

Update on work in progress

Advances to the ‘Chains then Loops’ Hypothesis

Although the preferred name for the current work that posits a pre-fermion theory of everything is ‘Ring Theory’, in its current stage it only makes predictions, none of which has yet been verified by experiment. So it must remain a hypothesis for now. The predictions made include: the existence of a viscous background through which relativistic motion occurs, and one where the lack of background enables travel above c , the single form of all compound particles from fermions up, with similar form for dark matter; the tired light effect on all photons which produces an extra red shift with consequent effects on the expansion after the Big Bang; the co-existence of inflationary and a form of steady state universe where previous failed inflation events appear as black holes studded within our successful expansion; the existence of only one universe where physics fails nowhere and why stable systems have zero total energy.

TAPU and DAPU frameworks

In advancing the ideas of the current work, some earlier conclusions can be improved on. The following discussion builds on the two earlier published papers *How SI Units hide the equal strength of gravitation and charge fields* (<http://dx.doi.org/10.4172/2090-0902.1000151>) and *A viscosity hypothesis – that the presence or absence of viscosity separates relativistic and quantum systems based on the simplest possible theory of everything* (<http://www.omicsonline.com/open-access/a-viscosity-hypothesis-that-the-presence-or-absence-of-viscosityseparates-relativistic-and-quantum-systems-based-on-the-simplestp-2090-0902-1000200.php?aid=80828>).

The paper on SI unit simplification introduced Adjusted Planck Units (APU), Double Adjusted Planck Units (DAPU) and Triple Adjusted Planck Units (TAPU). The former two involved the realignment of charge units and the elimination of the Gravitational constant G from SI units to form New SI units. The latter added the elimination of Planck’s constant h to produce Brand New SI units.

Whilst there are many positive features to excluding h from SI units, the beauty of the resulting symmetry should not be allowed to overshadow the physicality of the result. When considering the physical size of the electron in the three sets of units the results are that for PU, DAPU and TAPU respectively, using the formulae for the meon motion within loops

$$\hbar = M_p c L_p \quad \text{and} \quad \hbar = M_* c L_* \quad \text{and} \quad 1 = M_T c L_T$$

and equivalence of loop rotational and mass energy

$$M_p c^2 = \hbar w_p \quad \text{and} \quad M_* c^2 = \hbar w_* \quad \text{and} \quad M_T c^2 = w_T$$

The respective radius for the electron is calculated to be

$$7.010 \times 10^{-24} \text{ m} \quad \text{and} \quad 2.453 \times 10^{-21} \text{ m} \quad \text{and} \quad 1.878 \times 10^{+4} \text{ m}$$

It is apparent that the TAPU radius, based on the very large TAPU mass $M_T = 1.731 \times 10^{+4} \text{ kg}$ gives an unreasonable physical size for the electron loop.

By contrast, the DAPU radius is much more in line with the expectation that it will be small. The difference between the DAPU and TAPU treatments of G and h is that whereas G is split equally in DAPU as $G^{1/2}$ between the APU parameters M_o and R_o , increasing R_o whilst reducing M_o , in TAPU the equal split of $h^{1/2}$ reduces both M_* and R_* . The latter effectively stretches DAPU space by h , whereas the former keeps the PU and APU spaces symmetric.

The result is that the referred set of units is the DAPU set, suggesting that it is the DAPU mass M_* that forms the basis of all meons. The values of the DAPU set of Planck, SI and derived maximal property values were presented in the SI units paper.

Loop breaking

The second area which was not clearly presented in the viscosity hypothesis paper concerns in what circumstances loops can be broken and reformed – effectively whether two loops interacting retain their identities or can swap component pairs to exit as different loops. It was explained that black holes act as loop breakers when loops get close enough to those large black holes.

It was not discussed whether away from large black holes any loops can be broken into constituent pairs and reformed into different loops. Currently the normal assumption of physicists is that any collection of particles can become any other collection provided the sum of the properties remains unchanged.

