is gravitational, electrostatic, or magnetic potential. Not all the energies are created equal.

Invalid claim that the Spin Magnetic Moment is quantized had been supported by a bogus interpretation of the Stern-Gerlach Experiment. The beam splitting of the Stern-Gerlach Experiment had been interpreted as a spatial quantization of Spin Magnetic Moment, which is incorrect. What the experimenters overlooked was the fact that the Stern-Gerlach Experiment is simply insensitive or blind to

the orientation of the Spin Magnetic Moment of an Atom. They failed to realize that the information regarding the orientation of an Atom is completely lost when an atom passes through the Stern-Gerlach Magnetic Field or any magnetic field. They failed to consider the magnetic coupling of Atoms in a beam. Even before the Atoms in a beam of Atoms enter the Stern-Gerlach magnetic field, Atoms are already magnetically coupled. Half of the Atoms in a beam are oriented in one direction and the other half of the Atoms are oriented against that direction. Neighboring atoms have opposite orientations. No two neighboring Atoms have the same orientation.

Noteworthy:

Since the Atoms in a beam are magnetically coupled, by changing the orientation of just one Atom, you are changing the orientation of all the atoms in a beam. Orientation of neighbors are against each other. Half of the Atoms in a beam have one orientation while other half has the opposite orientation.

When the first atom enters the Stern-Gerlach Magnetic Field, it immediately orients itself with the magnetic field before the rest of the atoms enter the Stern-Gerlach Magnetic Field. Since the External Magnetic Field \mathbf{B} is such $\mathbf{B} \gg \partial \mathbf{B} / \partial z$, the orientation takes place before any drift takes place. When the first atom orient itself towards the Stern-Gerlach Magnetic Field, the rest of the atoms in the beam follow the suit due to the existing magnetic coupling between atoms in the beam even before the rest of the Atoms enter the Stern-Gerlach Magnetic Field. When the first Atom is in a strong external magnetic field, the rest of the atom in the beam have no option but to follow. Now, just after the first Atom entered the Stern-Gerlach Magnetic Field, the Atoms are arriving pre-aligned either towards or against the Stern-Gerlach Magnetic Field. This is what Stern and Gerlach had failed to realize, and this failure lead to wrong conclusions, voodoo-physics.

When a beam of Atoms enters the Stern-Gerlach Device, one half of the atoms enter already aligned towards the Stern-Gerlach Magnetic Field while the other half enter aligned against the Stern-Gerlach Magnetic Field, alternatively. After the first atom entered the Stern-Gerlach Magnetic Field (SGMF), the rest of the atoms enter Stern-Gerlach Magnetic Field one by one aligned either toward or against SGMF alternatively. The first Atom of any beam is always aligned with the SGMF unless it is against SGMF. Every atom undergoes the same amount of deflection along the Stern-Gerlach magnetic field either positively or negatively. Atoms aligned toward the Stern-Gerlach Magnetic Field drift positively (Spin-Up \uparrow) while the atoms arriving aligned against the Stern-Gerlach Magnetic Field drift negatively (Spin-Down \downarrow). This Up and Down drift has nothing to do with the original orientation of the Atom or the state of

the Atom. One beam has been split into two separate beams of each with the same number of atoms but with the orientation one against the other. At any time, both Split-Beams have the same number of Atoms since they enter SGMF with alternate alignment, one Atom towards SGMF and the next Atom against SGMF alternatively. One beam is Spin-Up while the other is Spin-Down relative to an observer or relative to the Stern-Gerlach Magnetic Field. This Up and Down alignment says nothing about the actual alignment of Atoms prior to entering the Stern-Gerlach Device.

There is no uncertainty about which Atom ends up in which beam. The first Atom always ends up in Spin-Up beam if its orientation is not totally against the SGMF. The second in Spin-Down beam. The third in Spin-Up, forth in Spin-Down and continues alternatively; Atoms at odd positions, 1, 3, 5, ... will be in Spin-Up Beam while Atoms at even positions, 2, 4, 6, ... end up in Spin-Down beam.

However, if the first Atom has the orientation against the SGMF before it enter the SGMF, then, when it enters Stern-Gerlach Device, it always be in Spin-Down beam and hence, in this case, all the atoms in odd positions 1, 3, 5, ... will be in Spin-Down beam while the Atoms in even positions 2, 4, 6, ... will be in Spin-Up beam.

Atoms in the Spin-Up beam remain in that orientation as long as they are in the Stern-Gerlach Magnetic Field. Similarly, the atoms in the Spin-Down beam remain in the same orientation as long as they are in the Stern-Gerlach Magnetic Field. Spin-Up and Spin-Down in SGMF is volatile. Once the Split-Up and Split-Down split beams are out of the SGMF, they are not in that orientation due to the magnetic coupling of the Atoms. The orientations of neighboring Atoms in each split beam will be opposite to each other in the absence of external magnetic field.

Before all the Atoms are free of the first SGMF, if we send the atoms in the Spin-Up Split beam or Spin-Down Split beam through a second Stern-Gerlach Magnetic Field placed in the same direction as the direction of the first SGMF, there will be no splitting since all the atoms in the beam are in the same forced orientation by the First Stern-Gerlach Magnetic Field. All the atoms enter with the orientation toward the second SGMF and undergo the same deflection without splitting and hit the screen at a single point. Placing a second Stern-Gerlach Device in this manner is equivalent to the direct extension of the length of the first SGMF. There is no wavefunction collapse here. State of a particle is not determined by a wavefunction. Particles do not have wavefunctions. Moving charge particles generate electromagnetic waves if they are stopped.

Before all the Atoms are out of the first SGMF, if we send the atoms in the Spin-Up Split beam or Spin-Down Split beam through a second Stern-Gerlach Magnetic Field placed at an angle to the direction of the first SGMF, then, there will be a beam splitting.

