Aether Model Explains Particles, Photons and Forces by Reinterpreting μ_0 and ε_0

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Abstract:- The Standard Model of Particle Physics is held up as one of the most successful theories in physics, but it is littered with dubious renormalised infinities, fundamental particles that have never been directly detected and even fails completely to explain the force of gravity. In this paper I use the idea of the aether which was proposed as the medium through which Maxwell's electromagnetic waves travelled. By comparing the formula for the speed of light in free space to that of sound in any medium I have reinterpreted μ_0 as the density of free space and ε_0 as the compressibility of free space. I propose that the actual structure of free space is a tetrahedral lattice of nodes similar to many crystals found in nature and that these nodes are connected with identical connecting rods under compression. The length of these connecting rods is a new fundamental constant but with this very simple model I can easily explain the nature of Planck's constant, h, the Gravitational Constant, G, the charge of the electron, e, the mass of the electron, m_e, the mass of the Proton, m_p, the mass of the Neutron, m_n, the Relative Magnetic Moments of the Proton μ_p, and of the Neutron μ_n In explaining the origins of these fundamental constants, I have also explained the nature of matter and light and the two forces, Electromagnetism and the Strong Nuclear Force. It adds to the flowing space theory of Gravity by explaining some of its problems. In the case of matter, it explains the nature of inertial and gravitational mass and in the case of light it explains why the photon has no gravitational mass. This model also explains many unexplained phenomena such as β^- decay parity violation, single particle interference experiments, Stern-Gerlach experiments, Bell inequality experiments, Aharonov Bohm effect and the mass of many sub atomic particles. It also has a very simple explanation for Dark Energy, Dark Matter and the Matter-Antimatter asymmetry.

Introduction

I have always been intrigued by the fact that the proton and the electron have the exact same magnitude of charge, but they have totally different masses. To me they must at least have something fundamental in common, and this is one reason why I have never been convinced of the validity of the standard model of particle physics. It describes the proton being composed of quarks with fractional charges even though the electron, which is considered a fundamental particle, has only unit charge. This feels physically wrong and in my view is nothing more than a mathematical abstraction. The Standard Model also, does not explain Dark Matter, Dark Energy, Gravity or why neutrinos have mass or change spontaneously between types. There are other short comings as well, but it is safe to say that the Standard Model is woefully inadequate. One just needs to read Oliver Consa's paper[7] to see how bad it really is. The principal of Occam's razor states that the simplest

solution is probably the more correct one and I have used this principle to guide my own thinking, often discarding ideas because they were getting too complicated. The standard model of particle physics is littered with inconsistencies and is nothing more than multiple layers of mathematically complex abstractions describing physically meaningless ideas.

I am also uncomfortable with the explanations put forward by Quantum Mechanics to explain many, so called, weird observations. Interpretations such as "Many Worlds" and "Superposition of States" just make no physical sense to me and are again only mathematical abstractions. While I appreciate that it has great predictive power it has no clue as to what is actually happening as demonstrated by Richard Feynman in his "*shut up and calculate*" comment. This reminds me of the infamous epicycles that were extremely accurate at predicting planetary orbits, but which were totally wrong physically.

General Relativity has been very successful at explaining the realm of the very large, but it cannot derive the fundamental constant of Gravitation, G. It therefore does not actually explain what gravity is because if it did then it should be able to derive a value for G at a minimum.

The reason, I think, that science has failed to unify Special Relativity, Quantum Mechanics and the Standard Model of Particle Physics is because the interpretation of the real world by Quantum Mechanics and General Relativity are largely incorrect and that the Standard Model is nonsense.

The great 19th century physicist, Lord Kelvin, said,

"It seems to me that the test of "Do we or not understand a particular subject in physics?" is, "Can we make a mechanical model of it?" I have an immense admiration for Maxwell's model of electromagnetic induction. He makes a model that does all the wonderful things that electricity does in inducting currents, etc., and there can be no doubt that a mechanical model of that kind is immensely instructive and is a step towards a definite mechanical theory of electromagnetism" [1].

The model I propose in this paper is a mechanical model as desired by Lord Kelvin which is both elegant and powerful in its simplicity.

1. Reinterpreting μ_0 and ε_0

The generalised form of the one-dimensional differential equation describing a sound wave in a solid is

$$\frac{\partial^2 y}{\partial x^2} = \sqrt{\frac{K}{\rho}} \cdot \frac{\partial^2 y}{\partial t^2} \qquad (1.1)$$

where

K is the Bulk Modulus of the medium in units of Pressure or Nm^{-2}

ρ is the density of the medium in Kg m^{-3}

The velocity of the sound wave through the medium is $\sqrt{\frac{K}{\rho}}$

This can also be written in the form

$$\frac{\partial^2 y}{\partial x^2} = \sqrt{\frac{1}{\rho \beta}} \cdot \frac{\partial^2 y}{\partial t^2} \qquad (1.2)$$

where

β is the compressibility of the medium in m^2 N^{-1}

and the velocity of the sound wave through the medium is $\sqrt{\frac{1}{\rho \beta}}$

From Maxwell's equations, which describe electromagnetic waves, we get similar expressions for the propagation of Electric (E) and Magnetic (B) fields as follows

$$\nabla^2 E = \sqrt{\frac{1}{\mu_0 \varepsilon_0}} \cdot \frac{\partial^2 E}{\partial t^2} \qquad (1.3)$$

$$\nabla^2 B = \sqrt{\frac{1}{\mu_0 \varepsilon_0}} \cdot \frac{\partial^2 B}{\partial t^2} \qquad (1.4)$$

μ_0 is the permeability of free space in N A^{-2} or N s^2 C^{-2}

ε_0 is the permittivity of free space in C^{-1} N^{-1} m^{-2}

The velocity of light is $\sqrt{\frac{1}{\mu_0 \varepsilon_0}}$

The similarity of the two expressions for the speed of sound in a medium and the speed of light suggests that electromagnetic waves must also travel through a medium and that μ_0 is the density of that medium and that ε_0 is the compressibility of that medium.

While the expression $\sqrt{\frac{1}{\mu_0 \varepsilon_0}}$ does have units of m s^{-1} the units of μ_0 and ε_0 do not match with the units of their respective counterparts ρ and β.

The units of ε_0 are C^2 N^{-1} m^{-2} and the units of β are m^2 N^{-1}. The simplest way to make these two quantities have the same units is if the units of Charge are m^2 instead of Coulombs.

C^2 N^{-1} m^{-2} $\rightarrow$ (m^2)^2 N^{-1} m^{-2} $\rightarrow$ m^4 N^{-1} m^{-2} $\rightarrow$ m^2 N^{-1}

If we apply this same change to μ_0 then the units change as follows

N A^{-2} $\rightarrow$ N C^{-2} s^2 $\rightarrow$ N (m^2)$^{-2}$ s^2 $\rightarrow$ Kg m s^{-2} (m^2)$^{-2}$ s^2 $\rightarrow$ Kg m^{-3}

By changing the units of charge from Coulombs to m^2 the two parameters, μ_0 and ε_0, are now exactly equivalent to their counterparts ρ and β.

This is a very strong indication that light does actually travel in a medium and that μ_0 and ε_0 are its density and its compressibility respectively.

I am of the view that at the fundamental level, nature is simple, and that nature repeats patterns at different scales. After some trial and error and observations I have concluded that the medium of space has a structure just like the crystal structure of Silicon, Germanium or Diamond.

These crystals structures are essentially two interpenetrating face centred cubic lattices offset by a quarter of the cube's

diagonal length in the x,y, and z directions. Each atom is bonded to four neighbours in a tetrahedral arrangement as in fig 1.1 Four of the structures in Fig 1.1 combine to enclose a volume or cell as shown in Fig 1.2.

Figure1. 2

The resonant frequency of the diamond crystal structure is due to the relative movement of the two offset FCC lattices and can be approximated using the formula (1.5) below which is an approximation for a system with a large number of connected oscillators.

$$\omega_n = \frac{2}{l} \sqrt{\frac{k}{\rho}} \; Sin\left[\frac{n\pi}{2(N+1)}\right] \qquad (1.5)$$

where

k is the Bulk Modulus of the medium in units of Nm^{-2}

ρ is the density of the medium in Kg m-3

l is the length between the nodes

N is the number of nodes

n is the order of the oscillation

When N is very large then the highest mode (ie when n= N) frequency ω_{max} is given as

$$\omega_{max} = \frac{2}{l} \sqrt{\frac{k}{\rho}} \qquad (1.6)$$

Earlier, I claimed that k and ρ are equivalent to $1/\varepsilon_0$ and μ_0 but we still need to know the value of l in equation 1.6 before we can calculate ω_{max}. I will come back to this later in this paper.

The following is my proposal for the structure of the fabric of empty space and the nature of the "vacuum energy" within it.

a) The fabric of space has a tetrahedral lattice structure built from components as depicted in fig 1.1

b) This structure is essentially two interpenetrating face centred cubic lattices (FCC) offset by a quarter the length of the cubic diagonal in the x, y and z directions.

c) The resonant frequency of vibration of this structure is due to the relative movement of these two separate FCC lattices.

d) Each cubic cell of one of these lattices have one of the tetrahedral structures depicted in fig 1.2 contained within it and they all have the same orientation throughout the entire structure. The other cubic lattice cells also contain one of the structures depicted in fig 1.2 but they are all orientated 180^0 to those in the first lattice. These two oppositely orientated tetrahedral structures

do not occupy separate space but are also interpenetrating.

e) The shear modulus is $1/\varepsilon_0$ and the density is μ_0

f) The vacuum energy is the total of the kinetic and potential energy of the nodes and connecting rods as this structure vibrates.

g) I propose that a virtual electron is just the oscillations of the tetrahedral structures depicted in fig 1.2 contained within a cubic cell of one of the FCC lattices and that a virtual positron is the equivalent structure in the other FCC lattice. I will refer to these structures going forward as either virtual electrons or positrons.

h) These virtual electrons and positrons are therefore always present in the vacuum of space and possess energy as a consequence of the lattice vibrations.