There are two different situations to consider. One is that all different loops and anti-loops are present as zerons centred on each point in space and incident loops impact/interact to break the existing zerons into loop and anti-loop and these are what we observe as the exiting particles (total properties incoming and exiting the same). This is pair creation from a loop perspective, with no actual creation, just uncovering pre-existing composite pairs.

The second situation is the close approach of two loops. Since each constituent meon is the densest black hole possible, it will have the greatest mass and charge fields near to it. These will probably exceed the overall effect of any black hole composed of more than a single meon. So perversely, the place where loops are most likely to be broken and reformed is when close to another loop, of any type. So provided the rotational rates, charges and spins are retained overall, the output loops of any collision could be different to the input loops, confirming the normal assumption of physicists, although within a more restrictive framework.

Energy and momentum

Considering the viscosity hypothesis paper which built on the foundation SI units paper, the motional energy of the meons was used directly to arrive at the loop mass, wave equation and angular momentum rather than the total energy. This means that the basic structure $E_M = (\gamma - 1)M_*c^2$ was used instead of $E_M = \gamma M_*c^2$ and $E_Q = (\gamma - 1)Q_*c^3$ instead of $E_Q = \gamma Q_*c^3$. (From this point on all M , s , q and Q values are in DAPU without using the star subscript for simplification.) The motional component is what defines what the loop is observed to have in terms of mass and frequency, but the total energies are still within the loop although the M and Qc terms sum to zero with the s and q terms providing external charge and mass multiplier.

The question is whether it is necessary to consider the total masses in the momentum of the meons, rather than just the motional energies, and also whether the expansion of γ produces any observable effects.

The first question uncovers a difference in the way momentum is currently defined for mass and charge, whereas the loop framework requires that the two are treated identically in the use of formulae. The charge momentum, or magnetic moment of charge q when ignoring the c factor, is defined to be the current acting over an area. In normal usage this is given by

$$\mu_q = q\pi r^2/t = q\pi r^2w/2\pi = \frac{1}{2}qvr = \frac{1}{2}qh/m$$

Since mass and charge equations in the framework presented here are identical, then the simple moment, or mass momentum, equivalent H for the motion of meon mass M will be

$$H_M = M\pi r^2/t = M\pi r^2 w/2\pi = \frac{1}{2}Mvr = \frac{1}{2}Mh/M = \frac{1}{2}h$$

This links well with the simple energy formula using the mass motional energy of the meons,

$$E = (\gamma - 1)Mc^2 = \frac{1}{2}Mv^2 = \frac{1}{2}Mvrw = \frac{1}{2}hw = H_M w$$

So the energy formula includes the gamma factor whereas the mass momentum formula does not. This suggests that the momenta formulae should use the gamma factor, which would introduce additional terms under the expansion for H as

$$H = \frac{1}{2}\gamma Mvr = \frac{1}{2}h(1 + \frac{1}{2}v^2/c^2 + 3v^4/8c^2..)$$

This compares with the motional energy expansion

$$E = (\gamma - 1)Mc^2 = M(\frac{1}{2}v^2 + 3v^4/8..)$$

Or the total energy expansion

$$E_{tot} = \gamma Mc^2 = Mc^2(1 + \frac{1}{2}v^2/c^2 + 3v^4/8c^2..)$$

Thus it is clear that it should be the total energy of the meons that must be used in both the energy and momentum formulae and the expansion terms considered when the meon velocities are significant.

However, this interpretation would mean that angular momentum within loops is not constant. The preferred solution includes the gamma within h , so that all meons in all loops will always have h angular momentum, although the contributions of mass and charge will vary dependent on meon type and twist orientation. Here the treatment of mass angular momentum and charge magnetic (or angular) momentum is identical mathematically, although the physical actions may be different.

There are two potentially different ways in which the meons can retain their angular momentum in a loop. The first is when the mass angular momentum component must be the same for each meon, in which case the positive and negative twisting meons in an electron will rotate at different radii and velocities, as would be the case if the mass angular momenta for two similar meons were different. The second is when the total mass and charge momenta is the same for each meon and the effect due to both is identical physically, in which case all meons rotate at the same radius and with the same velocity. The viscosity hypothesis paper proposed the first case of different rotational radii, but it is possible that the same radius may be the case.