Now the orientation of the first Atom is entering the second SGMF at an angle. As long as that angle $\theta \neq 180^\circ$ degrees, there will be an alignment torque. As soon as the first Atom enters the second SGMF, it immediately orients itself with the second SGMF and deflected as Spin-Up. As a result, the second Atom enters the with the orientation against the second SGMF due to magnetic coupling between Atoms. All the Atoms in odd positions, 1, 3, 5, ... in the beam enter in the direction of the second SGMF while the Atoms in even positions, 2, 4, 6, ... enters aligned against the second SGMF. This results in the Spin-Up or Spin-Down beam entering the second SGMF splitting into two, one with the orientation along the second SGMF while the other aligned against the SGMF. Spin-Up in the second SGMF is different from the Spin-Up in the first SGMF. It is always the direction of the SGMF that determines the Spin-Up; it has nothing to do with the original orientation of an Atom or the state of an Atom. New Spin-Up from the second SGMF has nothing to do with the Old Spin-Up in the first SGMF. Current Spin-Up or Spin-Down has nothing to do with the previous Spin-Up or Spin-Down. Current Spin-Up is in the direction of the second SGMF while the old Spin-Up is in the direction of the first SGMF. Similarly, the current Spin-Down is against the second SGMF while the old Spin-Down is against the first SGMF. The directions of first and second SGMFs are determined by an observer. The direction of the Atomic Spin Magnetic Moment or the orientation of an Atom is determined by the population of the Atoms and any other magnetic field of the environment the Atom is in.

When a beam of atoms passed through a Stern-Gerlach Magnetic Field, we have Spin-Up beam and Spin-Down beam with the same number of atoms. As long all the Atoms are under the influence of the Stern-Gerlach Magnetic Field, both beams remain in that forced orientation. However, when the Stern-Gerlach Magnetic field is turned off or when all the atoms are out of the Stern-Gerlach Magnetic Field, there is no force to keep all the atoms in one orientation and hence natural attraction of the opposites and the repulsion of the alike take over. As a result, atoms in Spin-Up beam will not remain in that orientation. They re-orient themselves so that no two neighboring atoms will remain in the same orientation just like the original beam. Atoms in the Spin-Down beam also undergo the same re-orientation when there is no external magnetic field to force them to be in one orientation. Each beam now has half of atoms in one orientation and the other half in the opposite orientation alternatively just like they were in the original beam.

SGMF is not a state-washer of an Atom or a particle. SGMF is not a brainwasher. SGMF is not after secretly gathering personal information of Atoms or particles. SGMF is just an enforcer; SGMF enforcement is volatile. You are welcome in my territory if you follow the Bushism while you are in my

territory. You are free to leave any time. What you do is none of my business when you are out of my territory. Once you leave, you will not even have a trace of evidence to that you had been in a SGMF. Whether you are a single Atom or a beam of Atoms, once you leave SGMF, your orientation will be the same as the orientation before you entered the SGMF.

If you send one of these Spin-Up or Spin-Down split beams that is completely out of the influence of the first SGMF through a second Stern-Gerlach Magnetic Field (\nearrow or \rightarrow) with any orientation, the beam will Split into two beams; one beam has the orientation with the second Stern-Gerlach Magnetic Field (Spin-Up \nearrow or \rightarrow) while the other has the orientation against the second Stern-Gerlach Magnetic Field (Spin-Down \swarrow or \leftarrow). You can define Up and Down anyway you like. Up can be any direction one chooses to be, \uparrow , \nearrow , or \rightarrow , while the Down is the any of the opposites. One beam will be aligned along the second SGMF while the other will be aligned against the second SGMF. Each Split beam now contains one fourth of the atoms of the original beam. Once again if $\theta \neq 180^\circ$ degrees, Atoms at odd positions, 1, 3, 5, ... will be in Spin-Up Beam while Atoms at even positions, 2, 4, 6, ... end up in Spin-Down beam, where θ is the angle between the orientation of the first Atom in the beam and the second SGMF.

If $\theta = 180^\circ$ degrees, then Atoms in odd positions, 1, 3, 5, ... will be in Spin-Down beam while the Atoms in even positions, 2, 4, 6, ... will be in Spin-Up beam. In this case, Spin-Up means orientation along the second SGMF and Spin-Down means against the second SGMF. The orientation of the Split beam is always relative to the direction of the SGMF the Atoms are in. Atoms have no memory of previous orientation. It is we who decide the orientation of SGMF. We can choose whatever the direction we want SGMF to be.

There is no wavefunction association with particles. Probability plays no part here. Everything here is deterministic. When Atoms goes through the second SGMF, the Spin-Up and the Spin-Down are relative to the direction of the second SGMF, previous directions are completely forgotten, erased, just like what happened to Ronald Reagan during the contra affairs; he could not remember anything.

Particles do not behave as waves here. There is no wavefunction in action here. No roll of Dies or probability here. Nature does not have to roll the dies to determine what to do next since nature knows exactly what it is doing. It is we who roll dies because we do not know how nature works. The reality is deterministic. Everything in nature is deterministic. The way people turn everything in nature into financial gold mines by plugging in some sort of hypothetical mystery here and there is simply pathetic, appalling, but mystery sells books even when it is an artificially forced fabricated mystery. Some of these books have become all-time best sellers overnight, so why not? How did the voodoo-physics books become best

sellers making new kind of multi-millionaires? Human appetite for mystery, not the reality is the answer. The same reason why Harry-Potter books disappear from bookstore shelves. How and why did the meaningless archaic religious texts that has no value in any comprehensible manner become the most printed books? Those are books written by ancient people in the flat-earth or earth-centric era, who had no idea even what goes around what. It is incomprehensible why those Crafted Prophecies (CRAP) are still stuck with us like leaches that suck life out of.

