

## A HYPOTHETICAL PRE-FERMION PARTICLE THEORY OF EVERYTHING BASED ON 95 THESES

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This is a hypothetical pre-fermion particle theory of everything, explaining the symmetric foundations of physics and why relativistic and quantum systems are different and irreconcilable. It is based on a single particle/anti-particle foundation and the background from which they emerge, using which the zoo of fermions, bosons, nucleons, photons and the observed universe are explained. The only two underlying types of energy presumed to exist are treated identically and produce standard formulae, except where the missing component in current formulae is shown to be necessary to explain stable orbits and why there is a maximum speed through the background universe. Matter and anti-matter are shown to be present in equal quantities and some dark matter is shown as the same composite loop form as matter, but with immiscible symmetries due to different number of particle/anti-particle pairs in the composites. The emergence of the particle/anti-particles from merged to unmerged state is shown to lead to randomly distributed failed big bang events within the single universe through which our successful big bang is expanding. Viscosity in the background universe, comprising merged particle/anti-particle pairs, saps energy from all composite particles and produces the light speed terminal velocity of photons. The resultant viscosity red-shift needs to be accommodated within current estimates of the size, age and expansion rate of the universe. The viscosity of the background in sapping energy from all motion within it leads to an arrow of time, the second law of thermodynamics and the relativistic framework. Where the background is absent, in tunnels between entangled loops, there is no viscosity present and velocities above light speed are possible and the quantum framework exists. Composite loops formed from the unit meon building blocks during different inflation events produce different sizes of fermions, nucleons and atoms, but produce a type of universe with symmetries similar to ours as the inevitable outcome of a successful inflation event. The rate of expansion after a big bang is a function of the size of the equivalent of the electron formed during inflation and that size defines whether the expansion will eventually succeed or fail. Key paradoxes are shown not to be paradoxes. This framework explains what energy and inertia are, how positive-only mass arises, spin units of  $\frac{1}{2} h$ , electrons with  $g=2$  and 720 degrees of rotation, charge unit sizes, why particles have internal magnetic moments, the second law of thermodynamics and the arrow of time, where there is a maximum speed for particles, why stable states exist, why tired light may reduce the need for dark energy or the size of the universe, why there is no matter/anti-matter imbalance, what different types of dark matter are likely to be, the physical reality underlying zero point energy, why physics fails nowhere, why there is only one universe and threefold symmetry within our nucleons.

*Keywords:* Universe, Quantum mechanics; Inflation; Expansion; Black hole; Symmetry; Loops; Stacks; Chain star; Meon; Lepton; Anomalous magnetic moment; Quark; Electron; Viscosity; Dark Matter; Theory of Everything; Dark energy; Arrow of time; Second law of thermodynamics; Viscosity redshift; Prefermion; Pre-fermion; Prequark; Steady state;

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## Introduction

These 95 theses are a riposte to the modern physics establishment; they seek to start a reassessment of the current interpretations of all physics, although disagreeing with none of the experimentally observed numbers. Currently there are some sections of the physics jigsaw which fit together well, and some that do not. These theses are a pointer to how to reassemble the pieces so that they all fit together and the whole picture becomes clear. Symmetry and simplicity underlie what follows. There can be no simpler system than devised here.

## The 95 Theses

- 1 **There is nothing separately physical in the universe except a myriad of the two fundamental particles**, a pair of positive and negative ‘meons’, which when merged form a zero mass black hole (ZMBH) and from which they initially unmerge. Myriad ZMBHs are the background of the universe that produces a viscosity against which all composite particles made from different numbers of pairs of the meons move.
- 2 **The viscosity of the background takes energy from all composite particles** because the latter’s component meons are always in motion, either in rotating loops of meons or additionally as loops translate.
- 3 **A loop is both a wave and a composite particle underlying wave-particle duality.** Bohr and Einstein were both correct. They referred to different levels of structure, meons and loops, without being aware that there were different levels. All observable loops, which contain 3 pairs and are the leptons and quarks, and loop dark matter, which have other than 3 pairs, have the same composite loop structure. The meons are pre-fermions, being the only components of fermion loops and the combinations of fermion loops, in various sizes, are the only compound components of all matter.
- 4 **Viscosity energy lost by loops takes two forms.** Photon double-loops, that is a loop and an anti-loop merged together and rotating in the same sense, lose angular frequency (rotational rate) as they translate at light speed – called viscosity red-shift.
- 5 **Viscosity red shift requires the rethinking**