The identical effect of mass and charge angular momentum is not clear. The assumption that the mass angular momentum sets the radii of rotation regardless of the size of charge angular momentum is fundamental to the first two treatments. In the case of equal h for each meon mass angular momentum, the result of different rotational radii gives rise to a net negative magnetic charge moment for the electron loop. However, the symmetry of mass and charge treatments suggests that the effect of charge angular momentum should be included in the setting of radii. It may be that it is the chase effect of opposite mass energy interactions which gives rise to this symmetry breaking.

Case One

Considering the former case first, the viscosity hypothesis paper looked at the system where the mass angular momenta for each meon was equal to h , and those results remain as follows, now including the γ factor, the simplified relationship for two non-twisting meons (not physically possible) in a loop rotating at different radii would be

$$h = \gamma_1 M v_1 r_1 = \gamma_2 M v_2 r_2 = \gamma_1 Q c v_1 r_1 = \gamma_2 Q c v_2 r_2$$

Looking at the more exact versions of the formulae for the electron, as considered in sections 4 and 14 of the follow-on viscosity hypothesis paper, but without considering the gamma expansions, using $a = s/6M$ they become

$$H_M = \frac{1}{2}\gamma_1(M + aM)v_1r_1 + \frac{1}{2}\gamma_2(-M + aM)v_2r_2$$

And, since $v_1 = r_1 w$ and $v_2 = r_2 w$ is assumed still to hold

$$(1 - a)/(1 + a) = \gamma_1 v_1^2 / \gamma_2 v_2^2 = k$$

For the positive meon the relationship for mass angular momentum is now

$$H_{M+} = \frac{1}{2}\gamma_1(M + aM)v_1r_1 = \frac{1}{2}h(1 + a)$$

So the introduction of the s energy has increased the mass angular momentum of the meon in this system. The case for including s but keeping h in total will be made below.

For the negative meon in this system

$$H_{M-} = -\frac{1}{2}\gamma_1 M(1 - a)v_2r_2 = -\frac{1}{2}h(1 - a)$$

So the total mass angular momentum for three pairs around a loop is

$$H_{Mtot} = \frac{1}{2}h6a = \frac{1}{2}hs$$

The charge formulae for a meon pair in an electron is now, using $b = q/6Q$, which is the same size as $a = s/6M$, since $s = qc$ in size and $M = Qc$,

$$\begin{aligned} \mu_Q &= \frac{1}{2}\gamma_1(Q - bQ)v_1r_1 + \frac{1}{2}\gamma_2(-Q - bQ)v_2r_2 \\ &= \frac{1}{2}\gamma_1 Q(1 - a)v_1r_1 + \frac{1}{2}\gamma_2 Q(-1 - a)v_2r_2 \\ &= \frac{1}{2}Q(1 - a)h/M - \frac{1}{2}Q(1 + a)h/M \\ &= -\frac{1}{2}Qh2a/M \\ &= -\frac{1}{2}h2a/c \end{aligned}$$

So for a loop of three pairs the charge angular momentum is now

$$H_{Qtot} = \mu_Q c = -\frac{1}{2}h6a = -\frac{1}{2}hs \equiv -\frac{1}{2}hqc$$

In total the loop will have

$$H_{MQtot} = \frac{1}{2}hs - \frac{1}{2}hs = 0$$

The positive meon will have total mass and charge angular momenta of

$$H_{MQtot}^+ = \frac{1}{2}h(1 + a) + \frac{1}{2}h(1 - a) = h$$

And the negative meon will have

$$H_{MQtot}^- = -\frac{1}{2}h(1 - a) - \frac{1}{2}h(1 + a) = -h$$

So even though each meon has $\mp h$ angular momentum due to both mass and charge energies, the loop has zero in total, but is still rotating.