2. The Electron and Positron

It is well established that electrons exert a force on each other and therefore do work on each other. In order for some system to do work it must have an energy source and therefore electrons must have a continuous energy source otherwise electrons would have ceased to be electrons as soon as their "stored energy" was exhausted. At some point in the past, electrons and positrons were created and I
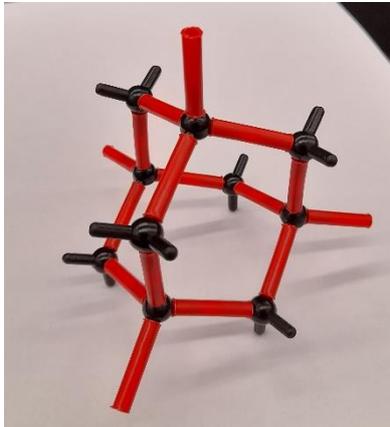

Fig 2.1

propose that an electron is a virtual electron that has a different mode of oscillation, and that this mode of oscillation is sustained by extracting energy from the fundamental vibration mode of the tetrahedral lattice structure. Fig 2.1 depicts a virtual electron. This structure has ten nodes, four "axial nodes" which are connected to three other nodes of the virtual electron and six "lateral nodes" which are connected to just two other nodes of the virtual electron. I call the four axial nodes such because they are each connected to an axis. The four axes are included in fig 2.1, the open ends of which coincide with four of the corners of the FCC cell in which the electron is located. As can be seen in fig 2.1, at the top of the virtual electron is a "tri star" formation concentric with the vertical axis. At the bottom of the structure is a distorted hexagonal formation,

also concentric with the vertical axis. These two formations are connected by three vertical connecting rods parallel to the vertical axis. If the tri star formation partially rotates about the axis in one direction and the hexagonal formation rotates in the opposite direction, then the three connecting rods will be tilted over and stretched. As they tilt over, they will cause the tri star formation and the hexagonal formation to get closer to each other and therefore reduce the volume contained within the electron. This reduction in volume will also cause a stretching and distortion of the lattice structure around the electron. When the structure expands again, the counter rotating motion of the tri star and hexagonal components moves to another pair on one of the other axes. This process continues with the counter rotating motion cycling in turn around all four axes while contracting and expanding the electron structure. A real electron is therefore a virtual electron that has been set in this mode of oscillation, and which gets its energy from the lattice. The positron is exactly the same as the electron except that it is created from a virtual positron. As the electron oscillates it will cause waves of disturbances in the lattice to radiate away from it and this activity is what explains many of the properties of the electron.

3. Electric Charge

To explain why it is valid to change the units of charge to m^2 we need to get a new understanding of what charge actually is.

In the previous section I stated that the electron structure has two counter rotating components which cause the continuous contraction and expansion of the electron. This oscillating causes three different types of waves to be emitted and like all waves, they carry energy. The energy E, carried by a wave has the general form

$$E = \rho V (\frac{c}{\lambda} A)^2 \qquad\qquad 3.1$$

where

ρ is the density of the medium
c is the velocity of the wave
λ is the wavelength of the wave
A is the Amplitude of the wave
V is the volume occupied by one wavelength.
The power (W) in the wave is the energy times the frequency

$$W = \rho V (\frac{c}{\lambda} A)^2 \cdot \left(\frac{c}{\lambda}\right) \qquad \text{as f} = \frac{c}{\lambda} \quad 3.2$$

The Intensity (I) of the wave is the power per unit area. If the volume V is a cylinder of length λ and radius r, then

$$I = \rho \frac{\pi r^2 \lambda}{\pi r^2} (\frac{c}{\lambda} A)^2 \cdot \left(\frac{c}{\lambda}\right) \qquad\qquad 3.3$$

$$I = \rho (\frac{c}{\lambda} A)^2 \cdot c \qquad\qquad 3.4$$

The pressure (P) exerted by the wave on the area is I/c therefore

$$P = \rho (\frac{c}{\lambda} A)^2 \qquad\qquad 3.5$$

The force F exerted on the area is therefore

$$F = \rho(\frac{c}{\lambda} A)^2 \cdot \pi r^2 \qquad\qquad 3.6$$

If we replace the density ρ with μ_0 then

$$F = \frac{1}{\varepsilon_0} \cdot \frac{\pi r^2 . A^2}{\lambda^2} \qquad\qquad 3.7$$

In the case of the electron $\lambda = \pi l$ and as the tri star formation rotates, A^2 will be some function $k_1 l^2$ where k_1 is a constant and l is the lattice unit length. As the distorted hexagonal ring as shown in fig 4.1 rotates rapidly it will flatten out to form a regular hexagon of side l and the nodes will transcribe a circle of radius l as the rotate. We can therefore use l as the radius when calculating the area in equation 3.7. Equation 3.7 can therefore be rewritten as

$$F = \frac{1}{\pi\varepsilon_0} \cdot \frac{l^2 \quad k_1 l^2}{(l)^2} \qquad\qquad 3.8$$

As an electron can move only in increments from one cell to an adjacent cell. The minimum distance it can move is $2l\cos\Theta_h$, where Θ_h is the angle the tetrahedral makes with the horizontal, therefore it can only move a distance $n2l\cos\Theta_h$ where n is an integer and equation 3.8 can be rewritten as

$$F = \frac{1}{4\pi\varepsilon_0} \cdot \frac{l^2 \quad k_1 l^2}{(n.l.cos\theta_h)^2} \qquad\qquad 3.9$$

This equation embodies the fact that distance is quantised, and therefore so is the force. The force an electron experiences at a distance of n lattice cells from another electron depends only on ε_0, the amplitude squared of the emitted wave and the cross sectional area. This equation has the same form as the Coulomb force if charge is measured in meters instead of Coulombs.

We can therefore look at the electric charge of the electron as the energy emitted by the electron in the form of waves into the surrounding lattice as the electron oscillates. This wave produces a force on another electron by either constructively or destructively interfering with the nodes of that electron causing an imbalance in the force it feels from the pressure in the surrounding lattice.

4. Estimating the lattice unit length

The highest energy gamma rays ever measured[4] at an energy of 2.4 PeV have a frequency higher than 6.1×10^{29} Hz and a wavelength shorter than 4.9×10^{-22}m. These detections are very rear so if we assume that these photons have the highest energy possible then the lattice length is of the same order of magnitude as the wavelength of these photons i.e 4.9×10^{-22}m and the fundamental vibration frequency of the lattice will be approximately 6×10^{29} Hz.

5. Electric and Magnetic Fields

When the electron oscillates three types of waves are emitted. In this section I will describe two of them. If we just look at the vertical spin or rotation axis, then above and below the cell there are connecting rods that connect the electron cell to the bulk lattice. These rods are all parallel to a rotation axis. There are seven above the cell and six below the cell but the central one of the seven doesn't contribute to any rotation of the lattice. As the cell contracts the tri star and hexagonal components rotate counter to each other a total of 120^0 each. As they rotate during the contraction they will cause the rods parallel to the spin axis above and below the cell to twist around each other like the fibres in a rope and as the cell expands again the rods will untwist back to the original position. As the rotating components are counter rotating the twist above the electron will be in one direction while the in phase twist below the electron will be in the opposite direction. This is the reason why the electron has a North and South pole. After the expansion of the electron is complete the rotating components do not continue to rotate in the opposite direction because another tri star and hexagonal couple start to rotate about one of the other spin axes instead. This twisting/untwisting action causes transverse waves to propagate through the lattice bulk in opposite directions from the electron but largely confined to a direction parallel and concentric with the rotation axis. As the electron cycles through all four axes there will be a wave propagating in opposite directions along each axis. This is the electrons magnetic field.

The second wave to be emitted when the cell contracts and expands is emitted at right angles to the rotation axis. As the nodes on the rotating components oscillate back and forth a plane transverse wave and is emitted around the entire circumference of the electron. Unlike the magnetic wave which is highly directional this wave spreads out as the rods connecting the electron to the bulk lattice in this direction are divergent. As the electron cycles through all four axes, it will on average emit a radially uniform wave of this type. This is the electron's electric field.

As can be seen from the description of the nature of the electric and magnetic fields they are fundamentally very similar in that they are both produced by the same action and are both transverse waves propagating through the lattice structure at the speed of light. According to Maxwell's laws, a changing electric field produces a magnetic field and vice versa. This is easily understood using this model. A change in an electric field corresponds to a change in the amplitude of the electric wave and if such an amplitude change occurs while propagating through a lattice cell then the cell will experience a torque for as long as the amplitude of the electric wave continues to change. The torque will be in one direction for an increase in the amplitude and in the opposite direction for a decrease in the amplitude. This torque causes the same twisting of the lattice structure as described above and therefore constitutes a magnetic field. The reverse of this process is a changing magnetic field producing an electric field.

6. Particle Interaction with Electric and Magnetic Fields

When an electron emits a wave that carries the electric charge it will have a frequency which is equal to that of that of the lattice frequency ω_N. It will be in phase with the oscillation of the FCC lattice which contains the electrons but out of phase with the FCC lattice that contains the positrons. This is because the two lattices move in opposite directions.

Before continuing it needs to be stated that when a particle moves through the lattice due to a force acting on it, it is only the vibration mode, and the energy associated with it that migrates from one virtual particle position to a another. There is no physical movement of lattice nodes or connecting rods through the lattice. It is similar to the concept of the phonon.

When an electric wave from an electron meets a positron, it will be out of phase with six of the nodes in the positron and therefore destructively interfere with them while constructively interfering with the other four. There will therefore be an imbalance of forces around the positron which will cause it to move in the direction of the emitting electron.

