A HYPOTHETICAL PRE-FERMION PARTICLE THEORY OF EVERYTHING IN DIAGRAMMATIC FORM

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This paper shows a diagrammatic representation of the foundations of 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, hadrons, 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 of the 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 loop composites. Viscosity in the background universe, comprising partially merged particle/anti-particle pairs, saps energy from all composite particles and produces the light speed terminal velocity of photons. 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. This hypothesis explains what energy and inertia are, how positive-only mass arises, spin units of ½ h, electrons with g=2 and 720 degrees of rotation, unit charge sizes, why particles have internal magnetic moments, 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 loop-based particles.

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; Second law of thermodynamics; Arrow of Time; Viscosity redshift; Prefermion; Pre-fermion; Prequark; Steady state;

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Introduction

The hypothesis is a riposte to the modern physics establishment; it seeks to start a reassessment of the current interpretations of all physics, although disagreeing with none of the experimentally observed results. Currently there are some sections of the physics jigsaw which fit together well, and some that do not. The figures shown below are a simplified explanation of how to assemble the particles that are normally observed. Symmetry and simplicity underlie what follows. There can be no simpler system than devised here. After the figures and their descriptions, some structural and other consequences are explained.

This paper has been produced as a result of requests to explain the pre-fermion hypothesis, proposed previously, in a diagrammatic way, rather than the verbose method with equations used before [1, 2, 3, 4].

The result is the following series of figures with short explanations that start from the foundation and end at atoms and the quantum mechanical framework.

The Diagrammatic Representation

All figures are not to scale and are shown in two-dimensions, although the components are all three-dimensional.

In some of the figures, some of the components are omitted for clarity. Single column layout has been used to accommodate the large figure sizes.

Figure 1

Figure 1 shows the underlying material from which the universe is made – effectively there is nothing there - but the unit volume hides that it is a composite. A myriad of these zero mass black holes (ZMBHs), of adjusted-Planck radius $R = \sqrt{h/c^3}$

m spheres, is how the universe may have started. These ZMBHs have no mass or charge in total because when fully merged the properties of the two component particles, a meon and anti-meon, exactly cancel. There are no mass or charge fields within and beyond the physical volume that the ZMBH occupies when the meon and anti-meon are totally merged.

This volume represents the unit size of the fundamental building blocks of the universe, so that in all compound systems, using the component meons and anti-meons which unmerge, they cannot change size and so there is no expansion of 'space' due to this effect in the currently accepted sense.

Figure 2

Figure 2 now shows the two partially merged components of the ZMBHs as a pair of meon and anti-meon, of same physical shape and size. The meons have fundamental mass $M_+ = +\sqrt{hc}\ kg$ and fundamental charge $Q_+ = +\sqrt{h/c}\ C$, whilst the anti-meons have fundamental mass $M_- = -\sqrt{hc}\ kg$ and fundamental charge $Q_- = -\sqrt{h/c}\ C$. These are double adjusted Planck units, as defined previously [2]. The presumption is that, just as positive fundamental mass attracts positive fundamental mass, so negative fundamental mass attracts negative fundamental mass.

These fundamental masses are not what we usually term the 'mass' of a 'particle', as will be explained. The fundamental charge acts in the same way as normal charge, but is never observable at the size Q.

In the figure, the pair are partially merged and will stay that way unless they become unmerged. The pair may translate, rotate, vibrate, spin and form chains with other partially merged pairs. These chains are what transmit all forces. Where there are no partially merged meon chains, other than directly between unmerged meons, there are no forces able to act.

A myriad of the partially merged pairs are what the background to the universe has become, through which all relativistic motion occurs. Although the mass and charge energies are different energy types, they are always equal in size in all meons or compound systems. The amount of one energy type in one system interacts with its same energy type in another system, despite the total of all energy types always summing to zero in all systems.

Meons and anti-meons are the densest particles possible and cannot be broken, even in massive black holes, so physics does not break down anywhere. There are no singularities because the building blocks are unbreakable.

Figure 3

Figure 3 shows a partially merged pair unmerged into its component meon and anti-meon, also termed positive and negative meons. In order to unmerge the pair, the same amount of each type of energy is required each time. This energy $E_m = \pm sc^2/6\ J$ has its mass form as the spinning of the meons about an internal axis (to differentiate from normal spin, this is called 'twisting'). The charge energy form is the size of one-sixth the electron charge energy at $E_q = \pm qc^3/6\ J$ where q is the electron charge and $|qc| = |s|$.