Case two

Where the system is instead that the mass angular momentum of each meon is always equal to $\mp h$, the equations for a pair would be

$$H_M = \frac{1}{2}\gamma_1(M + aM)v_1r_1 + \frac{1}{2}\gamma_2(-M + aM)v_2r_2 = \frac{1}{2}h - \frac{1}{2}h = 0$$

$$\mu_Q = \frac{1}{2}\gamma_1(Q - bQ)v_1r_1 + \frac{1}{2}\gamma_2(-Q - bQ)v_2r_2 = \frac{1}{2}h - \frac{1}{2}h = 0$$

And the total for each meon would be

$$H_{MQtot}^+ = \frac{1}{2}h + \frac{1}{2}h = h$$

$$H_{MQtot}^- = -\frac{1}{2}h - \frac{1}{2}h = -h$$

Which is exactly the same as the previous case except that the rotational radii are now the same for positive and negative meons as

$$1/1 = \gamma_1 v_1^2 / \gamma_2 v_2^2 = k = 1$$

And there is no net s or qc loop angular momentum. Since the value of s affects the observable mass of the loop, this lack of effect strongly suggests that the different radii system is the more likely.

Effect of the γ function

The effect of including the γ function within the value of h total angular momentum for meons in a loop is to introduce a disparity between the velocity of the meons and the frequency of rotation, so it may no longer hold that $v = rw$ precisely in a loop. Then there would no longer be a direct and simple relationship between the loop velocity, which provides the observable mass of a loop and the frequency of rotation of the loop, which is what we consider to be the wave function. The effect is minimal at low frequencies but gets higher as velocities approach c .

In terms of small loop velocities, the effect is of the order of m_e/M , the ring mass divided by the Planck mass, so unobservable.

A comparison of the relationship between v and w in meons and in loops shows that they are different. For a positive meon the formulae in DAPU are

$$E_M^+ = \gamma Mc^2 = \gamma hw_*$$

$$\cong Mc^2 + \frac{1}{2}Mv^2 = hw_* + \frac{1}{2}hw$$

$$E_Q^+ = \gamma Qc^3 = \gamma \mu_Q cw_*$$

$$\cong Qc^3 + \frac{1}{2}Qcv^2 = \mu cw_* + \frac{1}{2}\mu_Q cw$$

Or for the motional energy second expansion parts only

$$E_{MQmot}^+ = \frac{1}{2}Mv^2 + \frac{1}{2}Qcv^2 = \frac{1}{2}hw + \frac{1}{2}hw = h$$

$$E_{MQmot}^- = -\frac{1}{2}Mv^2 - \frac{1}{2}Qcv^2 = -\frac{1}{2}hw - \frac{1}{2}hw = -h$$

For a loop the formulae for the total motional energy is derived from three times

$$2h - 2h = \gamma_1 Mv_1 r_1 + \gamma_1 Qcv_1 r_1 - \gamma_1 Mv_1 r_1 - \gamma_1 Qcv_1 r_1$$

$$= \gamma_1 Mv_1^2 / w + \gamma_1 Qcv_1^2 / w - \gamma_1 Mv_1^2 / w - \gamma_1 Qcv_1^2 / w = 0$$

Or

$$\begin{aligned}E_{totmot} &= hw - hw = \frac{1}{2}\gamma_1 M v_1^2 + \frac{1}{2}\gamma_1 Q c v_1^2 - \frac{1}{2}\gamma_1 M v_1^2 - \frac{1}{2}\gamma_1 Q c v_1^2 = 0 \\&= \frac{1}{2}M(v_1^2 + \frac{1}{2}v_1^4) + \frac{1}{2}Qc(v_1^2 + \frac{1}{2}v_1^4) - \frac{1}{2}M(v_1^2 + \frac{1}{2}v_1^4) - \frac{1}{2}Qc(v_1^2 + \frac{1}{2}v_1^4) = 0\end{aligned}$$

which is different by the extra $\frac{1}{2}v_1^4$ factor from the meon case. For the loop to have the same rotational frequency as a meon, equivalent to the effective loop mass, requires a lower meon velocity, even though the total energy in each case is zero.