- of how much, or whether, dark energy exists and the size and age of our big bang.
- 6 **In the other form of viscosity energy loss non-photon loops would lose energy, rotational rate, except that they interact with photons in order to take frequency from the photons** by stacking (absorption) and release (emission) so that they maintain their frequency, which was locked-in by inflation in our big-bang. The background takes the energy from these loops into forms of additional rotation, vibration or motion of the background ZMBHs, so 'mass' would be lost in the absence of photons that would otherwise refuel those loops.
- 7 **Motion of loops which is not against background viscosity is without energy loss, is non-local and the source of quantum mechanics.**
- 8 **The speed of light  $c$  is the maximum local velocity at which a meon can travel against the background ZMBHs, balancing viscosity forces against the mass chasing force between meons in the two photon component loops.** Motion subject to this limitation is relativistic.
- 9 **If a loop is not passing through the background of ZMBHs, it is not limited to  $c$  and will not lose energy due to viscosity so exists in a quantum mechanical environment, producing non-locality with speeds above  $c$ .** ZMBHs that are completely merged can travel above  $c$  because they have no effective volume and are thus not affected by viscosity.
- 10 **The viscosity of the background ZMBHs underlies relativity, the arrow of time, electric charge generation and the second law of thermodynamics.**
- 11 **Relativity, where viscosity is present, and quantum mechanics, where viscosity is absent, are irreconcilable.** Quantum mechanics and relativity co-exist within loops and which of the two is observed depends on whether the background ZMBHs interact with the loops or not.
- 12 **Where two loops are entangled, considered currently as being in a superposition, they are instead linked through one or more tunnels between their positions, avoiding the ZMBH background.** The loops travel back and forth along the tunnels switching position at Planck frequency, so that they look like they are in a superposition. When one is 'measured', the two become locked in place where they are at that moment because the tunnel collapses. Tunnels through the background ZMBH space which enable travel at speeds above  $c$  are the basis of quantum non-locality.
- 13 **There is only one universe because there is**
- only one size of fundamental particle and one composite loop form.** ZMBHs unmerging enable loops, boson stacks, nucleon stacks and atoms. Nothing thus produces something, although the total energy is always zero for all systems.
- 14 **Our big bang is one of many throughout the history of the universe.** Failed big bangs are studded throughout the universe as isolated black holes and collapsing galaxies. The success or failure of a big bang depends on the amount of inflation of loops that occurs along the three dimensional space axes. The mix of two axes defines the size of each type of loop inflated in that plane, so there are three families of loops.
- 15 **There are only two sizes in the universe, other than the loop sizes ('masses') which were locked-in by loop inflation,** which are the Double-Adjusted-Planck Unit (DAPU) size of the meons and the fine structure constant, a function of the energy needed to unmerge ZMBHs. There are only three spatial dimensions because there are only three families of fermions and no evidence exists of any more.
- 16 **If the amount of loop inflation of a big bang is sufficiently large, the resulting loops will be large in radius, so small in mass.** The energy released by this amount of inflation will drive a large expansion away from the centre of loop inflation, acting on small mass loops. In this scenario, gravity will be unable to overcome the subsequent expansion. If the amount of inflation is not sufficiently large, the resulting loops will be small in radius, so large in mass. The energy released by this amount of inflation will not be enough to drive a large expansion away from the centre of inflation and it will be acting on large mass loops. In this scenario, gravity will overcome the subsequent expansion and the loops will collapse over different timescales to become black holes or slowly collapsing galaxies. Many black holes and galaxies are these failed inflation events. Isolated black holes with no surrounding matter would prove that they were such failed inflation events.
- 17 **Inflation is of the loops, not the ZMBHs, so our big bang is moving through the pre-existing background** in which failed big bangs should be observable as having 'wrong' red shifts for their positions relative to our big bang expansion. Where there are seemingly physically conjoined objects that have different red-shifts, one will be part of our expansion and the other part of the pre-existing universe. The difference in red-shifts for these objects at the same distance from us will enable the calculation of the relative motional rates and the age of our big bang.

- Since we are unlikely to be at the centre of expansion, there will be significant uncertainties in the calculation.
- 18 **The unit size of meons means that the universe cannot be expanding in the accepted sense of all distances increasing.** The observance of expansion in this sense is due at least partially to the viscosity of the background producing a red shift in photons which has not yet been taken into account. The viscosity of the background produces the viscosity red-shift of photons proportional only to the distance travelled by the component meons rather than the photon frequency. There will be a change in average red-shift gradient versus distance starting from the extreme point of our big bang's current expansion, the average being mixed closer in with the red-shifts of our expansion itself. The existence of the viscosity red-shift will necessitate reconsideration of our current standard candle calibration.
- 19 **Energy has been misunderstood. Because all meons and composites composed of meons have zero total energy at all times, the mathematics currently employed to describe the energies or interactions of systems is insufficient at the foundation level and a simpler mathematics is required.** Every loop and every fundamental particle – the meons – always have total energy of zero because every system always has equal amounts of the only two types of energy that exist. Other types of energy are derived from the actions of the two fundamental energies, due to fundamental mass and fundamental charge. It is how the same energy types interact between different loops and meons that drive actions. All meons and loops and everything composed of loops have total energy equal to zero.
- 20 **The spherical adjusted-Planck DAPU radius sized meon pair of positive meon and negative meon has only two interactive properties, fundamental mass and fundamental charge,** each of adjusted-Planck size when merged as a ZMBH. The positive meon has positive of each and the negative meon has negative of each. Energy is a counting mechanism. What we call the 'mass energy' of a loop is its component meons' rotational rate and is equal in size and opposite in type to the spin energy of the loop.
- 21 **The strength of fundamental mass and fundamental charge fields is equal.** All charge and gravitation fields have equal strengths of interaction when considered in fractional adjusted-Planck terms in DAPU form. This is because the gravitational constant  $G$  is related not just to the mass of bodies, but also to their separation. By increasing the current Planck mass by the factor  $\sqrt{G}$ , and reducing the current Planck radius by the same factor,  $G$  can be eliminated completely from SI units and all equations.
- 22 **The Planck and gravitational constants  $h$  and  $G$  can be shown to be dimensionless ratios using dimensionality analysis of all the properties.** This involves considering a dimension  $Y$  for each property, where mass has dimensionality  $Y^1$ , velocity  $Y^2$ , distance  $Y^{-3}$ , energy  $Y^5$ , charge  $Y^{-1}$ , Electric Field  $Y^9$  etc. Laws of nature can be used to uncover these dimensionalities and new laws can be found by reversing the process.
- 23 **Elimination of  $h$  and  $G$  shows that size is not what differentiates gravitational from quantum systems.** The energy equations in both systems are the same when the kinetic energy of spin is accounted for. Since the fundamental constants  $h$  and  $G$  have zero values for dimensionality they can be eliminated from all equations by appropriate adjustment of SI units because they are only dimensionless ratios. To correctly understand the relationships between properties  $G$  needs to be eliminated.
- 24 **Dimensionality is the underlying relationship between properties.** Every property has a dimensionality of  $Y^x$  where  $-9 \leq x \leq 17$  for those properties already known and two not yet discovered. Dimensionally Planck's constant  $h$  is  $Y^0$  and  $G$  is also  $Y^0$ . Any equation where the sum of the dimensionalities on each side are equal is a law of nature ( $h = mvr$ ,  $Y^0 = Y^1 Y^2 Y^{-3}$ ). Laws of nature can be uncovered by equating properties across an equation ( $\eta V = h$ , the product of viscosity and volume is a constant). This latter is why the background viscosity effect is the same for all frequencies of photons. All photons are composed of meons which all have the same volume, so are all affected equally by the background viscosity. The spiral path of meons in a loop is the distance over which they are subject to viscosity and, apart from at very high frequencies, this can be considered as the path of the loop itself. Any property which has a dimensionality of zero is a universal constant, not affected by any. It is possible to eliminate other properties of dimensionality zero like  $G$  or  $h$ . But only the former can be done without unphysical results.
- 25 **Given the dimensionality relationships, the laws of physics could not be any different to what they currently are. Physics is the same everywhere and breaks down nowhere. There are no singularities.** The laws of physics can be no different anywhere because the maximal values of all properties are powers of  $\sqrt{c}$ , or  $\sqrt{c}$  and the fine structure