You can Split a beam of atoms into two beams using non-linear magnetic field such as Stern-Gerlach Magnetic Field so that all the atoms in one beam will be oriented toward the Stern-Gerlach Magnetic Field (Spin-Up \uparrow) while all the atoms in the other beam are oriented against the Stern-Gerlach Magnetic Field (Spin-Down \downarrow). This is still a forced orientation by an External Magnetic Field. If you want to maintain the same orientation in each split beam, all the atoms in each beam must be in the External Magnetic Field. Once all the Atoms in the Spin-Up beam are out of the SGMF, they will not remain in the same direction as the direction of the SGMF. Similarly, once all the Atoms in the Spin-Down beam are out of the SGMF, the Atoms in Spin-Down will not remain in the direction against the direction of the SGMF.

There is no Spin-Down Atom without a nonlinear external magnetic field. You can get Spin-Up Atom with linear external magnetic field. You cannot get a Spin-Down Atom with linear external magnetic field. If you send a beam of Atoms through external linear magnetic field, all the Atoms in the beam align with or against the external magnetic field, but there is no deflection of atom with one orientation in one direction and the Atoms with opposite orientation in the opposite direction. As a result, you have no Spin-Up beam or Spin-Down beam with a linear external magnetic field.

If you want a Spin-Up Atom, you can use any linear magnetic field to get it since an Atom in an external magnetic field is always oriented toward the magnetic field, Spin-Up. You cannot do the same to get a Spin-Down Atom though. You cannot get a Spin-Down Atom using a linear external magnetic field. If you want a Spin-Down Atom, you need at least two magnetically coupled Atoms, and you must use a nonlinear magnetic field such as Stern-Gerlach Magnetic Field to get it. First Atom is always Spin-Up and deflected towards the SGMF and the second Atom is Spin-Down and deflected against the SGMF. What you get from SGMF is a forced orientation, not a natural orientation of atoms. You cannot split a beam into forced orientation of Spin-Up and Spin-Down beams using ordinary uniform magnetic field since the deflection force is zero in the absence of Magnetic Field Gradient.

The orientation of Atoms in the SGMF has nothing to do with the actual orientation of the Atoms. Spin-Up beam simply means that the Atoms in the beam are

aligned with the direction of the SGMF irrespective of the orientation of the SGMF; the direction of SGMF can be horizontal, vertical or in any other direction. Spin-Down beam means the Atoms in the beam are aligned against SGMF. It is we who chose the direction of the SGMF. You cannot prepare an Atom to be Spin-Up or Spin-Down since Up means whatever direction the SGMF is directed to and Down means against that direction. Once the Atoms are out of the SGMF, the orientations of the Atoms will not be the same since they are determined by the population of the Atoms and any other magnetic field of the environment the Atoms are in.

When an Atom passes through the Stern-Gerlach Magnetic field, the information regarding the original orientation of the Atom is completely lost. The split beams Spin-Up and Spin-Down say nothing about the original Spin Magnetic Moment (SMM) of the Atoms. Spin-Up beam and Spin-Down beams are on a forced orientation determined by the direction of the SGMF determined by observers. As a result, Stern-Gerlach is not a Device for measuring the Spin of an Atom. It is not a device to prepare an Atom for a certain Spin since the forced orientation is volatile. It is only a Device for separating the Spin Magnetic Moment of Atoms aligned toward SGMF from the Atoms oriented against it; this alignment is temporary. Once the atoms are out of the SGMF, forced orientation is lost.

There are no such things called Spin-Up beams or Spin-Down beams. They are forced alignments by Stern-Gerlach Magnetic Field. Those are not permanent alignments. Those alignments disappear when the Stern-Gerlach Magnetic Field disappear or when all the atoms are out of the Stern-Gerlach Magnetic Field.

There is absolutely no difference between Spin-Up beam and Spin-Down beam. Spin-Up and Spin-Down are observer dependent, relative. Take Spin-Up Atom and rotate it by 180° degrees, what you get is a Spin-Down Atom relative to your Spin-Up direction. Now, take a Spin-Up Atom relative to an Observer. This time, instead of rotating the Spin-Up Atom, rotate the Observer by 180 Degrees, what does the Rotated Observer see? Rotated Observer sees that Atom as Spin-Down.

Earth is Spin-Up for people in the Northern Hemisphere. The same earth is Spin-Down for the people in the southern Hemisphere. If you are in the space, Spin of the earth depends on the direction you are looking at. Spin-Up for one person in Space can be Spin-Right or Spin-Left for another Observer in Space. Spin-Up or Spin-Down is not attached to an Object; it is attached to an Observer. There are no Spin-Down or Spin-Up particles since Spin-Monopoles do not exist. Spin-Up is not a state of a particle. Spin-Down is not a state of a particle. This mantra is repeated to stress the importance of the message; if we had understood this, we would not have come across Quantum Spookiness.

The Split of a beam of atoms into two beams is not

a Spatial Quantization of the Spin Magnetic Moment. It is not a wavefunction or probability that determines whether an atom ends up Spin-Up or Spin-Down split beams. In which of the two beams an Atom ends up is completely deterministic. The split of a beam of Atoms into two beams is a result of magnetic coupling of the atoms in a beam. Stern-Gerlach Experiment is insensitive to the orientation of Spin Magnetic Moment. To change the orientation of atoms in a beam, all you have to do is to change the orientation of one atom in the beam and the rest follow the suit. In the case of Stern-Gerlach, it is the first atom that entered the SGMF that changes the orientation of the Atoms in the whole beam. Since the SGMF is strong, it has a firm grip on the first Atom of the beam that enters it, and hence the rest of the Atoms in the beam has no option but to follow the suite due to the magnetic coupling between the Atoms. Strong SGMF does not allow the orientation of the first Atom to budge.