Quantum motion

The earlier paper explained how it is possible that entanglement allows the existence of tunnels between entangled loops. The work here has provided more clarity in that where the background ZMBHs do not exist (inside tunnels) then there can be no rubbing of meons against the background as they twist and so no $q/6$ charge generated. The presumption is that, since the twisting energy still exists, its balancing energy normally seen as generated charge must be what holds the tunnel open.

There is no direct loss of observable mass for charged loops, since the twist energy provides the net pressure which allows the loops to have their mass observed. A loop with 1s will show its whole mass in proportion to its frequency or size, whilst a loop of 2/3 s will show 2/3 its frequency. But the observation of mass is dependent on the background ZMBHs moving appropriately in relation to the meons in the loops as detailed in the viscosity paper. Without the background in the tunnel, there will be no mass effect of the background observable and since all loops have zero total energy they have no actual mass anyway, just their effect on the background. What this means is that within entangled tunnels the loops will have no effective mass or charge and so can move at any speed without needing energy.

Abstract for Physics 2017

A hypothetical pre-fermion particle theory of everything explaining the symmetric foundations of physics and why relativistic and quantum systems are different.

Based on a single particle/anti-particle foundation and the background from which they emerge, the zoo of fermions, bosons, nucleons, photons and the observed universe are explained. The only two types of energy existing are treated identically and produce standard formulae, except where the missing component in current formulae is shown to be necessary to explain stable orbits. Matter and anti-matter are shown to be present in equal quantities and 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 our 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.

Black holes and information – a basic discussion from foundations up

There are two aspects regarding black holes and information which have not been appreciated. The first is due to the underlying nature of particles and mass, and the second is what separates relativistic systems from quantum systems.

The first aspect is how information moves at the surface of a black hole – the mass, charge and spin of the particle entering. To explain this requires understanding the nature of a particle – explained in more detail below – but the outline is that all the particles we observe are made of only one type of particle (meon) and its anti-particle (anti-meon) which always occur in pairs and are always chasing each other. The pair is the basis for chains- pairs joining other pairs to chase – which eventually catch onto their own tails to form loops. It is the loops that we call fermions and are the basis of all our observable particles. Loops of three pairs are our matter, all other pair numbers are dark matter. Each meon twists as it moves and generates $1/6$ electron charge with sign dependent on twist orientation versus direction of travel and whether meon or anti-meon. This provides the charge set for our fermions. What we term the mass of a loop is the product of half its angular frequency and the Planck constant h for each meon/anti-meon (equal to the size of the kinetic energy of each meon/anti-meon in a loop). But since there are equal numbers of meon and anti-meon in each loop, the total energy of all loops is zero. It is the physical size of the loop (smaller means higher frequency and smaller size through $h=Mvr$) that deflects space to look like mass, as explained below. In the same way that each meon has two types of energy, equal and opposite in fundamental charge and mass, a loop also has equal and opposite energies in its mass and spin energies. Although each fermion is said to have spin $1/2$, its spin energy is $1/2$ hw , equal and opposite to its mass energy.

So when a loop approaches a black hole, it is stretched by the differential gravity acting along it proportional to each meon's distance from the black hole. The stretching slows the frequency of rotation of the loop, and this makes the apparent mass of the loop lower (and its spin energy). At some point the loop will break, at which point the mass and spin energies will have become zero in the loop, leaving only a chain. There is no transfer of mass (or spin) because there never was any mass (or spin) to transfer, the total is always zero – it is the physical size of the loop that we observe as its mass in its deflection of space (the background). But the charge of the loop and each meon's twist energy will still be in the chain which enters the black hole.

Since the meons are Planck fundamental mass, charge and radius, they are the densest matter possible and so will never be broken. So there is no singularity within a black hole since it is composed of chains, which are themselves composed of meons and anti-meons in equal number. A black hole is a chain star that is very diffuse compared with the meon density. And there is no actual single black hole boundary – each loop will break at a point dependent on its original incoming size (energy as we term it).