- constant  $\alpha$ . Loop sizes define the size of interactions but not the relationships between properties. However, the results of those laws (energy levels etc) depend on the sizes of the loops, which could be different in a different big bang to ours.
- 26 **When a ZMBH is unmerged, or split into a meon pair, it always requires the same amount of energy**, again of two equal and opposite types. That amount of energy is the equivalent of  $qc^3/6 = \sqrt{\alpha/2\pi} Q c^3/6$  which is where the fine structure constant appears from. The mass energy goes into twisting the meons ('twist' meaning to spin about an axis along the meons' direction of motion, used to differentiate this mode of rotation from a loop's rotation about an axis perpendicular to the plane of the loop, which is what we call spin) and the other is electrostatic charge generated by spiral motion of the meons' fundamental charge against the background axially along its direction of motion. The sign of electrostatic charge generated by the twisting depends on the identity of the meon and the direction of spiral twist in motion. In all cases both signs of charge  $+q/6$  and  $-q/6$  are generated by each unmerging meon pair. Twist energies occur in units equivalent to the  $q/6$  electron charge  $qc^3/6$  because it takes the same amount of energy to unmerge each ZMBH into a meon and anti-meon pair. Once unmerged, the meons chase each other to try to recombine. This is because, although the fundamental charges act in the same way as electronic charge (same repel, unlike attract), the fundamental masses act differently (same attract, but unlike masses try to maintain separation from each other so are attracted to retreating meons and repelled by approaching ones) – the combined charge and mass effect is that opposite meons chase when in motion. Their relative direction of chasing depends on the initial cause of their change in separation because either could be the chaser or the chased. There can be no retro-causality. Because there are both positive and negative fundamental masses  $M+$  and  $M-$ , each adjusted by positive or negative twist energy  $sc^2/6$ , within loops, the normal electromagnetic equations apply exactly as for charges, except for the additional viscosity factor due to the background. So there are mass flux lines between masses in the loops in the same way as magnetic flux lines between charges.
- 27 **An unmerged chasing pair of meons will find other similar pairs when a big bang occurs and will form chains**, each meon chasing the one in front. When a chain catches onto its tail, a loop is formed. This is the only stable form of combinations of unmerged
- 28 **When a loop has three pairs, it has possible electrostatic  $q$  charge values of  $\pm 1, \pm 2/3, \pm 1/3$  and 0 and is our matter with three-fold symmetry.** These loops are our fermions. The symmetric loops are the electron and some variants of neutrino. Some neutrino and anti-neutrino loops differ by only 60 degrees of rotation. The quark loops are asymmetric. Normal matter is loops of three pairs. Dark matter is mainly loops with other than three pairs. Loops can stack one above another, provided the stack itself is symmetric overall, which means that the number of pairs in a loop define which other loops can successfully contribute to the overall symmetry of the stack.
- 29 **For a stack to be symmetric overall requires that the total charge in the stack is either  $1q$  or  $0q$  and the asymmetries of the asymmetric loops balance along the stack axis.** Nucleons are stacks of loops, each loop rotating opposite to its adjacent loop. Since the only particles in a stack are the underlying meons which comprise the loops, both electrons and neutrinos can exist within nucleon or other stacks.
- 30 **Loops of other numbers of pairs are one form of dark matter**, unable to stack in our threefold symmetric stacks, because their symmetries are different and unable to produce balance along the stack axis. Dark matter loops can stack with loops of their own pair symmetry to form stacks. However, only odd pair number loops can produce chemistry.
- 31 **The requirement of symmetry, to match the local environment where  $q$  charges are 1 or zero, is why quarks do not easily appear on their own.**
- 32 **Stable matter stacks include protons and neutrons.** To change a neutron into a proton requires that the electron loop in the neutron stack be impacted and replaced by a neutrino loop of appropriate energy. This change from neutron to proton is usually described as the weak force, but it is only the result of incident neutrinos. A stack has to have all the component loops of the same size in order for balancing symmetry.
- 33 **What we term the mass of a particle, considering just a single loop, is its rotational rate  $w$**  because all the fundamental mass/charge and twist/charge energies in the loop due to the meons' motions sum to zero, leaving only the rotation. The mass energy can be considered as being due to the rotation around the loop of the meons' fundamental masses. The spin energy can be considered as being due to the rotation around the loop of the meons' fundamental charges. The mass and spin energies of every loop are the same