The sign of one-sixth charge that each meon generates depends on the spiral direction of twist relative to translational motion, but always sums to zero over an unmerged pair.

The positive and negative fundamental masses interact by trying to maintain separation from each other. As a result, when one of a pair moves away, the other chases towards and the first mover is thereby chased. When one of a pair moves towards, the other is chased away and the first mover chases.

The result is that there are two possible fundamental, plus twist generated, mass or charge energy sizes for each unmerged meon, ignoring kinetic energies.

The positive meon may have energy $E_{M+} = (M_+ \pm s/6)c^2$ J and $E_{Q+} = (Q_+ \pm q/6)c^3$ J and the negative meon may have energy $E_{M-} = (M_- \mp s/6)c^2$ J and $E_{Q-} = (Q_- \mp q/6)c^3$ J.

In SI units $q_{SI} = \sqrt{h/c}\sqrt{\alpha/2\pi}/(10^{-7})$ C whereas in DASI $q = \sqrt{h/c}\sqrt{\alpha/2\pi} = Q\sqrt{\alpha/2\pi}$ C.

From now on, unless specified, the meons and anti-meons will be treated as pairs, either as a partially merged pair or as an unmerged pair.

Figure 4

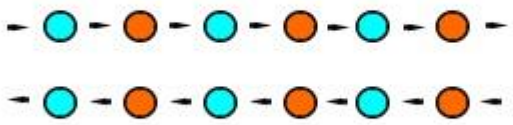


Figure 4 shows the result of an unmerged pair chasing within a volume where many partially merged pairs have been unmerged. The unmerged pair will latch onto the tail of other unmerged pairs to form a chain. The chain chasing becomes the loop frequency when the loop catches its own tail and has formed at whatever radius it achieves, initially at near Planck energy, as part of a myriad of unmerger events – a big bang.

Figure 5

Figure 5 shows the same chasing effect is the case for partially merged pairs, with the added motional possibilities of the chains attaching to unmerged meons and being swept about with them, or forming their own loops as explained below.

Figure 6

Figure 6 shows the result of a chain of unmerged pairs latching onto its own tail to become a loop. The direction of planar rotation differentiates the loop spin into what is usually referred to as 'spin $+h$ ' or 'spin $-h$ ' for what is currently termed a 'particle'.

Within each loop, the fundamental, plus twist generated, energy of the positive meons exactly matches the same energy of the negative meons since each will have $\pm h$ angular momentum around the loop because they need to rotate at the same rate to remain as a stable loop. The $\pm sc^2/6$ twist energy relative to the fundamental mass energy $\pm Mc^2$ affects the radius at which each positive or negative meon rotates.

So although the rotational fundamental mass and twist energies of the loop sum to zero, the loop still rotates due to the

chasing forces between meons and anti-meons in the loop. Even though the loop has no total fundamental mass and twist energies, its rotation within the background with the partially merged chains attached to each meon and anti-meon ensures that the loop rotation affects the background and the background affects the loop, as explained below.

It can be said that the mass energy of such a loop in the background is $E_L = ½\ hw_L = m_L c^2\ J$. So what is currently described as the 'mass' of a particle is emergent due to the formation of a loop. The same is the case for the spin of a loop and the time associated with a loop. So space-time only truly exists for loops individually.

The charge on the loop depends on the total of the one-sixth charges that each meon and anti-meon has in the loop.

The total loop charges for a loop of three pairs can be ± 1, $\pm 2/3$, $\pm 1/3$ and 0 q electron charge.

The single loops are our leptons and quarks. The loop is the only stable form of combinations of unmerged meons.

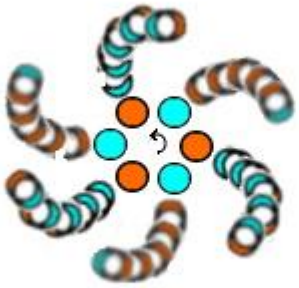
The three families of single loops only differ by loop radius. Loops of other than three pairs are dark matter.

At a big bang unmerging event, loops will be formed near Planck energy. It is the subsequent impact between loops that drives the loop size, not space, to inflate. The amount of inflation along the three spatial axes sets the three family sizes as the loops end up in one of the three planes formed and thereafter try to maintain those sizes locked-in.