Similarly, when an electric wave from an electron meets another electron, it will be in phase with six of the nodes in the electron and therefore constructively interfere with them while destructively interfering with the other four. Again, there will be an imbalance of forces around the electron causing the electrons to move apart

As described earlier the magnetic force wave is a twisting/untwisting transverse wave. These waves will have the same frequency as the contraction and expansion of the electron and positron. If we imagine a magnetic wave travelling from an electron in the +z direction that encounters an electron travelling in the +x direction the twisting phase of the magnetic wave will encounter it while the electron is in its contracting phase and will therefore only cause a small torque to the cell that contains the electron. As the untwisting phase encounters the electron it will have fully expanded and will therefore receive a much larger torque in the opposite direction. The overall torque will therefore be in this direction, and this will cause the cell containing the electron to twist which gives the electron a component of velocity in the +y direction. If the same magnetic wave encounters a positron travelling in the +x direction its twisting phase will encounter the positron when it is fully expanded and therefore apply more torque to it than during the untwisting phase. The net torque is therefore opposite to that applied to an electron and therefore a component of velocity in the -y direction will be given to the positron. The faster the electron or positron are travelling then the stronger is the coupling between the particle and the magnetic wave and therefore the amount the particle is turned is greater and the greater is the component of its velocity in the y direction. The coupling is stronger at higher speeds because as the magnetic wave travels forward at the speed of light it also rotates at the speed of light. The faster the particle is travelling at right angles to this wave the longer it spends in contact with the crest of the wave. This also explains why a

magnetic field does no work on an electron as it does not do any translational movement of it.

7. Electron Spin

When an electron contracts, the tri star component can rotate either clockwise or anticlockwise and as the electron cycles through all four axes the rotation of each will be the same i.e. all four clockwise or all four anticlockwise. In addition to this rotation direction is the order in which the rotation moves from one axis to another. I will refer to this going forward as the spin order. If an electron encounters an external magnetic field the direction of this field can be any arbitrary direction and not necessarily aligned with any of the spin axes of the electron. In order for the electron to align with the external field the sequencing of the spins of the four rotors will change so e.g. one rotor might spin four times and another three and the other two just once. The vector sum of these four will then be aligned with the external field. If one electron has its tri star component rotating clockwise then it will have its North pole pointing up and if another has it rotating anticlockwise, then it will have its South pole pointing up. This explains the two spin states of the electron.

8. Electron Mass

When the electron is compressed, there is work being done on it by the pressure of the surrounding lattice and just like with a gas the energy dE, required to compress it is the product of the pressure P, and the volume change dV.

$$dE = PdV \qquad 8.1$$

I have already reinterpreted $1/\varepsilon_0$ as the shear modulus which has units of Pressure.

$$P = \frac{1}{\varepsilon_0} \qquad 8.2$$

Density by definition is the mass per unit volume and since I have also reinterpreted μ_0 as the density of the aether then we can write

$$\mu_0 = \frac{m}{V} \qquad 8.3$$

$$dV = \frac{dm}{\mu_0} \qquad 8.4$$

If we substitute 8.3 and 8.4 into 8.1 we get

$$dE = \frac{dm}{\varepsilon_0 \mu_0} \qquad 8.5$$

When we integrate both sides we get

$$E = mc^2 \qquad 8.6$$

By reinterpreting $1/\varepsilon_0$ and μ_0 as the shear pressure and density of the aether respectively I have shown that the Einstein mass energy equivalence comes from the fact that the electron extracts this amount of energy from the lattice as it contracts

and expands in response to the fundamental vibration of the lattice.

If we assume the lattice length is 5 x 10^{-22} m then the volume of the electron V, can be approximated to be 5 x 10^{-64} m³

If we also assume that the electron structure is compressed to a disk then dV is equal to V. We know that the mass of the electron is equivalent to 8.26 x10^{-14} J so the pressure P, required to compress the electron is

$$P = \frac{8.26 \; x \; 10^{-14}}{5.0 \; x \; 10^{-64}} \qquad\qquad 8.7$$

$$P = 1.65 \; x \; 10^{50} \quad N/m^2 \qquad\qquad 8.8$$

The vacuum energy has been estimated to be as low as 10^{-9} J/m³ and as high as 10^{113} J/m³. A more recent estimate[5] puts it at 4 x10^{45} J/m³. The units of J/m³ are equivalent to N/m² so we can equate energy density to Pressure and since there is no consensus on what the vacuum energy density value actually is then this value is as valid as any other.

This pressure will need to be higher if the lattice length is shorter than assumed or if the fraction of the electron's volume that is compressed is less than that assumed.

I must point out here that the value calculated for P above is significantly greater than $1/\varepsilon_0$ so if this is the pressure that is compressing the electron then the only way to explain why

$$E = \frac{m}{\varepsilon_0 \mu_0} \qquad\qquad 8.9$$

Is that the density of the electron structure increases with the applied pressure such that the ratio of the pressure to the density remains constant.

The Newton-Laplace formula for the speed of sound in fluids is given as

$$c = \sqrt{\frac{K_s}{\rho}} \qquad\qquad 8.10$$

Where c is the velocity, K_s is the isentropic bulk modulus and ρ is the density.

K_s is defined as

$$K_s \; = \; \rho \left(\frac{\delta P}{\delta \rho}\right)_s \qquad\qquad 8.11$$

where the derivative is the change of Pressure P, with the change of density ρ. When this expression is inserted back into equation 8.10 we get that the speed c is

$$c = \sqrt{\left(\frac{\delta P}{\delta \rho}\right)_s} \qquad\qquad 8.12$$

If this formula is valid for the aether structure, then we can reasonably assume that as the pressure around any lattice cell or group of cells increases then the density of the cells will increase also in a manner that ensures that the speed is constant. The values μ_0 and ε_0 might just happen to be the values for the density and the compressibility at the earth's surface. The Einstein mass energy equivalence formula should therefore be written as follows to convey better the physical process that is occurring

$$E = m \left(\frac{\delta P}{\delta \rho}\right)_s \qquad\qquad 8.13$$

and the coulomb force should be written as

$$F = \frac{1}{4\pi} \sqrt{\left(\frac{\delta P}{\delta \rho}\right)_s} \; \mu_0 \; \frac{l^2}{(n.l.cos\theta_h)^2} \qquad 8.14$$

9. The Strong Nuclear Force

When a positron or an electron contract they twist the connecting rods in the bulk lattice around them and as described already this twisting and untwisting produces a wave that radiates away as the particles magnetic field. However, close to the particle where the twisting is at a maximum there will be a contraction in the length of the lattice cells extending out from the particle along the spin axis. This is like the way a loosely wound rope contracts in length when it is twisted more tightly. If a positron and an electron align along a spin axis with their tri star formations facing each other and with opposite spins, then they will strongly attract each other when they twist the lattice structure along the spin axis between them. Because they are out of phase with each other, they take their turn in twisting the lattice structure and pulling the particles together. The force is much stronger than the electric force because it involves the actual contraction of the lattice as opposed to just a wave in the lattice as is the case for the magnetic force. If one examines the lattice structure you will observe that if a positron and an electron are aligned along their spin axes then when
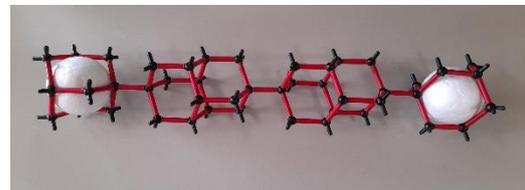

Fig 9.1

their centres are eleven lattice unit lengths apart there will be only a single lattice connecting rod that lies halfway between them on the same shared spin axis, as shown in fig 9.1. At the next position that this occurs the two particles would be in contact with each other. The two particles will therefore only be attracted to this minimum distance between them and will be confined there by the twisting lattice. If the particles move any closer together, they will feel a very strong repulsive force as

the lattice structure itself is compressed and pushes back against the moving particle. This is the strong Nuclear Force (SNF). Three known characteristics of the SNF are its short range, its greater relative strength and its repulsion at shorter distances which are easily explained by this model. The same force will exist between two electrons or two positrons. In the Standard Model of particle physics the electron does not experience the Strong Nuclear Force (SNF) but I think that this is incorrect. Two electrons in free space rarely get close enough to experience the SNF due to the electromagnetic repulsion and electrons and positrons usually annihilate each other. In this model electrons and positrons that approach each other from directions other than that described above will merge and produce two photons (described in detail later). I think it is difficult for a positron and an electron to maintain an approach along a common spin axis due entirely to the structure of the lattice. It is easier for an electron to deflect from this type of path and approach the positron in a manner that will cause both to annihilate. It is therefore highly unlikely that we will see a free electron and a free positron experience the SNF in normal circumstances.

10. The Proton

It is well understood that the sixfold symmetry of the macro structure of snowflakes has its origins in the molecular structure of hydrogen bonded water molecules. It is often the case in nature that the same or similar pattern keeps repeating at different scales and so it is with the proton. Just as the electron is composed of ten vibrating nodes of the lattice the proton has the same electron cell shape but, in this case, the ten nodes are electrons and positrons. There are four electrons situated at the four axial nodes and six positrons at the six peripheral nodes. An additional electron is trapped in a potential well near the centre giving an overall charge of +1e.