- size, although of opposite type.
- 34 **The charges on the loops are the sum of the  $q/6$ 's of the meons in the loop.** The sum of the twist energies in the loop is the sum of the  $s/6$ 's of the meons in the loop. A symmetric zero charge, zero twist loop will have no observable mass. A  $2/3q$  charge,  $2/3s$  twist loop will have  $2/3$  of the rotational frequency  $\omega$  of the loop observable. A non-symmetric zero charge, zero twist loop may have some mass observable.
- 35 **Although the loop is described as having a mass, it is the effect of the rotation of the loop on the background ZMBHs that produces the effect of mass.** This may be described as the deflection of space by mass, but it is actually the greater or lesser alignment and density of ZMBHs in the local background relative to the rotating meons in the loops and attached strings of ZMBHs attracted to the meons in the loop due to the meons' charges and chasing strings of ZMBHs due to the meons' masses. The appearance of the mass of loops and black holes is due to the local density of the background, caused by the frequency of loops indirectly. There are both magnetic and mass field lines through the centre of the loops, with the same shapes and equal strengths. As loops decrease in size (increase in energy,  $\omega$ ) the charge (magnetic) and mass fields passing within the plane of the loop increase in density and increase the local background density. Each ZMBH in a string attached to a meon in a loop is trying to attract/repel/chase other ZMBH/loop meons that are not in the loop, so the effect is like a whirlpool around the loop with charge and mass fields extending beyond loop itself, effectively frame dragging. Strings of ZMBHs attached/chasing in the plane of the loop provide stability for spin momentum and limit how far and what relative orientations for spin interactions act between loops. As a loop enters a black hole, the attached/surrounding background ZMBHs enter the black hole and its 'mass' increases because the local background density is larger. The same is the case for  $Q$  charge energies that produce the 'spin' of the loop. Once a loop is broken, the ZMBHs surrounding/attached are inside the black hole. The entering chain retains its existing  $q/6$  charges and  $s/6$  twist energies.
- 36 **Photons and bosons are not force carriers.** The background ZMBHs provide the means for transmitting forces due to mass (gravity), spin and charge by changes of local density, spinning, moving, vibrating or aligning in chains. Magnetic field lines are real. ZMBHs transmit forces via density changes and strings of vibrating, rotating or moving ZMBHs between sources. The background is rather like a form of aether with loops acting on the background and the background acting on the loops. The background itself is a form of dark matter, taking energy from moving meons to increase the ZMBH frequencies of rotation, vibration or velocity and varying in density dependent on local loop concentrations. However, the background is not exactly dark because of its interactions via charge fields and viscosity in addition to gravitation.
- 37 **The effects of spin are not currently included in energy calculations correctly.** Although large objects like the Earth and Sun may not have all loop spins aligned (so no overall spin-spin potential energy) the loops still all have total spin energy equal to total mass energy. Even if the net spin energy is zero, the kinetic energy of all the spins still exists and acts like mass kinetic energy.
- 38 **Rotational energy is outwards from the centre of rotation. Energy is a vector.**
- 39 **The force balance equation for a stable planetary orbit clearly shows outward motional force balanced by inward mass potential force.** The same is the case for motional and potential energy once the kinetic energy of the spins is included. Then  $Mm/r^2 = mv^2/r$  is correct for force and  $Mm/r = \frac{1}{2}mv^2(\text{mass}) + \frac{1}{2}mv^2(\text{spin})$  is correct for energy, differing only by the  $r$  factor.
- 40 **Vector energy in rotating systems like gyroscopes and bicycles shows that vertical energies/forces exist relative to the horizontal axis of rotation and points of balance and is termed correctly as centrifugal energy.** The direction of velocity in the plane of a sphere is immaterial; such a speed produces a perpendicular energy/force relative to the centre of that sphere.
- 41 **The total of motional and potential energies of a stable system is zero.** That is why the system is stable. The energy levels currently measured are changes in the overall balloon size of the mass kinetic energy, but when spin kinetic energy is included, all motional and positional energies total zero overall.
- 42 **The quantum orbital energy and momentum levels are correct for mass kinetic energy when spin states are included.** At this level the relative spin momenta and mass energies are included, although spin kinetic energy has not been included as such so far, rather the spin angular momenta instead.
- 43 **The odd shape of some electron orbitals, where parts of the volume of probability distribution are separated, shows that the electron is 'skipping' via entangled tunnels between volumes.** Since the sum of the