Any 'expansion' of space-time that involved further general increases in loop sizes would result in lower loop frequencies and so lower particle masses. Red shift spectography of distant celestial objects suggest that this does not occur.

The charge angular momentum effect is explained below.

Figure 7



Figures 7 shows how partially merged meon chains attach to the unmerged meons within a loop, and are swept around by the loop. They sweep through the background, but the latter is not shown for clarity.

There are also partially merged meon chains within the loop, directly between all unmerged meons/anti-meons. Because they start and end on an unmerged meon/anti-meon they are not subject to the same type of dragging effect within the background, as explained below.

Figure 8

Figure 8 shows the background of the universe where the ZMBHs and partially merged pairs inhabit all relativistic space. The time experienced in such a volume is the average of the inverse of the partially merged pair frequencies – that is the average of the energies of the partially merged pairs present. Each partially merged meon/anti-meon pair has its own individual space-time.

Our 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 massive black hole it loses all time and reverts to become a chain. So massive black holes eat time, but are not home to singularities, because there are none and quantum mechanics does not act there because there are no loops inside massive black holes.

The background has a different time to the time experienced by the loops within that volume, which are not shown. Motion through the background requires energy because the partially merged pairs act as a form of viscosity that needs to be overcome. The background has fundamental mass and charge fields that produce the viscosity experienced by all loops as they travel. Loop time is emergent.

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 of partially merged pairs. To some extent it can be said that if a loop is not within the background, it is not within the observable universe since no forces can act from, or on, it.

Figure 9

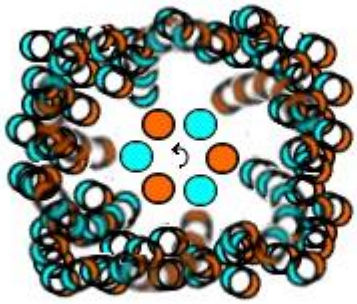


Figure 9 shows a rotating loop with attached chains, where those chains are sweeping through the background (only an outer circle of it is shown for clarity).

It is the action of the loop and its chains moving through the viscous background that produces gravity as an emergent force.

The loop rotational frequency affects the lengths and velocities of the chains and so the size of the viscosity experienced by the loop. The density of the background affects how much energy is lost by the loop. Since every loop is always rotating, they will all lose energy and, for those loops whose size has been locked in by inflation, they will require frequent energy transfers from photons to top up to that size.

The gravity effect of a loop is represented by its emergent mass energy $E_{Lm} = ½\, hw_L = mc^2$, which is balanced by the opposite type charge motional energy of the loop $E_{Lq} = -½Qcvrw = -½\, hw_L$. So the mass energy of a loop is always equal in size and of opposite energy type to its spin energy.

We call the former the loop (particle) mass mc^2, and the latter the loop (particle) spin of ½ h which ignores the frequency part. The effects of the chains of merged pairs is always to drag the local background and so its actions look like positive-only gravity for any loop. This effect leads to interpreting mass as only being positive and attractive.

Really it is the loop shape which has confused. The mass angular moment of each meon/anti-meon is always equal to $\pm h$, since all meons and anti-meons must rotate together, but the radius at which each rotates depends on whether its twist energy $\pm sc^2/6$ adds to, or subtracts from, its fundamental mass $M = \pm\sqrt{hc}$ kg.

So there are only two relative radii of rotation for meons and anti-meons in loops. The result is that in order for the mass

angular momentum to have the correct value $|h|$, the meon/anti-meon charges must rotate at the 'wrong' radii and the net effect is shown as the loop magnetic moment and charge.

This means that basic loop charge angular momentum is still h, not ½ h, and so the loop frequency is half the expected size. The charge energy expression should be $E_q = h(½w)$ not $E_q = ½hw$ and the consequence is that the magnetic moment is twice the expected size (ignoring the anomalous part).

All figures from this point do not show the background, unless stated, but it is there and transmitting all the mass and charge type forces.