We know that protons are extremely stable, so the constituent positrons and electrons cannot be bound by just the electric force. The proton structure briefly described above has electrons and positrons bound together by the SNF acting along common spin axes between the constituent particles. This structure is what gives the proton its extreme stability as it is flexible enough to distort and dissipate the energy of collisions and yet is so strongly bonded together by the SNF that they have remained intact since creation. Earlier I stated that it is difficult for positrons and electrons to experience the SNF because it is rare for them to maintain an approach along a common spin axis but in the hot and dense environment of the early universe a certain proportion of interactions between positrons and electrons would result in pairs bounded by the SNF. Alternatively, it might just be a case of waiting a sufficiently long time for the event to occur in a cool environment. Most of the collisions would have resulted in annihilation of the two particles only for them to possibly reform again. The SNF bound pairs would now be attracted to the opposite electrically charged ends of other pairs and just as water molecules form hexagonal structures as it freezes so too would these electron positron pairs and stabilise them enough for the SNF to connect the pairs together along common spin axes to form into distorted hexagonal rings. Once a ring has been formed additional collisions by single positrons attracted to the electrons in the ring eventually attach by the SNF to form the

three "connecting rods" between the hexagonal component and the tri star component. The three positrons at the top of these three "connecting rods" will strongly attract an electron where it then gets bound by the SNF to just the three positrons at the top. This structure will have a net positive charge of 2e and therefore attracts electrons, one of which gets pulled into the centre of the structure and gets trapped in an electric potential well created by all ten other particles. The overall charge of the proton is therefore reduced to + 1e. This is only one of many possible paths to creating a proton, but it is equally likely that an anti-proton structure would form by this mechanism. It only depends on which side of the hexagonal ring that additional particles successfully connect and complete the structure.

11. Proton Mass and Gravity

As we can see from fig 9.1 the distance between the centres of the positron and the electron in the proton structure is 11 lattice unit lengths. The full length of this structure is approximately 12.33 lattice unit lengths. This means that the volume of the proton structure is 12.33^3 or 1876 that of the electron. As I described earlier the mass of the electron is proportional to the change in its volume so if the percentage change in the volume of the proton is the same as that of the electron, then this explains the proton-electron mass ratio. When an electron and a positron bound by the SNF in the proton structure contracts and twists the lattice rods between them, the distance between them will shorten. The actual full length of the structure in fig 9.1 is 12.333 lattice unit lengths. As they get twisted out of alignment with the spin axis by the rotating electron each of the 12.33 lengths effectively contract by half the amount as the electron does because only half of the twist of the electron contributes to the twisting. The positron will then do the same and cause an additional contraction. The distance between the positron and the electron will therefore have shortened by 24.66 times the amount the electron contracted. If the tension in the lattice behaves like a spring, then the energy will be proportional to the displacement squared or in the case of the proton it will be 24.66^2 or 608.44 times that of the electron. As the spins of all the particles in the proton are aligned the three parallel connecting rods attached to a tri star structure will all contract together and therefore triple the energy emitted into the lattice. This would produce an energy of 1825.33 times that of the electron. When this is added to the energy emitted by the eleven positrons and electrons in the structure then the total amplitude is 1836.32 times that of the electron. This calculated value is only 0.01% greater than the known value of 1836.15. The Proton- Electron mass ratio can therefore be expressed in the formula

$$\frac{m_p}{m_e} = (3 \ x \ (12.333 \ x \ 2)^2) + 11 \qquad 11.1$$

$$\boldsymbol{\frac{m_p}{m_e} = 1836.33} \qquad \boldsymbol{11.2}$$

If we assume the measured value is correct, then the energy emitted by a proton in the form of a longitudinal wave is therefore 1836.15 times greater than that of an electron.

The volume of the proton, V_p, using an octahedral and tetrahedral side length of 12.33 times that of the electron we find that the volume is 1876.02 times that of the electron which is only 2% greater than the measured value. We can reasonably assume therefore that the volume of the proton is 1836.15 times that of the electron and that the energy emitted by the proton is also 1836.15 times that of the electron.

The actual proton electron mass ratio is 1836.15 and this discrepancy might be explained by the fact that the proton structure has to contract and expand in order to generate longitudinal waves. If it overshoots in the expansion phase, then 1836.15 might therefore be an average. It is also the case that the ratio of the change in volume of the proton to the change in volume of the electron as they oscillate is 1836.15. It is more likely that it is the change in volume of a particle that determines its inertial mass as this is the property of the particle that distinguishes it from a non-oscillating lattice cell which has the same volume as an electron but no mass.

In his paper[6] Dr Henry Lindner independently describes gravity as resulting from flowing space which is an idea which has been around since the 1920's. The theory describes gravity and inertia well but has some major questions that remain to be solved. The theory requires that space flows into a mass such as a planet or star and therefore must be compressed as it does so and the question is, where does the energy come from to do this? The second question is what becomes of the space once it enters a mass and the third question is how is the space that is consumed by matter replaced, otherwise the universe would be contracting and disappearing. Dr Lindner suggests that the strong nuclear force might play a role.

I propose to answer these outstanding questions by using the model for the proton and the strong nuclear force just described. We know the escape velocity of earth is 11200 m/s and its surface area is $5.11x\ 10^{14}$ m^2 therefore the volume of space flowing into the earth is $5.73x10^{18}$ m^3/s. I have earlier explained how the proton is contracting and expanding at the lattice natural frequency by absorbing and reradiating away the energy in the form of a longitudinal wave via the strong nuclear force. As the strong nuclear force is 137 times the electromagnetic force then we can assume that at least 99.3% of the energy absorbed by the proton during contraction is released as a wave during expansion. The rest is radiated away as electric and magnetic transverse waves. It is also the case that as the lattice vibrates at its fundamental frequency it will also deliver energy to the proton and therefore 100% of the energy absorbed by the strong nuclear force mechanism may be available to radiate away as a wave while the energy for the electric and magnetic waves may come from just the lattice oscillation.

There are $3.57\ x10^{51}$ protons and neutrons in the earth. The volume of the proton is 1836.15 times the lattice cell and is therefore 1836.15 x 2.56 l^3 where l is the lattice unit length. The fundamental frequency is c/(π.l). If we assume that the proton volume is reduced by 50% during a cycle and that that inflowing volume of space per cycle is equal to the volume loss of all the nucleons in the Earth then the lattice length that satisfies this condition is $8.45\ x10^{-23}$ m. Earlier I estimated the lattice unit length from a 4.5 PeV photon as $8.77x10^{-23}$ m which is only 3.7%

greater. If we assume that the volume change is 90% then the lattice unit length that satisfies this condition is $6.3\ x10^{-23}$ m which is 28% less than the 4.5PeV photon estimate.

As space flows into matter its energy is absorbed by the strong nuclear force mechanism and probably 100% of it is then re radiated away as a longitudinal wave. As the aether is just energy then we can say that the matter has consumed the space. At the next compression phase more space will be pulled into the matter and the longitudinal wave that is emitted will be a high pressure pulse that compresses the incoming space as it radiates outward. This explanation answers the first two major questions about the space flow theory i.e. where does the energy come from to compress the inflowing space and what becomes of the space after it enters matter.

I don't think that the opposite process takes place in some exotic type of matter that cause space to flow out and replace the space that is being consumed by ordinary matter. There is no observational evidence for anything like this. I think that all the energy that is emitted from matter and photons in the form of gravity and electromagnetic waves will eventually reach the outer edge of a finite universe where it just reforms into the structure of space. There is therefore an exact balance between the rate at which space is being consumed and the rate at which it is produced. A problem with this suggestion is that it probably cannot be observed.

In the above calculation I worked out a few possible lattice lengths and compression ratio that would give the correct escape velocity for the earth. If one were to know with certainty what the lattice length and compression ratio are then one can create an expression for the Gravitational Constant, G. If we say that the compression ratio is C_r and the lattice length is l then then by reversing the analysis above it can be shown that the escape velocity V_{esc} is

$$V_{esc} = 3.14\ x\ 10^{48}\ \ x\ C_r\ x\ l^2 \qquad\qquad 11.3$$

The Gravitational constant, G can be expressed in terms of the escape velocity as below where R is the radius of the earth and M is its mass.

$$G = \sqrt{\frac{V^2 R}{2M}} \qquad\qquad 11.4$$

Therefore

$$G = \frac{(3.14\ x\ 10^{48}\ \ x\ C_r\ x\ l^2)^2\ x\ 6.38\ x\ 10^6}{2\ x\ 5.97\ x\ 10^{24}} \qquad\qquad 11.5$$

If we choose any of the combinations of C_r and l mentioned above then

$$G = 6.7\ x\ 10^{-11}\ \ Nm^2 Kg^{-2} \qquad\qquad 11.6$$

There is one change that I propose that needs to be made to the flowing space theory of gravity and that is that the flow is not necessarily continuous. When all the nucleons in the Earth contract simultaneously the flow will have to stop until the nucleons expand again and start the next cycle. Since the frequency of oscillation is of the order of 10^{30} Hz I don't think it will materially alter the space flow theory.

12. Proton Relative Magnetic Moment

From a previous section we seen that the proton is composed of six positrons and five electrons. This means that the magnetic moment of the proton is derived from just one net positron as the contribution of the five electrons is cancelled by five of the positrons. This single positron tries to rotate the volume of the proton as it rotates itself. Even though all the particles in the proton contribute to the overall Magnetic Moment, we can treat it mathematically as a single oscillating positron at the circumference of the larger proton. As the positron rotates it has little effect on the proton as it is like trying to open a gate by turning it at the gate post. As the positron is at the circumference of the proton the relative length of the arm through which it tries to turn the proton is the diameter of the proton which is 2 x 12.33 x $Cos\Theta_h$. Inside the volume of the proton there are 3060 nodes and inside the oscillating positron there is a net two nodes or 0.2 of the total contributing to its oscillation. The Relative Magnetic Moment of the proton is therefore

$$\frac{\mu_e}{\mu_n} \;=\; \frac{3060}{12.33 \; x \; 0.943 \; x \; 0.2} \qquad\qquad 12.1$$

$$\boldsymbol{\frac{\mu_e}{\mu_n} \;=\; 658.02} \qquad\qquad \textbf{12.2}$$

This differs from the measured value of 658.21 by 0.03%

13. The Neutron

The neutron is just a proton with an additional electron added to the structure. This would appear to be blatantly obvious as it is well known that the neutron decays to a proton and an electron during β⁻ decay. We also know that free neutrons decay with a half-life of about 15 minutes, so the additional electron is not very strongly attached. An electron will obviously be electrically attracted to a positive proton and as an electron approaches the "hexagonal" ring of a proton along the spin axis of the ring, a simple analysis of the Coulomb force on the electron from the eleven constituent particles of the proton shows that the net force on the electron will be zero at a distance of approximately five lattice cells. This however is a static analysis so we must also consider the dynamics as well. As the electrons and positrons are 180^0 out of phase with each other the approaching electron feels alternating attractive and repulsive forces such that the approaching electron is sometimes entirely inside the proton structure and sometimes outside. When the electron is located at five lattice cells away from the proton structure it will add five electron masses to the inertial mass of the proton but since we can assume that it is inside the proton structure for half of the time then the average mass added to the proton is just 5/2 or 2.5 electron masses. The inertial mass of the Neutron, m_n, can therefore be written as

$$m_n = m_p + 2.5 \; x \; m_e \qquad\qquad 13.1$$

$$m_n \quad 1.6749 \; x \; 10^{-27} + 2.5 \; x \; 9.108 \; x \; 10^{-31} \qquad 13.2$$

$$\boldsymbol{m_n \;=\; 1.6749 \; x \; 10^{-27} \;\; Kg} \qquad\qquad \textbf{13.3}$$

This calculation is 99.9999% that of the known mass.