- probabilities of being in all the orbital volumes must be 100%, then the skipping between volumes must take no time and be via tunnels. The electron is self-entangled in orbitals and moves by skipping at adjusted-Planck frequency, looking like a superposition. Photon emission shells can also have separated but entangled volumes.
- 44 **Loops can form two types of short two-loop stacks.** Either the two rotate in the same sense or in opposite sense. When a loop and anti-loop stack rotate in the same sense, the result is a photon. A positive meon in one loop merges with a negative meon in the other loop, and vice versa, to almost reform a ZMBH, but with each  $M$  and  $Q$  adjusted by  $s/6$  and  $q/6$  respectively. However, the merger is not complete and the six ZMBHs have the meons from one loop chasing the meons in the other loop, so the whole double loop accelerates perpendicular to the plane of the loops until it reaches terminal velocity against the local background viscosity, which we call light speed  $c$ . A photon is effectively six ZMBHs almost reformed with chasing between meons in the two loops whose force is balanced against the background viscosity and the lost energy reduces the frequency appearing as a red shift.
- 45 **Whilst chasing externally to light speed, the meons continue to chase each other around each loop at angular frequency  $\omega$ ,** being the average of the two loops' frequencies before merger. Light speed  $c$  in metres per second depends on the local density of the background, which itself depends on the local masses present. Where there is a dense enough mass, light speed could be zero.
- 46 **Black holes are not black and physics does not break down inside them.** Since the meons are Double-Adjusted Planck Unit (DAPU) radius, mass and charge, they are the densest particles possible and cannot be broken. In comparison, black holes are far less dense than the meons. What a black hole can do is to stretch a loop as it approaches the hole. The differential action of gravity across the loop eventually breaks the loop into a chain, plus chasing/attached strings of ZMBHs, and that is what enters the black hole. The loop's rotational frequency – its mass and spin, plus its twist/charge, have been taken by the hole since the chain is now within the hole.
- 47 **Each meon retains its fundamental mass/charge and twist/charge energies even inside a black hole.** The pairs of meons in the chains can be split from them and attach themselves to other chains. A black hole is a mass of chains forming, breaking and reforming. A black hole is really a chain star.
- All black holes are the same, whether pre-existing failed big bangs or formed in our successful big bang because they break loops into chains, then shorter fragments, and spit out very symmetric photons whose frequency of exit depends on the mass of the black hole. Regardless of the loop sizes or pair number formed in the failed big bang, the result of being broken into chain fragments means all black holes are identical in their components.
- 48 **Some chains can reform symmetric loops and then photons at very high rotational frequency inside the black hole and break out,** but will lose most of their frequency in escaping. An escaping high frequency photon must exit perpendicular to the surface of a black hole, otherwise differential gravitational action will break the photon back into chains. There is a cut off frequency proportional to black hole mass above which no photons formed inside a black hole can escape due to frequency loss in the process, even if the photons form inside at DAPU Planck energy.
- 49 **Photon loops escaping from a black hole must be very symmetric,** having the same mass and charge energies in every meon in both loops. This means that only the equivalent of symmetric neutrino/anti-neutrino loops can combine as a photon and successfully escape from a black hole, if they have sufficient frequency and leave perpendicularly. Black holes transform loops preferentially to dark matter photons as 2-pair loops are more likely to form than 3-pair loops. The need to leave perpendicularly means that the physical size of the black hole cannot be observed. For an observer, the photons being viewed are those that escaped along their line of sight and no photons from other parts of the black hole surface can be observed simultaneously.
- 50 **Black holes act as symmetry sieves, taking in all symmetry loops and converting them to symmetric photons,** both matter and dark matter versions.
- 51 **Where a failed big bang has occurred, the loops formed during inflation have too large masses and not enough energy of expansion to resist gravity.** The loops formed will break into chains as the contraction occurs to form a black hole. The merger of meon pairs to reform ZMBHs will not occur because the meons are chasing each other.
- 52 **The success of our big bang may be a consequence of the small angular frequency, or mass, of the electron.** The physical electron loop size is possibly the largest radius (smallest mass) able to produce a successful inflation event and possibly defines the limit between success and failure