Figure 10

Figure 10 shows a short loop stack viewed from the side, with the arrow next to each loop representing the spin orientation of that loop, as +½ h or -½ h. This specific loop stack has total spin of zero as the two rotational axes are coincident and of opposite orientation. Such a stack is slow moving, defined as a scalar meson, and could be the following, depending on the identity of each loop:

	Quark Loop	Quark Loop
Pion $^{+}$	u	$\underline{d}$
Kaon $^{+}$	u	$\underline{s}$
Kaon ^{0}	d	$\underline{s}$

The stack will only be stable when the total charge of the stack is a unit of 1 q or 0 q and if the individual loop asymmetries balance along the stack – meaning in usual terms that they are colourless. Colour is the positional asymmetry of the $\pm q/6$ charges on the meons and anti-meons around the loop. In a three-pair loop, the asymmetries are threefold and so the interpretation has been of three colours.

If the stack were loop and anti-loop the result would be a zeron, of zero charge, zero spin and mass energy $E = hw$, which is the basis of quantum mechanics normal 'pair creation' in that such stacks exist everywhere at all sizes and an appropriate incident energy can dislodge the two, from their stack, for a short period of time inversely proportional to the energies of the loops in the stack. There is no creation of the pair – they already existed.

Figure 11

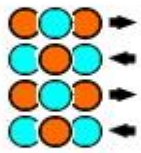


Figure 11 shows a longer loop stack with an even number of loops whose spins are of opposite orientation and sum to zero spin overall. Any long stack with an even number of loops and total spin zero will be scalar boson. An example could be the following:

	Loops	Loops
Higgs	lepton and quark	anti-lepton and anti-quark

Figure 12

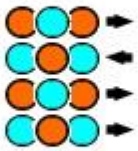


Figure 12 shows a longer stack with an even number of loops, two of whose spins are of the same orientation, and which sum to spin $\pm 1h$ overall. Any long stack with an even number of loops and total spin $\pm 1h$ will be a vector boson. Bosons are composites and do not carry forces, that is done by the partially merged pairs. Examples could be the following:

	Loops	Loops
W	lepton	anti-lepton
W	quark	anti-quark
Z	lepton and quark	anti-lepton and anti-quark
Gluon	quark (colour)	anti-quark (anti-colour)
Photon	lepton	anti-lepton

Figure 13

Figure 13 shows a short stack of two loops where the rotational axes are coincident and of the same orientation. This loop stack has a spin of $\pm 1h$. Such a short stack is fast moving, defined as a vector meson, and could be the following, again depending on the identities of the loops:

	Quark Loop	Quark Loop
Rho $^{+}$	u	$\underline{d}$
Phi	s	$\underline{s}$
Kaon $^{*+}$	u	$\underline{s}$
Kaon ^{*0}	d	$\underline{s}$

Figure 14

Figure 14 is a very short stack, because here the meons in the two loops have partially merged with their opposite loop anti-meons to form partially merged pairs since it is a loop and anti-loop, the result being a photon. This is a special case of the

spin $\pm 1h$ short stack, and the chasing by the meons/anti-meons is also now perpendicular to the plane of the loops, not just around the loops.

The loops accelerate up to their fastest possible speed, driven by their internal chasing across the loops, and the maximum speed they can achieve is light speed. But the numerical value of light speed depends on the local density of the background, and could be zero around a massive black hole where the background density, and so the local viscosity, is very high.

Photons do not transmit forces. They interact with other loops to transfer rotational frequency, meaning energy, so that the latter can maintain their original frequency as set by inflation.

When photons move through the background, they lose energy to it due to the viscosity of the background. They always travel at light speed along the axis perpendicular to their rotational planes and so can only lose energy by reducing rotational frequency. This is the basis of tired light in photons. Since all photons composed of two loops, each of three meon/anti-meon pairs, will all experience the same amount of viscosity on each component meon/anti-meon over the same distance travelled regardless of rotational frequency, the tired light effect is frequency independent. This means that the observed red shifts of celestial objects contain a fraction due to viscosity that has not yet been accounted for.

Figure 15

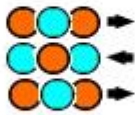


Figure 15 shows a stack of three loops, of which two are spinning one way and one the other. The stack could be extended to any number provided there are an odd number of loops, which balance their $\pm q/6$ charge asymmetries overall and have integer or zero q total charge and have a net stack spin of $\pm ½h$.

The addition of symmetric loops, like the charged leptons or symmetric neutrinos is possible because they do not alter the stack symmetry and are themselves threefold symmetric. The stacks are hadron cores where the forces between meons in different loops are direct and strong. The structural difference between the electron and quark loops in a stack is only the ability to balance the stack because they are both composed of three pairs of meon/anti-meon each and the quark loops are $\pm q/6$ charge threefold asymmetric whilst the electron loop is symmetric.