When the electron enters the proton during the period when the electrostatic forces are only attractive, it will come within one lattice unit length of the central electron as neither of them are repelling at this time. The strong nuclear force will now pull them together when they eventually rotate around their common spin axis. When we use the same formula (13.1) in this situation that I used to calculate the Gravitational mass of the proton we find that that the mass of the two electrons is increased by four additional electron masses. While the electron is outside the proton it contributes one electron mass to the Gravitational mass of the Neutron, but when it is inside, it contributes four electron masses. The average is therefore (4+1)/2 or 2.5 so the Gravitational and Inertial masses of the Neutron are identical.

14. Neutron Relative Magnetic Moment

The magnetic moment of the neutron is about -2/3 that of the proton. I showed that the magnetic moment of the proton was due to a single electron on the "circumference" of the proton trying to spin the mass of the proton. From the previous section on the Neutron mass, I showed that the mass of the Neutron can be explained by an additional electron being added to the structure at approximately the centre of one of the hexagonal rings. This additional electron tries to spin the entire mass of the Neutron and because it is located on a spin axis the arm it is trying to spin the Neutron with is half that of the electron in the case of the proton. In addition, because it is on the spin axis it has two arms with which to spin the Neutron so therefore this electron is able to spin the Neutron four times more efficiently than the electron in the proton. However, because it is situated at the hexagonal ring and not at the centre of the Neutron its ability to spin the Neutron is diminished. If we approximate this diminished ability as the ratio of the particles not on the plane of the spinning electron to the total number of particles in the Neutron i.e. 5/12, then we can approximate the relative magnetic moment of the proton and Neutron as

$$\frac{\mu_n}{\mu_p} \;=\; -\left(4 \; x \; \frac{5}{12}\right) + 1 \;=\; -0.666 \qquad \textbf{14.1}$$

The +1 in equation 16.1 is required as the magnetic moment of the proton has to be overcome to get the Neutron spinning in the opposite sense. I could have used the relative distances that the electron is away from the centre to calculate the 5/12 term but there is a lot of uncertainty in the calculation due to the dynamics involved. This simple calculation combined with the Neutron mass calculation demonstrate the validity of the Neutron model.

15. The Hydrogen Atom

To explain the hydrogen atom, one needs to essentially explain how electron orbitals are created and why electrons accelerating in orbits around the nucleus do not radiate away their energy and collide with the nucleus. Bohr's model of the atom just took the orbitals as a given without explaining how they came about and never explained why the electrons did not radiate away their energy while accelerating around the nucleus. Quantum Mechanics fudges this problem by claiming that the electron is everywhere at once which is totally unsatisfactory.

Earlier I explained how the structure of the proton contracts and expands to produce longitudinal waves which radiate into the lattice structure around the proton. In turn, the lattice surrounding the proton gets pulled radially inward in a stop start motion at the same frequency. We therefore have the situation where a medium is moving in the opposite direction to a wave, so this causes spherical standing waves to form around the proton with nodes at half the wavelength. This model provides a possible method of calculating the speed of de Broglie waves. If the Bohr radius r_B, is the position of the first node then the velocity is twice the Bohr radius times the lattice frequency or approximately 1 x 10^{20} m/s. However, as the inward lattice movement gets closer to the proton it gets faster. This causes the nodes of the standing wave to be further apart the closer they are to the proton. The electron orbiting the proton will tend to only occupy orbits at the nodes of the spherical standing wave and this is why the orbits are quantised.

As stated earlier the proton is composed of six positrons and five electrons. At the surface of the proton next to one of the electrons an approaching electron will feel a very strong repulsive force. Next to a positron it will feel a very strong attractive force. There will therefore be locations around the surface where the attractive and repulsive forces balance each other, and an approaching electron will feel no force at all. In the volume around the proton, all the way out to the most distant orbital, there will be locations where the net force is zero or near zero.

The electron around the proton therefore occupies these regions of zero or near zero force but confined to the nodes of the longitudinal waves. The orbits are quantised because of the longitudinal waves but the electrons do not radiate away their energy because they are not experiencing any force and therefore not accelerating. When an electron gets excited to a higher energy orbit it will have to leave a region where it experiences no force and traverse a region where it does until it reaches another region where it experiences no force. If an electron absorbs a photon with too much energy, it will overshoot this region and be attracted back to the energy level it came from and reemitting the photon. It is only when the photon energy is just right to promote the electron to the zero force region that the photon is absorbed.

The Bohr model, to be fair to it did accurately predict the frequencies of the lines in the hydrogen spectrum and was an intellectual leap forward in describing the hydrogen atom and is still in my view better that the current Quantum Mechanics model. In QM, an electron follows a wave function that has complex or imaginary components that cannot be considered mathematically real or therefore physically real either. Its only saving grace is that it predicts the electrons behaviour correctly but so too did the Bohr model.

16. The Photon

Earlier I described that an electron is an oscillation of a cell where the "tri star formation" rotates in opposition to the "hexagonal formation" and in doing so causes the lattice around it to stretch which then radiates pressure waves or longitudinal waves. When a positron and an electron annihilate each other, the process usually produces two high energy photons which have the same energy as the rest mass energy of the two particles. When the positron and the electron encounter each other, they will be in opposite orientations as in fig 16.1 and the two hexagonal components will be 180^0 out of phase with each so that the contraction of one particle cancels out the expansion of the other to leave two particles that are just oscillating without contracting and therefore have no mass. Because they are still oscillating around a spin axis, they produce the same electric and magnetic transverse waves as the electron and positron that formed them but the mc^2 rest energy of the electron and positron sets up and oscillation at right angles to the spin axes. Each time this oscillation changes direction it causes a 180^0 shift in the phase of the electric and

Fig 16.1   Positron Electron Annihalation

magnetic waves which produces the familiar alternating electric and magnetic fields we associate with photons. In the case of photons created by the annihilation of slow moving electrons and positrons this frequency is the Compton frequency, but this frequency of oscillation can be any value which is why the electromagnetic spectrum is a continuous one.

Because the photon does not contract like the electron it is possible for the photon to move through the lattice at the speed of light and to easily pass through another photon without interacting.

Photons are also emitted by accelerated charged particles and can therefore have a continuous spectrum of frequencies depending on how much they are accelerated. If we temporarily imagine the lattice cell and the electron as a sphere

travelling between two offset ladders that are separated by a distance a little less that the diameter of the sphere and with rungs of a similar separation it may be easier to visualise how a photon is created. As the sphere moves along the length of the ladders it will encounter a rung and rotate about it while also moving forward until it encounters a rung on the other ladder. It will then rotate in the opposite direction about it until it reaches the next rung on the first ladder and then the whole process repeats. At each subsequent step the sphere rotates a little faster as the ball's forward speed increases. The electron does the same as it is accelerated through the lattice transferring its oscillating pattern from one lattice cell to the next. The longer it is accelerated for the faster it will travel and therefore the higher the frequency of the oscillation. When the accelerating force is removed the electron will stop but the oscillation superimposed on it will continue in the direction that the electron was travelling, only now, the oscillation has been transferred to a virtual electron. This oscillation is identical to the ones produced during the electron positron annihilation but can have any frequency. As with the electron, any energy dissipated by the photon in the emission of electric and magnetic fields is recovered from the lattice.

I showed earlier how the electron gets its energy from the lattice by extracting PdV work. In the case of the photon, it extracts is energy from the lattice in the form of VdP work.

17. de Broglie Waves

When a particle moves through the lattice it moves in the same sense that a phonon does in moving packets of vibrational energy. These packets of energy move from one lattice cell to the next and therefore it is not a smooth steady process but is instead a stop start process. This links in with the stop start movement of flowing space that that I proposed is a necessary addition to the flowing space model of gravity. When an electron moving at "constant" velocity enters a lattice cell it will transfer its momentum to the one side of the lattice cell and come to a stop. The lattice cell then redistributes the momentum to the rear of the cell and causes the electron to start moving again in the same direction that it was moving. All the momentum is returned to the electron, and it continues with the same "constant" velocity. This disturbance of the lattice cells as the electron passes causes waves to be emitted in a similar manner to a bullet emitting sonic waves. The energy for these waves has to come from somewhere and it may come from energy released by the lattice as it expands.