Within the black hole, the chain will break, form loops, break, reform etc until some of its original pairs become part of a symmetric photon (loop and anti-loop rotating in the same direction) that has enough frequency (energy) to escape from the black hole at a consequently much reduced frequency. The charge that was on each pair of the loop that entered will still be on them, but the pair will be within other chains or the exiting photon. No charge is lost, and the fundamental mass exiting in the photon loop is still zero in total, as is its spin energy. The black hole evaporates by losing pairs as part of exiting photons – it is the number of pairs, not the mass directly that reduces. This is how previously entering loop information escapes from a black hole in a different form.

A black hole is a symmetry sieve that takes in asymmetric loops (in matter and dark matter) and symmetric loops (photons, leptons) and converts them all into symmetric photons. So the ratio of normal to dark matter changes over time dependent on the number of black holes. The ratio change is also dependent on the number of pairs in each photon exiting, whether as matter or dark matter photons.

Although photons or other double-loop composites (eg zerons – loop and anti-loop rotating in opposite directions with spin zero and mass hw) near the black hole boundary may be separated into loop and anti-loop with one loop entering the hole and one exiting, this is not a quantum pair creation effect, merely the differential separation of a composite particle. No loops ever appear from nothing, they are already there. And once the loop entering the hole breaks into a chain, there can be no quantum effect between the original photon pair of loops. As explained below, to have such an effect requires the absence of a background composed of partially merged pairs whereas the presence of a black hole is exactly where the density of the background will be largest and will slow the numerical speed of light almost to zero, although it will still be local c . Note that although the speed of light c is believed to be a constant in ‘empty’ space, it has Y^2 dimensionality and is thus not a constant since constants have dimensionality Y^0 . The density of the local background sets what speed is the local terminal velocity, and in the absence of the background, there is no terminal velocity.

In the second aspect is the vital difference between why a system is relativistic and why another is quantum in nature. The answer is simple to state, but needs a more complicated explanation.

The difference between relativistic and quantum systems is simply whether the particles in them are moving against the viscosity of the background universe or not. As explained, a photon is a double loop composite particle where each fundamental component (meon/anti-meon) in each loop is chasing both the next opposite type fundamental particle in its own loop and its opposite type fundamental particle in the other loop. This means that the photon has an internal force that both drives it round at a rotational frequency and simultaneously along transversely to travel at the maximum speed possible in its local environment. The rotational frequency is what we call w , its energy hw . We call the transverse speed c and say that it is a maximum in ‘empty’ space, but gets slower closer to large bodies.

What we term empty space is actually a seething mass of partially merged meon and anti-meon pairs (together - zero mass black holes) which, when fully merged, are nothing at all. But the background acts as a viscous drag on everything passing through it because of the electric fields present within the background, whose dimensionality is identical to that of shear viscosity. So depending on the local density of this background, the speed of light is faster or slower and represents a terminal velocity reached against this viscosity, like a skydiver slowed by the friction of air.

Although the background should be present in every space in the universe, when two particles become entangled, as in the electron and positron loops that combine to be a photon, or when separated, they generate a tunnel between them in which there is no background. So there is no viscosity present and the two particles can travel at above empty space c through the tunnel, swapping places at Planck frequency, so they look like they are in a superposition – as the two are mathematically equivalent. So entanglement requires tunnels so that the particles can travel without viscosity, and it looks like superposition.

The difference between the two environments is thus either with viscosity (terminal c , energy loss on all motion, arrow of time, thermodynamics 2, inherent time for all loops etc – the relativistic framework) or without viscosity (speed above c , no time, superposition, entanglement and collapse

– measure one and the other is stuck where it was because the tunnel has been closed etc – the quantum framework).

This framework shows where the two different realms exist, as well as how space can be both smooth and stubbly at the same time – the stubble is the individual meons (as described below) and the composite loops depressing space, but smoothed by the zero mass black holes which provide anything from zero to one Planck size deflection in themselves as they vibrate/rotate.