It is quite likely that a nucleon can be considered as a core stack with the correct balance and charge, surrounded by pions of total zero charge and spin, and with symmetric leptons as ‘end caps’ that separate the core with its asymmetric loops from the surrounding symmetric loop environment.

The hadron stack cores could be the following, depending on the identities of the loops:

	Quark Loop	Quark Loop	Quark Loop
Proton	u	d	u
Neutron	d	u	d
Delta $^{++}$	u	u	u
Lambda ^{0}	u	d	s
Sigma $^{+}$	u	u	s
Xi ^{0}	u	s	s
Omega $^{-}$	s	s	s

Figure 16

Figure 16 shows the main elements of a hydrogen atom, with a proton core stack and an electron loop. No background or partially merged meon chains are shown, but will be present as those chains are what transmit all forces.

The threefold symmetry of three pair loops is what drives chemistry. In an odd-pair number loop, there will always be an odd number of loops required in a stack in order to balance the asymmetries of the component loops. This means that the stack will always have a net $\pm$½ h spin, which will require an orbiting loop with $\mp$½ h spin to balance it.

If loops are composed of an even number of loops, then net spins will be zero or units of 1 h, and no further balance is required, so no chemistry will happen.

The latter requirement for balance is the fundamental drive in the universe. The largest imbalance will be sorted first, then smaller ones. All systems tend towards zero total of each energy type.

The current definition of matter and anti-matter confuses this drive. In a loop system, the number of degrees of freedom available when creating a loop and its anti-loop is larger than for a simpler particle system. The loop system shows that replacing all factors with their opposites means that the anti-loop of a loop is simply the opposite charge loop. So the anti-loop of a spin $+$½ h electron is a spin $+$½ h positron. This makes a photon a perfect loop/anti-loop composite.

Therefore if the definition of matter is chosen to be ‘particles with positive charge’, then anti-matter might be simply ‘particles with negative charge’. However, the definition has to be based at individual loop level, so that the overall matter/anti-matter identity depends on the number of each type of loop. Thus a proton core of up, down and up quarks counts two positive charge loops versus one negative charge loop and is therefore a matter stack. In contrast, the neutron core of down, up and down quarks counts two negative charge loops versus one positive charge loop and is therefore an anti-matter stack, even though it has zero charge.

This definition may seem obtuse, but the result is that nucleon cores are built of matter and anti-matter nucleons, with stability best when the number of each is the same. This is another of the drives to balance that the universe exerts.

The same is the case at atomic level where a matter proton finds balance in an orbiting anti-matter electron.

Matter and anti-matter do not annihilate each other, but combine to form neutral composite systems. The foundations of matter and anti-matter are created equally at the unmerging events, even if the numbers of each type of loop are not necessarily equal all of the time.

Figure 17

Figure 17 shows an electron loop with a stacked photon loop. This pairing is what drives emission and absorption of light as different rotational frequency photon loops leave from, or attach to, the stack. In the process, the old stack leaves one atomic orbital and the new stack arrives at a different orbital.

Whilst stacked, the two loops that comprise the photon will mostly unmerge so that there is little chasing effect between those loops, enabling the photon to remain in the stack.

For loops not in orbitals, the brief attachment of a photon serves to replace the energy lost by the loop to the background viscosity by transferring some rotational frequency, meaning energy, from the photon. This is energy transfer by photons, not

force transmission.

Figure 18

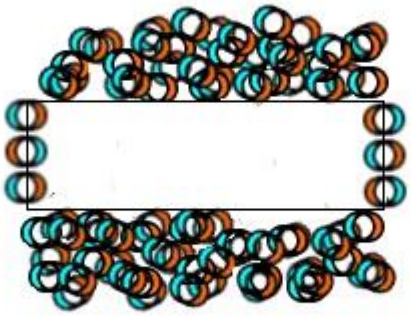


Figure 18 shows part of how quantum mechanics works. Where there is viscosity due to the background, there is relativistic motion. Where there is no viscosity, quantum mechanics and non-locality rules.

A tunnel through the background is shown with a photon at each end.

The two photons were entangled and have separated.

As they separate a tunnel is formed between them, consisting of chains of partially merged pairs which form loops to fill the expanding gap between the photons. The tunnel excludes the background. The two photons randomly swap position at the ends of the tunnel.