When the electron with momentum p is brought to a stop by stretching the lattice cell by an amount dx in a time dt then we can write that the kinetic energy lost by the electron dE is

$$dE = \frac{dP}{dt} \; x \; dx \qquad\qquad 17.1$$

$$dE \; x \; dt \;\; = dP \; x \; dx \qquad\qquad 17.2$$

We know from the Heisenberg Uncertainty principal that dE x dt = h and since the electron comes to a stop dE = E and dP = P so equation 19.2 can be rewritten

$$h = P \; x \; dx \qquad\qquad 17.3$$

$$\frac{h}{P} \;\; = \;\; dx \qquad\qquad 17.4$$

If we assume that dx is the wavelength of the wave that is produced in the lattice then we get the expression for the de Broglie wavelength, λ, of a moving particle

$$\lambda = \frac{h}{P} \qquad\qquad 17.5$$

These waves are longitudinal waves and therefore travel at a greater velocity than transverse just as is the case with seismic S and P waves. They therefore travel faster than the photon. As a photon or a particle is approaching a double slit it will be emitting de Broglie waves and the de Broglie wave will have sufficient time to pass through the slits and set up an interference pattern before the photon or particle arrives. When the photon or particle then passes through one of the slits it will encounter the wake of the de Broglie wave and be steered by the interference pattern within it. The Aharonov Bohm effect can be explained by de Broglie waves reflecting off the region of space containing the magnetic field as it is seen as a discontinuity. These reflected waves then interfere with other de Broglie waves setting up an interference pattern that steers the electron.

I find it hard to understand how a single photon that approaches a mirror at an angle of incidence of 45^0 will get reflected at 45^0. We are told that the photon is absorbed by an electron and then reemitted at the same angle of incidence. There are too many variables here to ensure that the photon is reflected at the correct angle each time. The position and velocity of the electron in the atom that absorbs the photon will be highly variable as will the direction that the new photon will be emitted. At a more macroscopic scale there will be a lot of variation in the surface smoothness of the mirror such that the local angle of incidence can vary greatly but the photon is still reflected at an angle determined by the very large scale orientation of the mirror. I think that as the photon approaches the mirror it will be emitting de Broglie waves that travel faster than the photon and therefore may be able to reach the entire surface area of the mirror and reflect back to form an interference pattern which then guides the photon onto the path that produces an angle of reflection that is determined by the macro level orientation of the entire mirror. If a photon can pass through a slit without encountering any electrons and yet change its path by significant angles, then surely a photon can be reflected from a mirror without encountering any electrons but instead be guided by the de Broglie waves forming an interference pattern which encodes within it the angle of the entire mirror with respect to the angle of incidence. This might explain why Feynman's path integral method over all possible paths works. However, it is not the photon that explores all possible paths but the de Broglie waves which then convey this information. These de Broglie waves are longitudinal, as are the waves emitted by particles that compress the flowing space which causes gravity. They travel at the same speed but faster than light and I therefore in this model I will collectively refer to them in future as Katrina waves.

18. Planck's Constant

Planck's constant has units of Js which is also the units of Action and angular momentum.

Earlier I stated that the photon extracts energy from the lattice by doing Vdp work. From Bernouilli's equation in fluid dynamics the pressure drop dP in a fluid moving at velocity v and density ρ is

$$dP = \frac{1}{2} \rho \, v^2 \qquad 18.1$$

As density is mass m per unit volume =V we can rewrite as

$$VdP = \frac{1}{2} m \, v^2 \qquad 18.2$$

VdP is therefore the kinetic energy and if we say that this kinetic energy is rotational kinetic energy we can write that

$$VdP = I\omega^2 \qquad 18.3$$

Where I is the moment of inertia and ω is the angular frequency. Angular momentum L is Iω so we can write

$$VdP = L\omega \qquad 18.4$$

Angular momentum L, has units of Js as does Planck's constant h and therefore equation 20.4 has the same form as the familiar expression for the energy E, of a photon with frequency f.

$$E = hf \qquad 18.5$$

The moment of inertia needs to be inversely proportional to ω so that L has a fixed value for all ω. We can postulate why this might be the case by examining how the nodes are oscillating. If we make the assumption that the nodes move at the same speed regardless of frequency, then at low frequencies the amplitude of the oscillation will be grater than that of high frequencies. As energy is proportional to amplitude squared and If we take a leap and equate energy to mass then the higher frequency oscillations will have a lower "mass" and therefore a lower moment of inertia inversely proportional to frequency.

Planck's constant can therefore be thought of as the angular momentum of the photon which is the same for all photons regardless of frequency and the energy of the photon extracted from the lattice per cycle is hf.

19. Proton Antiproton Asymmetry

Earlier I described a sequence of steps that were required to create a proton or an antiproton from positrons and electrons by having them approach each other along their spin axes. This required ten steps which all had a low probability of occurring because there are much easier ways for positrons and electrons to approach each other. I think therefore that the probability of the first proton or anti proton forming was very, very small but once the first proton formed the fate of the antiproton was sealed. This was because the first proton then became a

scaffold to create and ensure that the next particle created was also a proton. Because the proton is positively charged it attracts electrons, even if these electrons are at the centre of a free tri-star component. If the first proton attracts one of these components it will slow it down while holding it near one of its hexagonal rings. This makes it easier for a free hexagonal ring to be attracted to it where the SNF will bind them together as a proton shell. This new structure eventually breaks away from the first proton and captures an electron to become a proton itself. The first proton cannot attract a tri star component with a positron at its centre which is what would be required to help create an antiproton so the rate of proton creation exponentially increases after the first proton is created. Even if an antiproton did manage to form very shortly after the initial proton it would never be able to catch up to the rate of proton formation. They would eventually annihilate with protons leaving only the protons we have today.

20. Dark Matter

As I stated at the beginning of this paper the structures in nature keep repeating at different scales and by using that guiding principle this model suggests a very simple explanation for Dark Matter. After all the protons were created in the early universe, a large proportion of them captured electrons and became neutrons. As I described earlier, the electron is just attached to essentially the outside of the proton in the centre of one of the hexagonal rings. This protruding electron enables two neutrons to join together by having both join to the same electron and this process can continue until six neutrons form a ring. This structure would be very stable as it is essentially bound together by the SNF, the same process that binds neutrons and protons in atomic nuclei. These structures are obviously neutral and therefore have no net electric or magnetic fields, but they will have mass and will have gravitational effects. There would have been a very high probability that a high proportion of the protons became neutrons because there is no difficulty in the electron positioning itself at the hexagonal ring of a proton. Additionally, there is a high probability that two or more neutrons would have come together to form rings in the presumably neutron dense environment because the favourable position of the positrons on the hexagonal ring would attract it to the protruding electron of another neutron. There is therefore a high probability that there is a very high percentage of dark matter relative to ordinary matter which is what we see.

21. Dark Energy

The original energy in the universe was just the energy of the fundamental oscillation of the two FCC lattices but as particles and photons oscillate, they first absorb this energy and then radiate it in all directions. While moving they also radiate de Broglie waves of even lower frequencies.

We can picture the lattice as nodes connected by springs under compression and therefore as the particles absorb and reradiate away this energy these springs slowly extend, and the fabric of space will expand. The greater the distance between any two points the greater the expansion will be as all the

springs between all the nodes between the two points will contribute to the expansion.

If the Universe were infinite, then there would be an infinite resistance to the expansion and therefore no expansion, so I have to conclude that the Universe is finite. If it is in fact finite, then there may come a time when the lattice connecting rods are stretched to a point where they are under tension and then a contraction of the Universe will commence. This contraction will continue until all the lattice connecting rods are under sufficient compression to first stop and then reverse, leading to another expansion phase which we are in today. So, in this model, space is just a lattice structure that just slowly expands and contracts and at a certain stage of the expansion the energy conditions are right for spontaneous oscillations to occur which constitute electrons and positrons.

22. Relativistic Mass, Time Dilation and Length Contraction.

General Relativity gives no explanation as to what the physical mechanism behind these phenomena is but since they all behave according to the same Lorentz factor it is reasonable to assume that they are all caused by the same process linked to the velocity squared.

Bernouilli's equation relates the pressure change in a fluid to the square of the fluid's velocity, and I propose that a similar process is happening when a particle moves through the aether. For a particle to attain a velocity it must be given energy and in my model of a particle this energy can only reside in the connecting rods of the lattice that comprise the particle. As the connecting rods are modelled as springs under compression then any additional energy added will compress the connecting rods further and therefore increase the pressure they exert on the surrounding lattice. Any particle in motion will therefore experience a pressure difference proportional to the square of the velocity over and above what a stationary particle would experience.

This pressure difference will therefore cause the particle to oscillate at a lower frequency than a particle at rest and therefore the moving particle experiences time dilation.

It is the energy that is added to the particle that causes it to move in the first place which then causes the pressure difference, but this energy causes the connecting rods to contract so the particle contracts. If a contracted particle moves a number of steps through the aether, then it will move a shorter distance than a non-contracted particle would have in the same number of steps therefore the particle experiences length contraction.

Many physicists do not subscribe to the idea that the actual mass of the particle increases but instead it is its momentum or inertia that increases. As the particle has more energy and has also contracted it is more difficult for the combined oscillations which constitute the particle to move to another lattice cell and therefore, we can say that the particle's inertia has increased.

So, all three phenomena can be explained by the addition of energy to the particle which causes the connecting rods to

contract, which causes the particle to move, which causes a pressure difference which causes the frequency of oscillation to reduce.

23. Gravitational Redshift

As a photon travels directly upwards through a gravitational potential it will lose energy and become red shifted and when it travels in the opposite direction it will become blue shifted. Again, General Relativity or QM does not provide any mechanism for why this happens. The photon gets its energy from the pressure of the surrounding lattice and anything that changes this pressure will affect how much energy the photon has available to it. As the photon is travelling up through a gravitational potential the aether is moving in the opposite direction to the photon and therefore there is a pressure drop due to the increased relative velocity. The photon has less ability to extract energy from the lattice and therefore looses energy. While travelling in the opposite direction the opposite happens and the photon gains energy.