State of a particle is not probabilistic. State of a charge particle cannot be uncertain. Uncertainty cost energy. State of a particle cannot be defined by a wavefunction since the state of a particle must be unique. Wave function is not unique to a particle. Many particles can have the same wave function. If everything in the universe and the universe itself is determined by wavefunctions, then, the state of an embryo must also be determined by wavefunction. If a state of a human embryo is determined by a wavefunction, at which stage of the growth does the state of the person it grows into become certain and why?

The truth of the matter is that there are no wavefunctions associated with particles or objects. Position and Momentum of a particle are not independent of each other; they are mutually dependent. There cannot be a momentum without change of position. Change of position determines the momentum. Position cannot remain unchanged in the presence of a Momentum. Change of Momentum determines the Position of a particle unless the path of the particle is linear or circular, which are not waves. The position and Momentum of a particle are interlinked. Since Position and Momentum are mutually dependent, they are not a Fourier Transform Pair. As a result, there is no Uncertainty Principle. There is nothing preventing achieving Precision in both position and momentum simultaneously. All that is required is one radar pulse to determine both position and momentum simultaneously. There is nothing preventing in determining the position and momentum simultaneously. Both position and momentum can be determined simultaneously. Position and momentum are not probabilistic.

Energy of a particle is mechanical energy. Mechanical energy does not come in Quanta. Schrodinger Equation is just the time derivative of the plane wave function; it does not hold true [7]. There is nothing waving in a particle. Nature does not

normalize. You cannot quantize electromagnetic field to generate light particles [8]. Vectors cannot be quantized. Vectors are Bi-Polar. Bi-Polar entities cannot be quantized. The claim that every object including the universe itself has a wave function [3], and the decisions that have not taken in this world will be taken simultaneously in parallel world are even beyond fiction. If the energy is a constant, the proliferation of parallel worlds is going to drive the energy content thinner and thinner in this world we take decisions. Multi-world concept is going to proliferate the parallel worlds even faster than the Fibonacci numbers, or even the proliferation of rabbit population if there had not been a mechanism to naturally limit the life span of rabbits. Limited life span and the limited resources will keep the rabbit population in check, but no such check is there for the proliferation of Worlds under Many-World Theory.

Many-World theory is just a Crafted Prophecy (CRAP) to obtain a PhD, nothing more. Now, since we are at it, what is the purpose of doing a PhD? Become a professor, a publications counter? It is only after you received a PhD that you realize this degree has no use other than the ability call yourself a Doctor, which nobody cares. By doing a PhD, you have already wasted years of life under extreme odds for something that has no real value, in fact, a negative value. Your undergraduate colleagues are already managers at work when you get your PhD. Your undergraduate colleagues are the ones interviewing you for a job - so tell me Mr. so and so, what have you been doing all these years ...? To tell you the truth, I wasted it doing graduate studies, bye. If you have a PhD, there is another use, you can also write it at the end of your name, big deal indeed. Nowadays, you can also get a PhD certificate online for cash in no time and call yourself Doctor. You will receive your Degree certificate in mail from some dungeon, you know where. Most probably you can get a government job with that if you are young (governments are the most age discriminatory institution that exist), and no doubt, you will be working for your undergraduate colleagues who are now senior managers. When you apply for government jobs, somebody from human resources call you and request the birth date, even though it is illegal to do so, in the pretense of equal opportunity and enter it into data base so that they can screen out any future application based on age; you will never hear from them again; they call it equal opportunity.

Multi-Verse and Many-World concepts are utter nonsense. Just think about that. Do you really believe in those CRAPs (Crafted Prophecies)? Many-World and Multi-Verse are good publication mills for people in academia. Many-Worlds and Multi-Verse concepts are good for increasing the number of publications for people in academia, the only thing they care about. Not much else for others except some laughter, fictional entertainment, just like broom-riding Harry Potter books. The only thing people in academia care about is how to increase the number of publications,

nothing else matters, certainly not the content; it is just a result of pathetic situation of universities and people of the academia. The worst university I came across was the last university I attended, Carleton University. It was simply a waste of two years. How can an institution get so many mediocre people under one roof? Calling that place a university is simply an insult to the word university. Less than mediocre place, a waste of time and money. The so-called third world universities I attended were far superior than that place. Unless a university is carefully chosen, it is not only a time and money waster but also an emotional drainer. It is interesting that most of the people who become professors are the ones who cannot teach, lacks a good understanding of the subjects, lacks the ability to connect with students and provide guidance, and who are downright nasty. Telling a student "get a publication within six months or you are out" is not supervising. That is what happens when the recruiting is done based on the number of papers published in dinosaur journals; you get people who cannot teach; you get archaic guys with outdated knowledge and less than mediocre teaching skills.

If you turn the pages of dinosaur journals, you can see yourself that there is nothing in them other than page-filling nonsense. They talk as if they want to discover the universe, but their only interest is to cook up some publications that comply with the status quo of the archaic religious text. No question is more repulsive and preposterous than the question, "how many publications do you have?" That is the only thing they want to know if you apply for a faculty position, nothing else is important.

Spin-1/2 is a meaningless nonsense nobody seems to have any idea of what it really is. Every textbook talk about it without telling what it actually is. No one can explain it because there is no such thing call Spin-1/2. There is no doubt that Many-Worlds, Multi-Verse, Big-Bang, Universe Expansion, Spin-1/2, Particle-Waves, Wave-Particles, Time-Dilation, Space-time, Light Bending by gravity, Big Bang (Big Nonsense) will give you a good laugh about the state of Universities, dinosaur journals, and the higher education, and their high priests, mediocre professors. If you submit a paper that goes against these religiously guarded Crafted Prophecies (CRAP), it will be instantly rejected with no reason given by the high priest at the helm who are there no other purpose than just to protect the religious dogma. When it comes to mystique, Modern Physics has surpassed religions and ancient voodoo practices.