More detailed explanation:

The universe is composed of pairs of fundamental particle and anti-particle (called ‘meons’). There are no other particles. These pairs break out from being merged, where they start as partially merged rotating, vibrating zero mass black holes. They un-merge with the same energy each time which provides one-sixth the electron charge with charge energy balanced against the spin of each meon (called twist to differentiate from loop spin, and fundamental charge/spiral direction of travel decides sign of 1/6 charge). There are only two energies, due to mass and charge, which are equal and opposite types, with similar mass type attracting, opposite chasing.

The un-merged pair chases each other to try to reform. This is a result of the actions of positive fundamental mass of one and negative fundamental mass of the other, together with their fundamental charges of opposite sign. The pairs latch onto other pairs to form chains, which latch onto their own tails to form loops. Loops with three pairs are our matter, with charge values equal to our fermions. Loops of other than three pairs are dark matter and cannot stack with our loops due to differing symmetries. Our threefold symmetries are due to the three pairs in the loops. This also sets the stage for chemistry with the need for the smallest loop’s spin balancing the spin of the nucleon stack. Only odd symmetries allow chemistry.

What we observe as the mass of the loops is their frequency of rotation, the mass motion giving ‘mass’ as a deflection of space due to the loop’s physical size and the meons’ action against and due to the background. The motion of the charges gives us the spin energy of the loops, which we describe as $\frac{1}{2} hw$, but is actually h for each meon, with the $\frac{1}{2}$ being part of the w . The mass and spin energies are equal and opposite.

To get a photon requires a loop and anti-loop to be stacked and rotating in the same direction (two lots of $\frac{1}{2} hw$). Then each meon/anti-meon in one loop chases its opposite partner in the other loop, forming a very short chain perpendicular to the plane of the loops. Photons can form longer chains by stacking, just like loops stack to make bosons and nucleons, and n photons in a stack have the same energy, as we calculate it, as one photon. So a photon moving at c is the result of the chasing of meons and anti-meons along the direction of travel, trying to reform zero mass black holes.

Due to the loop structure, the properties which need to be reversed in turning matter into anti-matter (meon type, twist orientation versus direction of meon travel, loop orientation, rotation direction) lead to only the sign of charge of a loop defining whether the loop is matter or anti-matter. So a battery is a matter/anti-matter device and the anti-loop of a spin $+\frac{1}{2}$ electron is a spin $+\frac{1}{2}$ positron. This means that a photon is a merged loop and anti-loop.

The background, being formed of zero mass black holes vibrating, rotating and translating affects the passage of loops by taking energy from them, and is affected by those loops by forming chasing chains due to the meons in the loops, dragging them, and are the way in which forces are carried, not bosons. Bosons are just short stacks of even loop number.

The un-merging of a lot of zero mass black holes is a big bang. The un-merged pairs form chains then loops. At some point physical contact causes the loops to expand in physical size whilst maintaining

meon momentum. This is inflation. Only if the difference in size between the original loops, at Planck frequency and mass, and the final largest –physical size loop (eg the electron) is large enough, will the expansion continue, because the largest-physical size loop has the smallest energy. The energy ‘released’ by the amount of inflation is available to drive the expansion of the loops formed by that amount of inflation.

Where an expansion fails, the loops formed during inflation cannot escape their mutual gravitation because they were not given enough outward energy by inflation and are very large in mass, also because of the too small amount of inflation. They collapse back towards their point of origin. But they cannot reform zero mass black holes, and form instead either a black hole or a galaxy, depending on whether there was initial rotation during their inflation or not. These failed inflations happen randomly throughout the universe over all ‘time’ and the proof can be seen where an object that is a moving part of our successful big bang can be observed physically adjacent to a stationary failed big bang relic – a black hole or galaxy – since their red shifts will be different, despite being in the same place. This is a mix of big bang and modified steady state ideas.

But space is not expanding, since the meons never change size. Our big bang is moving outward across the existing background of zero mass black holes and each photon is losing energy as it travels, proportionately almost exactly to the distance the photon has travelled, due to the spiral nature of the meons paths in a photon loop.