24. Stern Gerlach Experiment

In a standard SG experiment a beam of silver atoms is passed through an inhomogeneous magnetic field, where the beam is split into two narrow beams corresponding to the two spin states of the unpaired electron in the atoms. If one of these beams is then passed through another SG apparatus at right angles to the first, then the beam is split in two again despite all the unpaired electrons in that beam supposedly having the same spin.

If one considers the four spin axes of the electron as unit vectors in a coordinate system, then any arbitrary spin direction can be composed of the vector sum of integer multiples of the four unit vectors. The orientation of the electron is fixed with respect to the lattice so for an electron to align with an external magnetic field requires that the four individual axes do not get to rotate the same number of times. Some rotate more times than others depending on the direction of the external magnetic field to produce an electron magnetic field either parallel or anti parallel to the external magnetic field. Any laboratory frame of reference will be constantly changing relative to the lattice and so too will the direction of any "fixed" external magnetic field. The process of electron spin alignment with an external magnetic field is therefore a very dynamic one. I will refer to this changing of the relative number of rotations around each axis so as to align with an external field as the spin sequence.

When a beam of silver atoms enters a SG apparatus the unpaired electrons align either with or against the field in a 50/50 split as that is the probability that an electron has clockwise or anti clockwise spin. The inhomogeneous magnetic field then separates the two beams. The electrons in one of these beams will all have clockwise spin, but the spin order will be random as will the spin sequence associated with each spin order. When this beam enters a second SG apparatus the spins of the rotating components will all be scrambled as the electrons settle into a new set of spin orders and sequences to

enable them to align with the new external field. They will however align 50/50 either parallel or antiparallel to the new field.

If this beam were instead directed to a second SG apparatus with the external magnetic field in the same direction as the first, then the beam does not split into two. This is because the electrons maintain their spin orders and sequences on leaving the first SG apparatus and therefore there is no scrambling of the spin orders and sequences as they enter the second as they are already aligned with this field.

25. Entanglement

When two particles are entangled, e.g. two electrons, it is not just their spins that align opposite to each other. Their spin order and sequence are also exactly opposite. Therefore, when the spin of one of the pair is measured using an external magnetic field with an arbitrary direction the other is found to have the opposite spin in an external magnetic field with the same direction. When the two particles enter their respective external magnetic fields, no matter how far apart they are, they will arrive at a new spin order and sequence that is opposite to the other because they were exactly opposite to each other to start with.

26. The Residual Strong Nuclear Force

While it is the Strong Nuclear Force (SNF) that holds the electrons and positrons together within the structures of the proton and neutron it is the Residual Strong Nuclear Force (rSNF) that holds protons and neutrons together within an atomic nucleus. As described earlier the SNF arises from the twisting of the lattice between a positron and an electron along their common spin axis. When two protons or hadrons come close together their relative orientations will be dictated by the structure of the lattice. They can only be orientated such that the axial node or electron in one proton will be aligned with, and facing, a hexagonal ring of the other hadron at a distance of about one proton diameter. The three positrons in the hexagonal ring will have a spin axis parallel to the spin axis of the electron in the other proton. As these four axes are parallel to each other the twisting of the lattice by the four particles concerned will cause an attractive force similar to the SNF but because they are not common spin axes the force is not as strong. The additional electron in the neutron structure which is on average at the centre of a hexagonal ring enables a proton and a neutron to get close enough together for the rSNF to bind them together but the electron ends up being confined halfway between the two. As the electron is sufficiently far away from either hadron it no longer contributes to the mass of the neutron as described earlier which accounts for some of the mass defect during nuclear fusion. The electron no longer has the energy it had while the neutron was free and because it is confined between two hadrons it can no longer easily escape the neutron as in β⁻ decay which explains why neutrons are stable inside neclei.

27. Bell Inequality

In his 1964 paper *On The Einstein Podolsky Rosen Paradox* [2], John Bell made one assumption on which his entire thesis rests. In his paper he says the following

Measurements can be made, say by Stern-Gerlach magnets, on selected components of the spins $\vec{\sigma}_1$ and $\vec{\sigma}_2$. If measurement of the component $\vec{\sigma}_1 \cdot \vec{a}$, where $\vec{a}$ is some unit vector, yields the value +1 then, according to quantum mechanics, measurement of $\vec{\sigma}_2 \cdot \vec{a}$ must yield the value -1 and vice versa. Now we make the hypothesis [2], and it seems one at least worth considering, that if the two measurements are made at places remote from one another the orientation of one magnet does not influence the result obtained with the other. Since we can predict in advance the result of measuring any chosen component of $\vec{\sigma}_2$, by previously measuring the same component of $\vec{\sigma}_1$, it follows that the result of any such measurement must actually be predetermined.

The vital assumption [2] is that the result B for particle 2 does not depend on the setting $\vec{a}$, of the magnet for particle 1, nor A on $\vec{b}$.

When the spin of an electron is measured it is its interaction with the external magnetic field that is in fact measured. The electron can therefore only have two possible spin states, either aligned with or against the field. When two entangled electrons are created, they have opposite spin directions, spin orders and spin sequence, therefore when one attempts to measure their spins with an arbitrarily orientated external magnetic field the two electrons will necessarily behave opposite to each other and align with the field in opposite directions to each other.

While Bell is correct to say that one measuring magnet will not physically influence the other measuring magnet, he is incorrect in his assumption that the setting of the magnet for particle 1 does not determine the measurement of particle 2. Quantum Mechanics claims that each electron is in a superposition of both spin states with an equal probability of either being the spin state of the first electron to be measured. It is of course true that the spin of the first electron to be measured will have a 50% chance of either aligning with or against the external field but once we know which way it aligns, the second electron can only align in the opposite sense as all its spin properties are opposite to the first. The first electron aligns with the field in a particular direction because that is the direction that requires the least amount of change to its spin sequence and order and not because it randomly selects one of two superimposed states. The second electron aligns in the opposite direction because it will go through the same minimum number of changes to its spin sequence and order.

As Bell's assumption is incorrect his conclusion is also incorrect.

28. Superconductivity

When a superconductor becomes superconducting at the critical temperature, a phase change occurs whereby all the electrons that have clockwise spin align with each other by aligning their magnetic fields. Just like in a plasma filament where the charges at the centre of the filament follow along

magnetic field lines so too do the electrons in the superconductor. Each electron in the superconductor follows the magnetic field line of the electron in front of it and in conductors where currents circulate these chains of electrons just complete a circle and continue circulating indefinitely. I envisage that at the surface of a superconductor there will be many separate chains of electrons all running parallel to each other. The electrons with anticlockwise spin form separate chains of their own and are probably located between the chains of clockwise rotating electron chains at the surface. I described the magnetic field earlier as a twisting and untwisting of the lattice and in a superconductor the lattice over almost the entire surface will be undergoing this twisting parallel to the surface. This is why no external magnetic field can penetrate this surface unless it exceeds some critical value. Cooper pairs are often cited in relation to superconductivity and while I'm not sure what they are I propose they are just referring in some way to the fact that there are two types of electron chains carrying the current.

29. The Wu Experiment

In 1956 an experiment [3] was carried out by Chien-Shiung Wu to test for parity violation in β^- decay of neutrons in Cobalt 60. The experiment involved placing the Cobalt in a very strong external magnetic field and observing what directions the electrons were emitted in. At the time it was expected that there would be an even distribution of electrons, but it was found that the electrons had a preferred direction opposite to the spin direction of the Neutrons. This can easily be explained by this model. When the Neutrons align with the external field, they will orient in such a way that the additional electron will be on the spin axis therefore if the spin axis is vertical the electron will be located near the centre of the hexagonal ring at the bottom of the Neutron. When it decays it will preferentially exit the Neutron from the bottom as is observed.

30. Single Photon Mach Zender Interferometry Experiments

In all single photon Mach Zender Interferometry type experiments, single photons are passed through a 50/50 beam splitter and then caused to interfere with themselves later. Quantum Mechanics says that the photon travels both paths in a superposition and then one is selected at random when a measurement is made but this makes no physical sense. Quantum Mechanics cannot explain how a single photon interacts with a single microscopic electron in the beam splitter and causes it to be reflected at the same macroscopic incidence angle. It uses the Feynman integral over all possible paths to determine the most probable trajectory for the electron. This claims that the photon somehow explores all possible paths between two points and that the sum of the phases of all these paths contribute to the probability of the photon taking a particular path. This again, like in most of Quantum Mechanics, is a mathematical construct with no meaningful physical process underlying it. Quantum Mechanics failure to explain this fundamental interaction at the start of all these types of experiments means that its conclusions about the results of these experiments are incorrect.

When a photon approaches a beam splitter it will be emitting de Broglie waves which travel ahead of the photon due to their much greater speed. These de Broglie waves will impact with a macroscopic area of the beam splitter and be reflected by the particles in it. This reflected wave will then interfere with incoming de Broglie waves and set up an interference pattern which then directs the path of the photon such that the reflected angle is equal to the incident angle. This is analogous to the usual wave explanation for reflection so there is nothing controversial in that. What is different is that the waves are de Broglie waves travelling at 10^{19} times faster than light which enables the photon to "sense" the macroscopic structure of the beam splitter through the interference pattern of the de Broglie waves which depends on the macroscopic structure of the beam splitter. It is the much faster de Broglie waves that "explore all possible paths" and not the photon itself. The mathematics describing the de Broglie wave interference pattern will be the same as Feynman's path integral analysis and that is why it gives the correct answer but without actually understanding the actual physical process.