Most of the archaic dinosaur era journals are dedicated to the promotion and maintenance of status quo of voodoo-physics. Recently, some backward and silly websites such as arxiv have joined the task to promote and rescue voodoo-physics. If you want to publish there, you must become a cult member that adhere to their religious text, anything that counter the cult-text will be deleted instantly and the voodoo-club membership will be cancelled. Only the practicing

voodoo-physics cult members that adhere to the religious text are allowed publish there. You require the blessing of at least two voodoo-club members to join. It is understandable since any exposure of cracks in the foundation of voodoo-physics will dry up their funds, the lifeline. They are as much blind to anything outside the religious text as the people who run those dinosaur journals.

Even more amusing, of course next to COVID-19 Modelling (biggest joke in the pretense of science by Government officials), is the idea that the space emerges from a wavefunction. Now we are in a Chicken and Egg situation. Which came first? Who created the creator? Wave function cannot exist without space. How can the space be an emergence of a wavefunction? Wavefunction has no existence without a position and momentum of a Particle. There is nothing waving in a particle either. There is no wavefunction since position and momentum of a particle are mutually dependent. You cannot have a momentum without change of position of a particle, and state of a particle is unique. It does not matter what the size of a mass is, if the momentum is a constant, the path of the particle is either linear or circular, not a wave. In order for position and momentum of a particle to be a Fourier Transform Pair, for a give position of a particle, the momentum should be able to have infinitely many values, and for a given momentum of a particle, the position of the particle should be able to have infinitely many positions, which is impossible for a real particle since a particle cannot be at infinitely many places at the same time. We cannot just force a particle to be at infinitely many places with infinitely many momentums just because we want to force position and momentum pair to be a Fourier Transform pair. We cannot subdue the reality to be what we want it to be just because we want to impose our ill-found religious doctrine on nature.

Wavefunction is a misinterpretation of the real electromagnetic radiation waves generated by the stopping of moving charge particles. Momentum of a particle does not generate waves; it is the motion of charges that generates waves. It is the change of chomomentum, qu that generates waves.

Wavefunction is not a natural phenomenon; it is something we human have enforced upon on a particle with wrong assumptions. There is no wave function if the particle is stable and neutral. Use a beam of stable and neutral particles and see for yourself if you get an interference pattern in the Double-Slit experiment or an image in the Particle Microscopes; you will not. Of course, you cannot accelerate neutral particles using an electric field; so, you may have to throw the particles as fast as possible at the Double-Slit barrier or at the specimen in a Particle Microscope. Wave function of a particle is a misinterpretation of electromagnetic wave generated by a moving charge when a charge is accelerated, decelerated, or stopped and it is not probabilistic, it is

totally deterministic.

Probability distribution is not a wave, and wave is not a probability distribution. The area under a probability distribution must be unity for the entire range. A propagating wave cannot be normalized for the area under it to be unity for the entire range. A wave that is normalized for the area under it to be unity for the range of wavelength is not a probability distribution. Representation of wavefunction as probability distribution is invalid in every sense of probability. Probability distribution is a purely static function. Propagating wave cannot be a probability distribution. Probability distribution cannot propagate.

It is not possible to quantize electromagnetic field to generate hypothetical Photons. Fields cannot be quantized. No Field can come in Quanta. Electromagnetic field does not come in Quanta. Electromagnetic field come in continuous wave bursts of limited duration [8]. There are no light particles or Photons. There are no imaginary force carrying particles. There are no gravitons. Light cannot consist of spatially random Photons or light particles. The concept of Photons came into existence under the assumption that Photons are spatially random. If the Photons are spatially random, there cannot be directional coherent light.

It is a mass or charge that generate Fields. Fields cannot come into existence without mass or charge. If particles emerge from vibration of wavefunctions, what is waving in a wavefunction? What is vibrating the wavefunction. There is no vibration for free. Vibration cost energy. Phrase "vibration of wavefunction" and the wavefunction of a particle themselves are meaningless. Hypothetical wavefunction has no existence without particles. You cannot claim that particles emerge from the vibration of wavefunction without telling what is vibrating there. If the universe itself emerges from the vibration of a wavefunction, what is there vibrating, where is it vibrating?

Electron Microscope is one of the most successful engineered devices with many real useful applications. However, the claim that it is an example where particle waves are at work is false, incorrect, deeply misleading, and downright voodoo-physics. Anything with a mass is a particle. Anything with a mass is not a wave. Particle is not a wave. Waves are not particles. There are no particle waves. The working of Electron Microscope has nothing to do with mysterious, hypothetical particle waves. What generate an image of a target is not particles or particle waves.

When an electron collides with a target, it generates electromagnetic radiation that is reflected from and penetrated through the target. It is these generated electromagnetic radiation waves that generates an image in an Electron Microscope. Faster the electron, smaller is the wavelength, and hence higher is the resolution of the image. It does not have to be a beam of electrons. Any beam of charge

particles will produce an image. However, larger the mass of the charge is, more the energy required to accelerate it to obtain the same resolution given by lighter charges. As a result, the use of smaller mass such as electrons is more appropriate since an electron is a charge particle with a smallest mass easily available, and engineering involved is simple. All that is required is heated cathode to generate electrons and an electric field to accelerate them. Higher the charge to mass ratio higher the resolution. Electrons provide the highest achievable charge to mass ratio and hence highest resolution.