- for a big bang and the subsequent rate of expansion or contraction.
- 53 **The loop structure produces unanticipated degrees of freedom that enable the anti-loop of a spin  $+\frac{1}{2}$  electron to be a spin  $+\frac{1}{2}$  positron.** The only possible property in a meon loop system that can be used to differentiate between matter and anti-matter is the sign of charge. If the choice is made to define the electron as the matter loop, then loops and stacks with net positive charge will be the anti-matter loops. And vice versa, if the choice is to make protons the matter stacks. Matter and anti-matter do not annihilate each other. No meons or loops are ever annihilated, although positive and negative meons might be able to remerge into ZMBHs under certain conditions.
- 54 **The meons within loops always exist, even though they may switch places with meons in other loops** converting two loops into two different loops, maintaining total frequency as mass and spin plus charge. Slower loops cannot speed up faster ones.
- 55 **Since charge is the only differentiator for matter and anti-matter, then all systems tend towards neutral outcomes.** Matter and anti-matter are created equally. All stable systems have equal quantities of charge because the only differentiator is the sign of charge. Atoms, as positive charge anti-matter, desire negative charge matter electrons to balance overall charge to neutral. Photons are formed to balance charges. So a photon is a perfect combination of matter and anti-matter.
- 56 **A electric battery is a matter/anti-matter device,** allowing positive and negative charges to be balanced in atoms and compounds.
- 57 **Another form of matter/anti-matter is a zeron.** This is a spin  $+\frac{1}{2}$  electron stacked with a spin  $-\frac{1}{2}$  positron, or vice versa with total spin zero. So opposite rotating loop and anti-loop. The zeron has the lowest energy balloon of any loop stack and zeron exist centred at all points in space at all concentric radius sizes. Zero point energy is multiple concentric shells of zeron centred at every point in space.
- 58 **Pair creation is the temporary separation into loop and anti-loop of a zeron that has been impacted by another loop of appropriate energy (frequency).** The loop pair always exists, but is hidden as zero point energy until impacted. Pair creation is effectively the temporary un-stacking of a zeron. Zeron are also the reason for the Casimir effect. Any zeron of greater diameter than the distance between two parallel plates cannot exist between the plates and have to be moved aside, creating a pressure at the plates
- 59 **Other examples of short stacks of loops are pions, which form when nucleon stacks are impacted.** They could be quark or lepton loops rotating in either sense, provided the total charge of the stack is  $\pm 1q$  or  $0q$ .
- 60 **There is no separate strong force in the nucleus.** What keeps the stacks of nucleons together is a combination of meon mass, charge and spin fields acting within the stacks and between stacks. Only two forces exist, due to underlying fundamental mass and fundamental charge. Actions of the apparent strong force are due to the loop nature of interactions between meons in adjacent loops, and the other energies in those loops.
- 61 **The displacement of loops in stacks by collision is the weak 'force'.** The colour 'force' is the balancing of asymmetric loops in a stack to produce rotational symmetry along the stack and integer charge in total.
- 62 **Changes to loop sizes can move loops between families.** An electron taking sufficient frequency from a photon or neutrino can change into a muon. It is the change in loop radius that changes the loop mass and magnetic moment.
- 63 **The magnetic moment of the electron has  $g=2$  because there are two components to its magnetic field.** One component is due to the rotation of the  $-q/6$  charges and the other to the rotation of the fundamental  $-Q$  and  $+Q$  charges, of negative and positive meons respectively, rotating at slightly different radii. The latter is due to the slightly different mass energies of the meons needing to rotate at slightly different radii to all have the same angular momentum of  $\hbar$  within the loop. The positive meons have  $+M+s/6$  and the negative meons have  $-M+s/6$  total mass energies. The positive meons have  $+Q-q/6$  and the negative meons have  $-Q-q/6$  total charges. The result is that the negative meons rotate at slightly larger radii than the positive meons, giving an extra  $g$  factor. The existence of positive and negative fundamental masses means that all the electromagnetic formulae applied to charge positions and motions can be applied to the masses, although there is the additional chase action and the effects of background viscosity to include.
- 64 **A loop will have balanced mass currents, but may have net charge current and internal electric fields producing magnetic fields due to loop rotation.** All meons have only two possible radii of rotation in asymmetric loops. In symmetric neutrinos, the rotational radii are the same and can be any size, which enables neutrinos to adjust size and frequency easily.
- 65 **The motions and positions of the meons**