Because there is no background inside the tunnel, there is no viscosity of the background to slow the speed of the photons as they travel. Their motion is non-local. The meons/anti-meons retain their own partially merged pair chains within the loop to maintain their structure, but without the trailing and transmitting chains they have no mass, spin or charge effect whilst within the tunnel.

What is seen at one end of the tunnel is the properties of one photon, for the time it is there, added to the properties of the other photon, for the time it is there. The result looks like a superposition, but is actually always the maximum of the properties of one or other photon which, over sufficient time, will tend towards the average of the properties of the two photons. Superposition is therefore a digital effect, not a steady mix of properties.

When an ‘observation’ is made at a tunnel end, the tunnel collapses and whichever photon was at that tunnel end is trapped there, whilst the other photon is trapped at the other tunnel end. Due to the random swapping at high frequency along the tunnel, it is very difficult to say which photon will be trapped at which tunnel end on collapse.

The same mechanism acts for entangled electron and positron split apart, from a photon, and travelling back and forth along a tunnel.

The tunnel ends are constrained to travel through the background, so cannot exceed light speed.

Viscosity acts on all motion, so that any move loses energy from the moving object and the move cannot be reversed without incurring further energy loss. This is the basis of the arrow of time pointing only in one direction.

Structural and Other Consequences

- There is nothing separately physical in the universe except a myriad of the two unmerged meon and anti-meon particles that normally only exist within loops
- The hypothesis uses only two fundamental particles, two energies and one composite form to explain almost everything. No hypothesis could use fewer foundations to build with.
- Viscosity red shift of photons requires the rethinking of how much, or whether, dark energy exists and the size and age of our big bang.

- Motion of loops which is not against background viscosity is without energy loss, is non-local and the basis of quantum mechanics.
- The viscosity of the background partially merged pairs underlies relativity, the arrow of time, electric charge generation and the second law of thermodynamics.
- Relativity, where viscosity is present, and quantum mechanics, where viscosity is absent, are irreconcilable.
- There is only one universe because there is only one size of meon/anti-meon fundamental particles and one composite loop form.
- 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 spatial 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.
- 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-SI (DASI) Planck size of the meons and anti-meons and the fine structure constant, a function of the energy needed to unmerge ZMBHs.
- 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 large 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 initially 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 relatively soon 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.
- 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 big bang 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.
- The unit size of meons means that space cannot be expanding in the accepted sense of all distances increasing.
- 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 different mathematics is required.
- 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 DASI 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. This means that there is no difference between gravitational and inertial mass.
- The reason gravity and charge appear so different in size, even after eliminating G, is because the gravitational effect of a loop is proportional to its rotational radius w, which in adjusted-Planck terms is very small in our normally experienced loops, whilst the charge effect is proportional to the adjusted Planck charge Q by the fine structure constant α, which is very large. For a loop to have the same size gravitational effect as a q charge effect, then the energy of each will need to be such that $E = qc^3 = hw_*\sqrt{\alpha/2\pi} = Mc^2\sqrt{\alpha/2\pi}$, where w_* is the adjusted Planck angular frequency.
- Dimensionality shows 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 so they are dimensionless ratios. Any equation where the sum of the dimensionalities on each side are equal is a law of nature ($h=McR$, $Y^0 = Y^1\ Y^2\ Y^{-3}$).
- Laws of nature can be uncovered by equating properties across an equation ($\eta V = h$, the product of viscosity and volume is a constant, as is the product of electric field and volume $\xi V = h$, suggesting a deep link between viscosity and electric field). 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 and anti-meons in a photon double-loop is the distance over which they are subject to viscosity and, apart from at very high frequencies, this can be considered equal to the path of the loop itself.
- Any property which has a dimensionality of zero is a universal constant. It is possible to eliminate other properties of dimensionality zero in the same way as G or h. But only the former can be done without the appearance of seemingly (but not) unphysical results. Laws of nature can be used to uncover these dimensionalities and new laws can be found by reversing the process.