Do not use Electron Microscope to substantiate hypothetical particle waves. Electron Microscope has nothing to do with hypothetical particle waves. Working of Electron Microscope is based on electromagnetic radiation, not some hypothetical particle waves. If you think that an image in a Particle Microscope is produced by particle waves, see if you can get an image of a specimen using a beam of neutral stable particles; you cannot.

Nature has no Ups and Downs. Ups and Downs are relative; they exist relative to an observer. What is Up for one Observer can be Down for another Observer. There is no Spin $1/2$. Spin $1/2$ that appeared in Quantum Mechanics is a result of wavelength error. Spin-Operator Matrices can only represent Spin Monopoles, not Spin Bi-Poles. All the Spins are Bi-Polar. There are no Spin Matrix Operators. For a Matrix to be an Operator of an observable, the Matrix must be Invertible. All the so-called Spin Matrices are non-invertible and hence do not represent Operators of Observables. No Matrix Operator can be in Quantum Mechanics. Matrix Operators are against the non-commutative relationship that the Quantum Mechanics founded upon. You cannot resolve the issue of non-compatibility between Matrix Operators and Quantum Mechanics by proposing Matrix Operators of Infinite Dimensions. Matrix Operators of infinite dimensions cannot be in Quantum Mechanics either since Infinite Dimension Matrix Operators cannot be Square. For a matrix operator to be Hermitian, matrix must be a square matrix. Neither finite nor infinite matrices can be in Quantum Mechanics.

There is nothing spooky about the action at a distance. Action at a distance is simply the magnetic coupling between atoms, which is causal. Every orbiting system spins. Atoms spin since they are orbiting systems. When an atom spins, it generates Atomic Spin Magnetic Moment, which makes atoms to behave as little magnets. Action at distance is due to this magnetic field. If you want to see action at a distance, place two compasses near each other and notice that their orientation is always against each other. Now, move one away and notice how the orientation of one compass change with the change in the orientation of the other compass by manually changing the orientation of one compass. It is the same with the atoms that are free to orient

themselves.

Of course, you can sell books by Harry-Potterizing or voodooifying the nature, but you cannot spookify the nature itself. Nature is real. You can only make nature unreal in your mind or on the pages of a book. If you entangle whatever you do with some mystery, and write a book about it, not only you can sell million copies and become a bestselling author and brag how many copies you sold, but also you can laugh all the way to the bank. It is the fictional books that sells not the reality books. Majority read for entertainment not to discover the reality. Some found a perfect place for nova-mining in Quantum Mechanics to dig for kind of nova-gold.

It is also possible to set up an experiment to demonstrate whatever you want to show using false interpretations just like the Stern-Gerlach Experiment and Double-Slit Experiment with a beam of atoms. The so-called Entanglement of particles is simply the magnetic interaction, nothing more, nothing less. Magnetic interaction of Atoms is real since every Atom carry an Atomic Spin Magnetic Moment, even though Atoms are electrically neutral. Orientation of an Atom is not a permanent state of an Atom. Orientation of an Atom is relative; it is determined by the population of the Atoms and any other external magnetic field present.

You cannot Quantize Spin into Spin-Up and Spin-Down without creating Spin-Monopoles. Representation of Spin Up and Spin-Down by orthogonal vectors cannot be done without Spin-Monopoles. The Spin 1/2 is a mathematical blunder wrapped in a bogus interpretation of Stern-Gerlach Experiment. When the fake curtains that cover the reality of the Stern-Gerlach Experiment and the Double-Slit Experiment for a beam of Atoms are opened, Quantum Mechanics has no place to hide behind; it will cease to exist. That is the reality of the non-Reality.

While writing about the prevalence of the commonsense in nature, the human world as we know it has almost come to a halt. Most of the human world is under lock-down due to an invisible, yet detectable due to human ingenuity, biological human enemy, COVID-19 (Corona Virus December-2019), where the lack of commonsense is out in the open. In some patches of land encircled by picket fences with guard posts, or so-called countries, people are paid to stay home. If you are a senior, unemployed, or homeless you are not considered people though. People were asked to go home and stay home; this may be puzzling to the many homeless living on the street; then again, they are not counted as people.

The reality is that, not only we need to be on guard against COVID-19, we also need to be on guard against presidential medical prescriptions as well as water-cures of predators appearing as religious priests. Meanwhile, so-called experts appear on media and claim repeatedly that science is not there yet to make decisions. They want to wait for more

research. Did our ancestors reach for research papers when they were in danger, when a lion jumps at them? It is ironic, if they did, we would not be here today.

One thing is clear though, if a lion is jumping at you, do not reach for research papers, turn immediately to the time-tested survival instincts. Experts permission is not required for the use of survival instincts. Reaching for research become commonsense only when immediate danger is gone, and when time is in spare in the safety of the environment. Medical advice from a president and water-cure from predators appearing as religious priests are neither a commonsense nor an educated-sense.

Wearing a mask in public during a respiratory pandemic is commonsense, yet the expert advice was quite the opposite during COVID-19 pandemic. Contrary to the medical experts, wearing a mask not only protect the public but also the wearer; that is the common sense. Claim by so called experts "masks do not protect the wearer" is simply a nonsense. Masks protects the wearer by preventing inhaling infected droplets from people close by irrespective of whether they are asymptomatic, symptomatic, or neutral. It is commonsense. Experts cannot defy the commonsense without appearing as ignorant. Experts in physics have been trying to defy commonsense for almost a century now; they could not. If you have been defying the commonsense, one thing is clear; sooner or later you will be proven to be a fool; it is certain. Anybody who try to defy the commonsense will learn the foolishness of it sooner or later.

You do not need an expert to announce the number of lives lost daily due to COVID-19. You do not need research or expert advice to wash hands and keep the distance from the rest in an epidemic, it is the commonsense.