- should allow some small anomalous magnetic moment to be calculated for loops. However, the calculated figure is far smaller than affects the accuracy of the currently accepted figure for the anomalous magnetic moment of the electron. So the present methodology of external interactions is likely to be the overwhelming reason for that anomalous moment.
- 66 **Retained momentum is what produces inertia.** Since energy is a vector in the same direction as an applied force, a body subject to such a force has energy along the same direction and retains that energy, ignoring viscosity loss to the background ZMBHs, as momentum until it encounters another body or force in opposition. Inertia is the vector mass energy that a particle has in an external frame of reference.
- 67 **It is possible to differentiate between the effects of gravity and acceleration, although not at a point.** Given a volume to observe, the gravity field will be a shortened conal shape, acting inwards towards the smaller end of the cone and the source of the gravitational field, gradually converging. Acceleration will be a cube shape with all lines of acceleration parallel. At the level of total mass motional and potential energy, the difference between acceleration and gravity fields acting on a body not in a stable orbit is that the body accelerating will have a positive total mass energy whilst the body in a gravitational field will have a negative total.
- 68 **Considering the velocity of a body in the plane of a sphere, it is immaterial which direction the velocity takes.** There is energy, and thus a force, outward and perpendicular to the plane of the sphere. This centrifugal force exists whilst centripetal acceleration does not.
- 69 **The outward energy of rotation is real and can be seen in three examples:** *A)* A bicycle wheel has unbalanced upward energy opposite its point of contact on the ground which helps keep the bicycle upright. *B)* In a gyroscope, the rotating circular armature can be considered as a circle rotating on the plane of a sphere centred at the point of axial contact. The upward force acts perpendicular to the plane of the sphere with a resultant acting along the axis of rotation, keeping the gyroscope upright until the rotational rate reduces and it can no longer defeat gravity. *C)* Newton's bucket keeps water in for both vertical and horizontal rotation provided the outward motional energy of the water due to rotation exceeds the effects of gravity.
- 70 **Relativity requires a new equation to enable large numbers of fields acting on a particle to be calculated.** To calculate the total value of a property limited to a maximum (such as velocity with a maximum of  $c$ ) requires a formula that relates the product of all its  $n$  scalar values  $x$  above the unitized 1 maximum ( $\prod_n(1+x) = A$ ) to the product of all its scalar values  $x$  below the unitized 1 maximum ( $\prod_n(1-x) = B$ ). This formula is  $Total = (A - B)/(A + B)$  and says that the effect of, for example,  $n$  scalar fields on a particle is the difference between its maximum and minimum values relative to the sum of those values. When simplified to just two velocities, along the same direction, the standard relativistic addition equation  $Total = (a + b)/(1 + ab)$  results, as well producing the gamma factor  $\gamma = 1/\sqrt{1 - v^2}$  for a single velocity. The same velocity equation also works for electrical resistance, since both have the same dimensionality.
- 71 **The twist/charge  $q/6$  sizes will be the same in any big bang because they depend on the size of the meons and the energy needed to unmerge them. The maximum speed of light  $c$  will also be the same in any big bang because the ZMBHs are always the same size.**
- 72 **Quantum mechanics, being supposedly dependent on pair creation as a door to other universes or dimensions is actually already a process within our universe** based on dislodging a zeron into its constituent loops.
- 73 **Space-time does not exist for the universe as a whole.** There may be average times across volumes of space, but time exists only within loops for bodies composed of loops. Time for particles composed of loops did not exist before loops formed. Time exists mainly in loops and when a loop breaks as it falls into a black hole it loses all time and reverts to a chain. General relativity requires time because it depends on the frequencies of loop rotations. Quantum mechanics does not require time because its non-local effects are outside the background ZMBH space.
- 74 **Before loops formed, there was no time in our sense since there were no loops, or composites formed of loops, existing to observe.** ZMBHs' rotational, vibrational or motional activities form a background but only affect the specific ZMBHs themselves. There are three levels of time – outside the ZMBH background, which has no time, ZMBH motion/rotation/vibration and loop time.
- 75 **Other failed big bangs may have had their own times, but will have lost them when their loops broke as a black hole formed and broke the loops.** There is no time inside a black hole since it is a chain star, so no loops in general, except high frequencies symmetric photons, can form stably and



- escape. So black holes eat time, but are not home to singularities, because there are none.
- 76 **The picture of random big bangs that fail or succeed is a mixture of an inflationary and a form of steady state models.** The big bang and steady state theories can coexist, with failed inflation events appearing randomly as isolated black holes or galaxies. Where two conjoined galaxies have different red shifts, one will be the result of a failed inflation in the 'stationary' ZMBH background and the difference in red shifts will represent the net expansion at that point in space. Very large black holes which appear to have formed too early after our big bang are probably pre-existing failed big bangs that have attracted our subsequent big bang matter around them.
- 77 **A photon is a mixture of  $\omega$  rotation and six ZMBHs, internally and externally chasing,** and also has quantum mechanical properties to add to its relativistic terminal velocity of local  $c$ . At emission it is a spherical shell of entanglement that expands away at  $c$ , with the photon skipping randomly on the shell. When an observation is made of a photon, the photon must be at that point of observation in order to be observed, otherwise the shell continues to expand. Immediately prior to a successful observation at the observer's location, the photon could have been equidistant away from the point of emission, on the other side of the shell far beyond its emission point away from the observer. At each skipping point the photon experiences local viscosity and the sum energy loss over its total path produces the photon's viscosity red-shift. Two entangled photons travelling through an apparatus will be continually swapping position so filters will not stop the passage of supposedly filtered photons.
- 78 **Distant collisions drive local random effects** in that 'observations', or sufficient size disturbances, of entangled loops or photons at a far distant location can result in the unentanglement of a loop or photon in another distant place.
- 79 **The shape of many simultaneous expanding photon emission shells from an object reflects the gravitational effects of matter distribution.** Each single photon emission shell has its photon randomly skipping around the shell, and affected by viscosity at each observable point, but the effect over many photons and shells is that the effective combined shell is populated and affected by gravity as it expands past objects.
- 80 **The twins paradox is explained by a differential change in loop phase between the two twins.** The home-based twin has the baseline loop phase, the tourist twin's loops change phase during acceleration or deceleration. When the two compare phases back together at home, there is a locked-in phase difference between the two, which is a time difference in their experiences. The twins' paradox is not really a paradox.
- 81 **Dark matter symmetric loops, of non-three pair size, have the same spin and mass energies as the same frequency of symmetric matter loop.** This is because it is the physical size of the loops ( $\omega$  frequency at radius  $r$ ,  $v=r\omega$ ) that defines what mass or spin energy the loops have. The number of pairs only defines the range of charges that the loop could have.
- 82 **The volume of dark matter exceeds that of normal matter because loops with less than three pairs are easier to make, black holes convert asymmetric loops into mainly symmetric dark matter photons and the background ZMBHs soak up viscosity energy which is higher around denser distributions of normal matter loops.** A symmetric 4-pair loop equivalent to the 3-pair electron size will have charge  $4/3q$ , spin  $1/2$  and electron mass at 100% of the loop frequency  $\omega$ . A similar neutrino equivalent will have 0% of loop  $\omega$ . The mass of normal and dark matter symmetric loops will be the same as  $1/2 h\omega$ . Their spin energies will all be  $1/2 h\omega$  as well, but the magnetic moments will depend on the number of pairs in a loop.
- 83 **Non-symmetric dark matter will have different fractional masses observable, when compared to the same frequency of matter loops.** A 3-pair matter quark of charge  $+2/3q$  will have observable mass  $2/3$  loop frequency  $\omega$ . The equivalent 4-pair dark matter quark (asymmetric) loop will have charge  $+6/8q$  and observable mass  $3/4$  loop frequency  $\omega$ . The actual loop sizes will be the same, as will their spins at  $1/2$ . Three-fold symmetry in normal matter arises because there are three meon pairs in normal matter loops.
- 84 **Chemistry arises from odd loop symmetries leading to odd numbers of loops in stacks.** Where the 'core' stack has  $\pm 1/2$  spin in total it needs an orbiting loop of  $\pm 1/2$  spin to balance it. The lowest symmetry that this works for with stacks is three, as in our matter. A single loop considered as a stack is already part of our chemistry for example in positronium, but has very limited chemical diversity. Chemistry arises because of the need to balance loop stack spin by the orbiting of the largest charge symmetric loop of the same pair number. Chemistry for five-symmetry is possible, but the probability of chains forming 5-pair loops is considerably less than forming 3-pair loops.