- Elimination of h and G from all equations 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.
- 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, their adjusted-Planck values, are powers of $\sqrt{c}$, or $\sqrt{c}$ and the fine structure constant α. 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.
- The symmetric three pair 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 all asymmetric. Normal matter is loops of three pairs. Dark matter is mainly loops with other than three pairs.
- 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.
- Loops of other than three-pair number are forms 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.
- The requirement of symmetry, to match the local environment where charges are $\pm 1q$ or $0q$, is why fractional charge quarks do not easily appear on their own.
- Relatively stable 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.
- A symmetric zero total charge, zero total twist loop will have no observable mass. A $2/3q$ charge, $2/3sc^2$ twist loop will have 2/3 of the rotational frequency w of the loop observable. A non-symmetric zero charge, zero twist loop may have some mass observable.
- As a loop enters a black hole, the loop is broken into a chain, but the entering chain of unmerged meons and anti-meons retain their existing additional $\pm q/6$ charges and $\pm sc^2/6$ twist energies.
- Photons and bosons are not force carriers. The background partially merged chains 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. Partially merged chains transmit forces via density changes and strings of vibrating, rotating or moving partially merged pairs 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 and anti-meons to increase the partially merged pair 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.
- 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 small or no overall spin-spin potential energy) the loops still all have total loop spin energy equal to total loop mass energy. Even if the net loop spin energy is zero, the kinetic energy of all the spins still exists and acts like mass kinetic energy.
- Rotational energy is outwards from the centre of rotation. Energy is a vector.
- 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, in DASI, $Mm/r^2 = m\,v^2/r$ in a system with zero net loop spin energy is correct for force and $Mm/r = ½mv^2(mass) + ½mv^2(spin)$ is correct for energy, differing only by the r factor from the force equation.
- 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 an outward perpendicular energy/force relative to the centre of that sphere.
- 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 in a stable orbital system.
- 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 is instead.
- 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 allowable 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.

- Massive black holes are not black and physics does not break down inside them. Since the meons and anti-meons are Double-Adjusted SI (DASI) Planck radius, mass and charge, plus twist energies, they are the densest particles possible and cannot be broken. In comparison, black holes are far less dense than the meons and anti-meons individually. 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 chains of partially merged pairs, and that is what enters the black hole. The loop's rotational frequency – its mass and spin, plus its net charge, have been absorbed by the hole since the meons and anti-meons that formed the loop are a chain that is now within the hole.
- Each meon and anti-meon retains its fundamental mass/charge and twist/charge energies even inside a black hole. The individual meons/anti-meons or pairs of meon/anti-meon in the chains can be split from their chain 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 maximum 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 mix of different components.
- Some chains can reform symmetric loops and anti-loops and then photons at very high rotational frequency at the surface, or just inside, a massive 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 on the surface at near DASI Planck energy.
- Photon loops escaping from a massive black hole must be very symmetric, having the same mass and charge energies in every meon/anti-meon in both loops. This means that only the equivalent of symmetric neutrino/anti-neutrino and charged lepton 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 since 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 necessarily be observed directly. 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 unless there are asymmetric electromagnetic or gravitational fields present.
- Black holes act as symmetry sieves, taking in all symmetry loops and converting them to symmetric photons, both matter and dark matter versions.
- 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 unmerged meon pairs to reform partially merged pairs is unlikely to occur because the unmerged meons are chasing each other and still have additional twist/charge energies instead of simple non-twisting fundamental mass M and charge Q usual in partially merged pairs.
- 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.
- Matter and anti-matter do not annihilate each other. No meons or anti-meons or loops are ever annihilated, although positive and negative meons might be able to remerge into ZMBHs under certain conditions.
- The meons and anti-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 which is the basis of the second law of thermodynamics.
- 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 opposite charges because the only matter/anti-matter differentiator is the sign of charge for loops.
- An electric battery is a matter/anti-matter device, allowing positive and negative charges to be balanced in atoms and compounds.
- Zero point energy is multiple concentric shells of zerons centred at every point in space.
- 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. Zerons are also the reason for the Casimir effect. Any zerons 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 to allow their return to their correct position.
- There is no separate strong force in the nucleus. What keeps the stacks of nucleons together is a combination of direct meon/anti-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.