If the photon gets reflected then there is a change in its momentum but if the photon doesn't even need to interact with an electron during reflection, then there must be something else going on that conserve's momentum. I propose that as the photon changes direction it creates two virtual photons which are just another mode of oscillation of a lattice cell. One of these virtual photons travels in the same direction as the real photon was originally travelling and the other travels in the opposite direction to the real photon's reflected direction. These virtual photons have the same frequency as the original photon and will reflect and refract just like a real photon as they will also emit de Broglie waves. The virtual photon that travels in the direction that the real photon was originally travelling is usually made, in these types of experiments, to travel along a path that interferes with the path taken by the real photon. The virtual photon will then interfere with the real photon and possibly change its path. This interference mechanism explains all the observations of these types of experiments without the need for superposition of states and other absurd explanations. I prefer to refer to the virtual photons as Dark Photons as they are real physical entities.

31. The Tau Particle

I have shown earlier that the mass of a particle is related to the volume or volume change of the particle and in all the examples of particles to follow in the next few sections I show how the ratio of the volume of these particles to the volume of the proton is in very good agreement with measured values. The Standard Model of Particle Physics tells us that the Tau particle is an elementary particle similar to the electron but with almost twice the mass of the proton. In this model the structure of the Tau can be explained by the collision between two protons.

Fig 31.1

When the protons collide a hexagonal ring from one proton will impact with the tri star formation of a second proton. The structure of the lattice dictates that this is the only orientation that colliding protons can be in as shown in fig 31.1. As the electrons in the hexagonal ring of one proton approach the positrons in the tri star formation of the other, they will interfere with the SNF bonds of the positrons of the hexagonal ring causing them to break, thus releasing the positrons, which then repel away from each other (not shown in fig 31.1). The same happens the single electron in the tri star formation but it gets trapped inside the structure (still intact in fig 31.1). Three positrons are lost as the protons collide, so the overall charge of this structure is -1e. Its volume will depend on how close the positrons and electrons approach each other but from fig 31.1 it is easy to see that it is a bit less than two proton masses. The volume of the trigonal pyramid at the top of the proton structure is 1/20 of the total proton volume and as about two of these volumes are lost in the collision, we can say that the mass of the structure is approximately 1.9 times that of the proton, so its inertial mass is 1.9 times that of the proton. The actual measured Tau-Proton mass ratio is 1.8938 so as this structure has the correct mass and charge of the Tau, I propose that this is actually the Tau particle. This structure is very unstable as the electrons and positrons from the two protons that initially met eventually annihilate the three pairs. The decay products of the Tau are most often a neutral pion, a charged pion and a Tau Neutrino (25.49%) or a charged pion and a Tau Neutrino (10.82%) and I will discuss these pion particles next.

32. The Neutral and Charged Pions

When the tau particle in fig 31.1 breaks apart as the three pairs of electrons and positrons annihilate, all that will be left is a distorted hexagonal ring from one of the original protons as shown in fig 32.1 and a tri star formation. Two of the electrons that were inside the Tau are attracted to the tri star formation making it overall neutral and therefore not immediately detectable. The remaining electron resides at the centre of the

Fig 32.1

hexagonal ring giving it an overall charge of -1e. The volume of the distorted hexagonal structure is actually that of a twisted trigonal prism where the triangle has the same area as that of the trigonal pyramid base, so its volume is just three times that of the pyramid or 0.15 of the proton mass. The measured charged pion to proton mass ratio is 0.148. As with the masses of all particles discussed in this paper these are average masses because the particles are continuously contracting and expanding so this is a very good approximation. As this structure has the same mass and charge as the charged pion, I propose that it is actually the charged pion. The neutral pion is just missing the central electron and therefore has slightly less mass. The charged pion has more mass because the central electron will be oscillating along the central axis and briefly popping outside the volume, contributing more to the inertial mass of the particle the same way as the electron in the neutron does. The hexagonal ring is obviously neutral as it contains three pairs of electrons and positrons, and it is also its own anti particle. It usually decays fairly quickly into pairs of photons as the particle pairs annihilate each other. The charged pion on the other hand decays in a different way and I will discuss that in the next section.

33. The Muon

The charged pion usually decays to a muon and a muon neutrino (99.98%) or to an electron and an electron neutrino (0.012%) but it can also produce electron-positron pairs or pairs of photons. If the central electron in a charged pion annihilates with one of the positrons in the ring, then an open ring with a
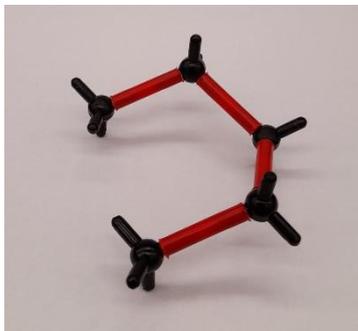

Fig 33.1

net charge of -1e will result as shown in Fig 33.1. The muon has a mass of about 0.79 that of the neutral pion which is very nearly 5/6 which is not surprising since the pion just lost one of its six constituent particles. As this structure has the same mass and charge as the muon, I propose that this is actually the muon.

Muons themselves eventually decay to an electron and an electron neutrino. The muon contains an electron and two electron positron pairs so when this structure breaks apart it will produce an electron and two neutral electron-positron pairs which largely go unnoticed.

34. The Kaon

When the structure in fig 34.1 decays it can do so in more ways than one. Instead of the three electrons annihilating with the three positrons as discussed earlier to produce a pion the three positrons can be annihilated by the three electrons trapped inside the tau particle. This will result in a neutral pion and another structure that consists of a tri star formation with three

Fig 34.1

electrons still attached by the SNF as shown in fig 34.1. The volume of this structure is 0.5 times that of the proton and therefore its inertial mass is 0.5 times that of the proton and its charge is -1e. The mass of the charged kaon is 0.52 times that of

the proton, so I propose that this structure is the charged kaon. If an additional electron is trapped inside this structure and oscillates in and out of this volume, then it will add more inertial mass making the neutral kaon heavier than the charged kaon which is what is actually observed.

There are two types of kaons designated K_s and K_L because the lifetime of one is about 10,000 times longer than the other even though they have identical masses. If there is an electron-positron pair trapped inside a kaon then it will add little to its inertial mass or charge, but it will reduce the lifetime by annihilating rapidly with an electron-positron pair in the structure.

With the four subatomic particles just discussed I have only detailed their most common decay paths. A review of the literature on the decay of these particles list many more, some of which I think are not correct such as the K_L decaying into three neutral pions. In this model there is just not enough positrons and electrons in a single K_L to create three neutral pions. In the chaotic environment of a particle collider there will be multiple protons colliding and disintegrating in multiple ways and many of the published decay paths for a single particle may be the result of multiple neutral particle fragments interacting with the single decaying particle making it look like it decayed into something that it actually didn't.

When referring to the mass of these particles I have always just referred to the inertial mass as this is directly proportional to the volume of the particle. The gravitational mass of these particles will not be the same as their inertial mass, but it is only ever the inertial mass that is measured in a particle collider.

35. The Neutrino

When the four particles, the Tau, the Kaon, the Pion and the Muon disintegrate, the decay products usually include neutrinos. This disintegration involves the breaking apart of electrons and positrons that are held together by the SNF which was described earlier as a twisting of the lattice structure between the pair of particles. When the two particles are ripped apart there is still a twist remaining in the lattice. This twist or distortion propagates away as it is no longer confined between to massive particles. The propagation of this distortion is a neutrino. As neutrinos have very little mass the distortion of the lattice is minimal and therefore neutrinos interact very little with matter. The three flavours of neutrinos maybe due to the direction that the neutrino is travelling relative to the lattice. It can travel parallel to the twist along the same axis of the twist, or it can travel at right angles to this or any combination of the two. The characteristics of the twisting action will be different in the three different scenarios thus producing different outcomes when they do interact with matter. Since all matter is moving or rotating relative to the lattice the trajectory of a neutrino will be constantly changing relative to the lattice and therefore changing flavour as it travels. According to this model there are not three distinct neutrinos associated with the electron, muon and tau as they are just the result of breaking SNF bonds between electrons and positrons regardless of what particle is decaying.

36. Bohemian Mechanics

My explanation for many phenomena with this model such as single particle interference, light reflection and the Aharonov Bohm effect uses my concept of de Broglie waves which travel faster than the speed of light.

Bohemian Mechanics which is a deterministic and non-local pilot wave theory is very successful at replicating the predictions of Quantum Mechanics but is largely ignored because it required that particles affected each other superluminally, meaning that information can be transmitted instantaneously over long distances. General Relativity requires that nothing can travel faster than light, but General Relativity is incomplete as Einstein himself accepted.

David Bohm considered that the pilot waves that his theory described were real as opposed to the imaginary wave function of Quantum Mechanics so the de Broglie waves that I have described could readily be the pilot waves of Bohemian Mechanics.

37. Conclusions

By proposing a tetrahedral lattice structure for the aether with a density of μ_0, a compressibility of ε_0 and a lattice unit length of l one can easily explain the nature of matter and light and the interactions between them. It provides us with a deeper understanding of the origins of Planck's constant and the Gravitational constant and allows us to express these and many other constants in terms of these three properties of the lattice. If the explanation for Dark energy given in this paper is correct, then these three constants of nature are not constant at all but are gradually changing as the lattice unit length imperceptibly increases.

It explains the structure and properties of many of the unstable subatomic particles as the disintegrating remains of shattered protons instead of the nonsensical zoo of fundamental particles as promoted by the Standard Model. It also provides a simpler and unified alternative explanation to the nature of reality than do either Quantum Mechanics or General Relativity and explains many phenomena that these two theories have failed to do.

It provides a solution to the main objection to Bohemian Mechanics which is the only sensible alternative to Quantum Mechanics.

38. Additional Follow on work

As I am not a mathematician or affiliated with any institution, I do not have the skills or the resources to rigorously test and validate this proposal by building a computer model of it, so I hope that someone is sufficiently interested in these ideas to take on that task. A lot of researchers have done work with pilot wave theories so perhaps their work could be modified to include the de Broglie waves that I have described. No doubt, I have made some mistakes and incorrect assumptions as I have worked entirely on my own without having anybody to consult with, but I hope that they are few and minor.

39. References

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