- 85 **With three-fold symmetry and odd loop stack numbers we get the proton and neutron which probably have seven loops in their stacks.** This would be a core of three quarks protected from the  $\pm 1q$  or  $0q$  local environment by end caps of total four neutrinos for the proton and three neutrinos and an electron for the neutron. It is likely that all the loops in a stack are the same radius, to provide maximum force holding each opposite-rotating loop in place. However, each loop mass observed will depend on the twist fraction.
- 86 **The electron and neutrino can both survive in a nucleon stack because they are each composed of adjusted-Planck size meons.** The electron needs additional energy (frequency) in order to match the stack loop size when forming a neutron stack and could take it from an incident neutrino or photon. Electrons also stack and unstack photons when they change orbital levels, adding to move higher and releasing to move lower. Photons can also stack with other symmetric loops.
- 87 **Neutrinos are not only left-handed.** The anti-neutrino of the most symmetric isomer of a neutrino is different only by 60 degrees of planar rotation. So it is hard to tell which is which.
- 88 **There is a hierarchy of zero total mass energy states which matter prefers to inhabit.** At each stage from unmerging a ZMBH into a meon pair, forming chains, then loops, loops stacking to form nucleons, nucleons combining to form atoms, atoms to molecules and so on, there are preferred states which always have zero totals of all the differing forms of energy present. Stable states exist as multiple levels of zero energy balance. All systems prefer states of zero total energy.
- 89 **Energy, in the sense of frequency  $w$ , has circles of life.** It starts in the background ZMBHs and their rotational, vibrational and motional movements. If a large enough energy balloon arrives at a ZMBH sufficient to unmerge meons, then there can be a cascade to unmerge many ZMBHs. The energy of unmerging produces  $\pm q/6$  through twisting against other ZMBHs and through the chasing motions of meon pairs. The pairs form chains then loops at extreme frequencies, which look like energy but is still total zero energy. At some point collisions occur between meons in different loops and the meons slow significantly. This expands the loop radius dramatically to maintain angular momentum  $h$  for each meon and the loop. This is inflation, the enlargement of the loops, not space. The ‘energy’ released by the reduction in loop frequency is put into translational motion of the loops outward from the centre of unmerging or expansion. Since energy is a vector, the symmetric outward mass energy of all the loops still totals zero overall.
- 90 **Both inflation and expansion take place against and through the background of ZMBHs that have not inflated.**
- 91 **The loops form photons, stacks, atoms, compounds, planets etc which all lose frequency as they move against the background viscosity, which increases the frequency of the local ZMBHs.**
- 92 **The photons absorbed or emitted (stacked or unstacked) by electrons and other loops serve to keep the loops at their post-inflation locked-in sizes.**
- 93 **Photons will eventually lose all their frequency and become free ZMBHs again.** Energy moves from the background ZMBHs to meons, then chains, then loops, then stacks - at each stage returning some through viscosity to the background until all is returned to the background.
- 94 **There is no beginning or end to the universe. ZMBHs have always existed and all loop and unmerged pair energies will eventually return to the background ZMBHs.** The ZMBH background is both a continuum and the source of indivisibles, providing a flexible mechanism for transmitting forces and one sort of lightly dark matter. The action of opposing change of separation, which drives the mass chasing force, is as fast as ZMBHs can transmit forces, so at  $c$  due to their own viscosity effect when partially merged. The meons themselves have always ‘known’ about all other meons during and after a big bang. When the ZMBHs are fully merged, they are not limited to  $c$ .
- 95 **SI units are currently misaligned.** They do not match mechanical and electrostatic properties correctly. Elimination of  $G$  is a start, but the factor  $\sqrt{10^{-7}}$  is also needed to adjust  $q$ , plus a recognition that the maximum possible charge is  $Q=M/c$  not  $q$ . New SI units will allow a much better understanding of physics.

For further information see the references.

**References**

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