- Except when physically very close, it is the partially merged chains acting through the background that affects other loops. Direct partially merged chains for loop-to-loop and meon-to-meon/anti-meon forces only occur at very small loop-loop separations, for example, in stacks. These chains could support the formation of tunnels between such stacked loops when entangled.
- 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 q or zero charge in total.
- 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.
- 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 partially merged pairs, 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.
- 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.
- 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.
- 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.
- The twist energy/charge $\pm sc^2/6$ / $\pm q/6$ sizes will be the same in any big bang because they depend on the size of the meon/anti-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.
- 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 loop and anti-loop.
- Time exists mainly in loops and when a loop breaks as it falls into a massive black hole it loses all time and reverts to become a chain. Without loops in massive black holes, there can be no quantum mechanics inside massive black holes.
- Before loops formed, there was no time in our sense since there were no loops, or composites formed of loops, existing to observe in that non-loop environment. Partially merged pairs' rotational, vibrational or motional activities formed the background but only affect the specific partially merged pairs themselves in a non-loop environment. There are three levels of time – outside the ZMBH background, which has no time, partially merged pair motion/rotation/vibration and loop time.
- 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.
- 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' partially merged pair background and the difference in red shifts will represent the net relative expansion or contraction at that point in space. Very high red shift, very massive 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.
- Distant collisions drive local random effects in that 'observations', or sufficient size disturbances, of tunnels between entangled loops or photons at a far distant location where one tunnel end exists can result in the un-entanglement of a loop or photon in another distant place where the other tunnel end exists.
- 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. At 'observation' either the shell is disturbed and the photon locked in place where it physically was on the shell at that instant, with a probability associated with its position, or the photon is observed and the shell collapses.

- 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.
- 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 (*w* frequency at radius *r* , *v*=*rw*) 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.
- 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 partially merged pairs 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 $\pm$½h and electron mass at 100% of the loop frequency *w*. A similar symmetric neutrino equivalent will have 0% of loop *w*. The mass of normal and dark matter symmetric loops will be the same as ½hw. Their spin energies will all be ½hw as well, but the magnetic moments will depend on the number of pairs in a loop.
- 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 *w*. The equivalent 4-pair dark matter quark (asymmetric) loop will have charge +6/8q and observable mass ¾ loop frequency *w*. The actual loop sizes will be the same, as will their spins at $\pm$½h. Three-fold symmetry in normal matter arises because there are three meon pairs in normal matter loops.
- Chemistry arises from odd loop asymmetries leading to odd numbers of loops in stacks. Where the 'core' stack has $\pm$½h spin in total it needs an orbiting loop of $\mp$½h 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.
- The electron and neutrino can both survive in a nucleon stack because they are each composed of adjusted-Planck size meons and anti-meons. The electron needs additional energy (frequency) in order to match the stack loop size when joining a neutron stack and could take it from an incident neutrino or photon. Electrons also stack and un-stack photons when they change orbital levels, adding to move higher and releasing to move lower. Photons can also stack with other symmetric loops.
- 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.
- There is a hierarchy of zero total 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.
- Both inflation and expansion take place against and through the background of partially merged pairs that have not inflated.
- 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, which could be considered as a form of heating the background.
- Photons will eventually lose all their frequency and become free partially merged pairs again. Energy moves from the background partially merged pairs to meons and anti-meons, then chains, then loops, then stacks - at each stage returning some through viscosity to the background until all is returned to the background.
- 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 $\mathrm{Total}=(\mathrm{A}-\mathrm{B})/(\mathrm{A}+\mathrm{B})$ 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 $\mathrm{Total}=(a+b)/(1+ab)$ results, as well as producing through a similar type of treatment using ($\sqrt{4\prod_n(1-x^2)}=C$) and $\gamma(n)=(A-B)/C$ the gamma factor $\gamma=1/\sqrt{1-v^2/c^2}$ for a single velocity.
- 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 and partially merged pairs. The ZMBH and partially merged pair 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 partially merged pairs can transmit forces, so at c due to their own viscosity effect. 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.

- 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.

Conclusion

The pre-fermion hypothesis proposed is deserving of a wider consideration as a potential theory of everything.

References

1. Lawrence M “A Hypothetical Pre-Fermion Particle Theory of Everything In 95 Theses”. (pre-print) Researchgate (2018)
2. Lawrence M (2016) “How SI Units Hide the Equal Strength of Gravitation and Charge Fields”. *J Phys Math 7:151*. doi:10.4172/2090-0902.1000151
3. Lawrence M (2016) “A Viscosity Hypothesis – That the Presence or Absence of Viscosity Separates Relativistic and Quantum Systems Based on the Simplest Possible Theory of Everything.” *J Phys Math 7: 200*. doi: 10.4172/2090-0902.1000200
4. www.maldwynphysics.org