You do not need a pandemic to learn that seniors are mostly at risk during a pandemic; experts should have known that. You do not need a pandemic to learn how important the work of the personal care workers and the necessity for compensating them appropriately; experts should have known that. You do not need a pandemic to learn that it is important to have the ability to produce the basic necessities in a pandemic, such as personal protective equipment, locally, to be self-reliant; experts should have known that. You cannot wait for personal care equipment to arrive in a shipment in a pandemic when borders are closed; experts should have known that.

How did the COVID-19 testing and modelling become such a joke in the pandemic? Person tested negative at one moment can be positive next moment in a viral pandemic. Prevention strategy must be uniform and should be independent of the number of cases in an epidemic.

Contrary to experts, cluster testing in a pandemic is useless. It is the random testing that can aid the control the spread of an epidemic. You cannot make

reliable prediction models based on cluster testing data; experts should have known that. Geographical and age distribution of the life-lost-count due to COVID-19 is the most reliable indicator. It was very clear that the COVID-19 epidemic prediction modelling had simply been carried out just to please politicians so that they can keep their jobs; one big modelling express joke. If border closure had been carried out in time, situation would have been completely different; experts should have foreseen that. Experts who do not have ability to foresee are not experts. We do not need experts to tell us how to wash hands. We do not need experts to inform daily the number of casualties due to the pandemic; that is not the job of experts, anybody can do that. Experts are there to formulate strategies for dealing with the unexpected before they show up at the doorstep. That is commonsense.

The necessity of early diagnosis and treatment of pneumonia is common sense because any delay may cause the loss of life, yet expert advice was to quarantine. Although antibiotics are not a treatment for viral pneumonia, treating pneumonia with antibiotics is also common sense since there is nothing preventing from having both viral pneumonia and bacterial pneumonia at the same time, yet experts were quiet. Experts seem to bypass the survival instincts to be politically correct stating that 'science is not there yet', a meaningless phrase in a pandemic. If science is there, there would not have been a pandemic in the first place; we would have not needed experts.

Every time a tiger jump at us, if our ancestors had waited for expert advice, reached for research publications, waited for science publications to appear, gone praying to an imaginary mental image of a creator, referred to flat-earth and earth-centric era ancient religious texts, taken medical advice from a president, chieftain or a king, or taken treatment from snake-oil salesman or a sales-woman, turned to water cure from a tele-evangelist, prayed toward a black box or statue, look for answers in a human crafted flat-earth or earth-centric era meaningless religious texts, we would not be here today. They use the time-tested commonsense survival instinct instead. We are thankful they did just that. Our presence here today is a testimony to that they were right.

If observation appears to violate the commonsense, it is the interpretation, or rather the misinterpretation, of the observation that must always be questioned, not the commonsense. If expert advice seems to violate the commonsense, simply discard that advice. If life and the universe is a creation, it should have come with a manual. No creation comes out without a manual. Lack of a manual is a clear indication that it is not a creation. If universe is a creation, how can a guy/gal who created the universe cannot produce a manual? Why does anybody create living species so that they have to gobble up each other to sustain life? Interestingly, human species seem to consume anything that moves, nothing is

barred from the menu.

It defies any logic. If it lacks commonsense, it ain't science, it is a religion. A statistical prediction model built based on available data is not science, it is a useful decision-making tool in the absence of underlined hard science of the event. Nature does not run on probability. Probability does not come to picture without human imposing of it on nature. It is human who described the nature with probability. It is our lack of understanding of the physics behind the nature that turn us toward probabilistic description. If we leave the probability behind and search for real mechanism of nature, we may find one day. Probability is a hindrance to the understanding of the nature. Probability is there for gambling and other day to day human decision making in the absence of a true understanding. If you have a collection of data, you can use probability and statistics to justify whatever you want, not what it is.

Undoubtedly, Quantum Mechanics has reached the state of a pandemic and hence the declaration as such is warranted; Test, Quarantine, and Social Distancing protocol may be required to control the spread of the pandemic. Unlike the case of COVID-19 pandemic, culprit of the QM pandemic is visible for those who want to see even though everybody appears to be blind to the fact in order to quietly harvest the benefits in maintaining the status quo.

Facts of the Matter:

For anyone who does not have time or patience to read that many pages, or who does not care about the mathematical detail, here is the brief run down, simple take home message:

1. Spin is an inherent characteristic of any orbiting system. An Atom is a microscopic orbiting system.
2. The net Spin Magnetic Moment of an Atom due to the spin of electrons is zero due to the magnetic coupling between the electrons.
3. Orbital Magnetic Moment of an Atom cancels out with the Merry-Go-Round Spin Magnetic Moment of an Atom since they are equal and opposite.
4. Spin Magnetic Moment of an Atom is due to the spin of the nucleus itself.
5. Stern-Gerlach Device is not a Spin Measuring Instrument. It is a volatile Spin Modifier.
6. If Stern-Gerlach Device records an Atom as Spin-Up, it says nothing about the actual Atomic Spin. It only says that the actual Atomic Spin is not against Stern-Gerlach Magnetic Field (SGMF).
7. Spin-Up Atom remains at that orientation only until the Atom is in the SGMF.
8. Stern-Gerlach Device is neither a Spin setter nor a Spin Measuring Device.
9. Direction of the Spin of an Atom is determined by the orientations of neighboring atoms or the external magnetic field it is in.
10. Spin is not quantized. Spin-Up and Spin-Down are observer dependent. Nature cannot quantize observer dependent quantities.
11. The direction of Spin is not a state of a particle.