Black holes are better described as chain stars, because when a loop descends into a hole, it is stretched and broken into a chain. The loop size (mass) and spin energy are both reduced to zero as the loop is stretched and its frequency reduces as it descends into the hole and is finally broken. The charge and meon twist energies stay with the pairs in the chain. Inside the hole, the entering chain will get broken, mixed, form, reform continuously until a photon double loop of sufficiently large energy (smallest size) escapes. As it does so, it will lose a lot of its energy. This is how a black hole evaporates and where it gets its temperature from and how the previously entering loops’ information escapes in a different form. And because the meons are the densest black holes possible, there will be no singularity within any black hole formed from meons. There is no particular event horizon since the breaking of each loop into a chain depends on its individual properties, but it is mainly the original mass (size) of the loop which decides at what distance from the centre of the black hole it breaks.

So black holes are composites containing entropy, able to eject it as new symmetric-only particles. They are symmetry sieves which convert asymmetric loops, including dark matter, into symmetric photons. The photons could contain any number of pairs, but will always have the same frequency and spin for a specific frequency w . But only photons composed of three pairs will be able to stack with our matter, as when forming stable electron orbitals or when emitted or absorbed moving between stable orbitals.

For loops entering a black hole, the breaking of the loop is where time stops for that loop. Only loops have time and time only formed when loops did. For different big bangs, successful or unsuccessful, normal or dark matter, the only time the loops know is their own rotational rate. In such a system, without overall rotation of the universe, all centres of rotation are equal and there is no preferred central frame of reference.

Because there is only one particle/anti-particle that is used to construct all loops – matter, dark matter, fermions, bosons etc there can be no other universes. It is even more complex to explain, but all fundamental particles and composites made from them always have total energy of zero. Why they move as they do is because of the amount of the same type of energy that each particle has, and only that same energy type interacts.

Also every stable orbit is a zero overall energy state. When we measure gravitational orbits, we do not yet include the spin-spin kinetic energy interaction, so conclude that their overall energy is negative. Include spin and the total is zero.

The strong force is the action of the meons between loops in a stack and across stacks in a nucleus, and the colour force is the balancing of asymmetries of 1/6 charge positions around each loop, down the stack across all loops, to provide balance to the stack overall. The weak force is the physical replacement of an electron loop in a neutron stack by an incident neutrino loop of appropriate size and energy. Matter and anti-matter are created equally because the only property that differentiates completely a loop from an anti-loop is charge – which is always created equally in the un-merging of a zero mass black hole. So our atoms are neutral balances of matter and anti-matter, and batteries are matter/anti-matter sources. And interestingly, we are composed of the densest black holes possible.

It is also necessary to understand that there is no universal ‘space-time’, only space for stationary zero mass black holes and space-time for individual loops, whilst they are loops. For each meon, there is no time at all – everything is happening at the same instant for every meon in every loop and every stationary zero mass black hole. Our time is an illusion, albeit a very convincing one. For time travelling twins, the issue is one of the phase differences between the loops that they are each composed of. If they start out matched, they will end up different and that difference represents the effects of gravity or acceleration on the phase of their component loops, a measure of the time difference between the loops.

The use of SI units in their existing form hides that gravity is not the weakest force. The SI units paper shows through symmetry arguments that Planck’s constant h and the Gravitational constant G are both dimensionless ratios when dimensional analysis is used at property levels deeper than mass, length and time. The resultant adjustments shown to be needed for SI units produce much simpler sets of units which also solve the issue, for example, of why magnetic field H and magnetic inductance B have not previously had the same units.

The result shows that gravitational and charge fields have the same strengths when considered in fractional adjusted-Planck values. By showing that h and G are dimensionless, they can be understood to be unit-dependent ratios which can be eliminated from all equations by merging them within new adjusted SI units, although realistic physical size constraints suggest that h need not be eliminated. The implications are that mass and charge sizes, and distance, are not the properties which separate quantum and classical gravitational systems. The equivalence of gravitational and inertial mass is also shown in the SI units paper. The new type of dimensional analysis shows how to uncover any law of nature or universal constant and that the current set of properties of nature is missing two from the set, whose dimensions and units can be inferred.

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