12. What is happening in the Stern-Gerlach Experiment is completely deterministic, not probabilistic. Failure to realize this fact led to the misinterpretation of Stern-Gerlach Experimental observations, the source of voodoo physics, Quantum Weirdness.
 13. Operators must be Invertible.
 14. Spin Matrices are non-invertible and hence they cannot be Operators of Observables.
 15. Propagating waves cannot be normalized for the area under the wave to be unity for the entire range.
 16. Wave normalized for the area under the wave to be unity only for the range of a wavelength is not a probability distribution.
 17. Act of Trying to turn a wave into a probability distribution by normalizing the wave only for the range of a wavelength is human insanity or ignorance of probability.
 18. Nature does not Normalize.
 19. Position and Momentum of a particle are mutually dependent. QM assumption that position and momentum are mutually independent is false.
 20. Independent of the size of a particle, Momentum is time dependent. Momentum has no existence without change of position and time. Particle cannot have fixed position in the presence of a momentum. Position and Momentum pair is not a Fourier Transform pair. As a result, Heisenberg Uncertainty Principle is invalid.
 21. Observables cannot be represented as eigenvalues of operators since eigenvalues are not unique. Only the eigenvectors are unique.
 22. Schrodinger equation is nothing more than the time derivative of the planewave equation under the invalid assumption that momentum is time independent, and an equally invalid assumption that the mechanical energy of a particle is quantized.
 23. Independent of the size of a particle, Momentum is time dependent, Mechanical energy is continuous, not quantized, and hence Schrodinger equation is invalid.
 24. Quantum Mechanics is a human folly that paved the way for Voodoo-physics, which is a nova-gold mine for Harry-Potterized books for publishers.
 25. Spin-Up and Spin-Down are bipolar. Spin is observer dependent. Dead and Alive are monopoles that are independent of any observer.
 26. Spin-Up and Spin-Down are not states inherent to a particle, observer dependent. Dead and alive are states inherent to a biological species, not observer dependent.
 27. Neither finite nor infinite order Matrix operators can exist in QM.
 28. There are no particle waves. Neutral stable particles do not generate waves. Moving charge particles generate electromagnetic waves in collision.
 29. Momentum of a particle does not generate waves. Collision of moving charges generate radiation, electromagnetic waves. Charge has no existence without a mass. Mass of an electron provides a home for a charge. Mass of a particle provides a charge the motion. Particle is a chauffeur for a charge. Motion of a charge, momentum, generates electromagnetic waves.
 30. In Quantum Mechanics, the electromagnetic radiation waves generated by moving charges, momentum, are incorrectly interpreted as particle waves generated by momentum.
 31. It is the electromagnetic waves that generate an image in Electron Microscope. A beam of neutral and stable Atoms does not generate an image in a Particle Microscope.
 32. It is electromagnetic waves that generates an interference pattern in the Double-Slit experiment. A beam of neutral and stable Atoms does not generate an interference pattern in the Double-Slit experiment.
 33. If the particles are incorrectly assumed to behave as waves, DeBroglie wavelength that the Quantum Mechanics was founded upon is incorrect. No particle has the energy required to be at deBroglie wavelength. Spin-1/2 is a result of this wavelength error.
 34. If the particles are incorrectly assumed to behave as waves, Spin-1/2 disappears when correct wavelength is used. There are no particle waves. Particles do not behave as waves.
 35. Vectors cannot be quantized. Bi-polar quantities do not come in quanta. A particle cannot be both Spin-Up and Spin-Down at the same time. Spin-Up and Spin-Down are observer dependent and hence do not come in quanta.
 36. If your q-bit gismo is working, it is working, not for the reason you think it is working. Spin-Up and Spin-Down are observer dependent bi-poles. Spin-Up and Spin-Down are non-separable and hence they are not in a super-position.
 37. If your q-bit gismo is working, it is due to the Atomic Spin Magnetic Moment. It has nothing to do with superposition. No particle can be in many states at the same instant, except in voodoo-physics, where impossible possible for the believers just like a religious doctrine.
- During the COVID-19 pandemic, Government leaders requested the population to go home and stay home to control the pandemic; they were blind to the fact that many people did not have home to go to. This work is dedicated to those who had no home to go to when they were ordered to go home and stay home, and to those who had unexpected exit from this world due to COVID-19, especially the hardest hit minimum-waged and emotionally drained senior care workers.
- Governments were so reluctant to boost the minimum-waged personal care worker salaries by few dollars, yet they were so generous for promptly helping businesses and other higher wage earners.

Governments were very generous in helping wage earners, students, and businesses. They were very reluctant to extend any support that were given to others to seniors in the mindset that seniors are a liability to the society and hence there is no reason to waste resources on seniors who are, in their view, the people waiting the exit. Yet, when big corporations came kneeling for handouts claiming that they had lost billion dollars, nobody asked how much of that loss was due to the salaries drawn by the top executives of the corporations. Once we thought we could not survive without the NORTEL. In fact, in hindsight, the demise of Telecommunication giant, NORTEL was a good thing since it paved the way to spring up hundreds of new innovative companies. Demise of Airline Giants in the aftermath of COVID-19 would in fact will be the best for the Airline industry and the population. There will be hundreds of new competitive airline companies springing up to replace the vacuum left by dinosaur company giants providing even more jobs and competitive services. It is important to realize that, if dinosaurs had not been extinct, human evolution had not been taken place. The natural demise of giant companies is eminent and not a bad thing for the evolution of the service industries and technologies; it is indeed a good thing.

A pandemic like COVID-19 is an appropriate time to let these inefficient dinosaur companies that are not agile to bear the brunt in difficult times to go into extinction with their dinosaur mentality highly paid executives so that new agile efficient state of the art companies with timely vision can rise up in their places. It is interesting to see a new class of beggars who take private jets to go for begging. In this case, givers can be generous whatever the way they want since they are handing out other people's money.

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