A Relativistic Mechanism for the Formation of Matter From Pure Energy

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1.0 Introduction/Abstract

The current favorite in Cosmology for the formation of this Universe from a single "Big Bang" purports the idea that there was an object of Planck dimensions that exploded at a hyper-Relativistic velocity. It proposes that single body (call it the "Cosmic Egg") was initially pure energy. Later in its expansion the energy of that Big Bang became disperse enough to form matter. Though the degree of that dispersion necessary for that formation is largely undefined. Even the proposals that offer purport some definitions do not meet in logic.

This paper reasons from the Classic Relativity equations a mechanism for that formation and offers a source of the energy needed for that formation. While it makes a very specific presumption that our Space-Time reality is infinite, that is surely more reasonable than assigning it the limits modern science does. Assigning limits to our Universe – in Space and Time – have been proven incorrect for the entire history of Science. It is unreasonable to presume the limits of our observations now are the same limits we will have for the rest of eternity. We must always remember that the data we obtain is from whatever Local area can be observed with the current technology – it is never infinite.

2.0 Establishing a Light Speed Limit to Escape Velocity for Matter

The principal equation in General Relativity is:

$$Time' = Time/(1 - 2GM/rc^2)^{½}$$

Though there are expansions that can be made to that equation that are expanded more in my paper The General Relativistic Perspective, there is a very fundamental point that can be made through a very simple re-expression of the above.

Consider that:

$$Velocity_{Escape} = (2GM/r)^{½}$$

Another form of that equation could be:

$$Velocity_{Escape}^2 = 2GM/r$$

So a valid re-write of the General Relativity time distortion equation could be:

$$Time' = Time/(1 - (2GM/r * 1/c^2))^{½}$$
$$Time' = Time/(1 - Velocity_{Escape}^2 * 1/c^2)^{½}$$

Or

$$Time' = Time/(1 - Velocity_{Escape}^2/c^2)^{½}$$

If the same logic used in Special Relativity is applied, that could be interpreted to mean that there is a light speed limit to escape velocity. That is completely in concert with the fundamental principal of Relativity: the slowdown of Bosons. Surely the Graviton is a Boson that would be slowed down by Relativistic force that is gravitational in nature.

There are other arguments that can be applied to this supposition. The fundamental of Relativistic Time distortion is the slowdown of Photons. That slowdown would mean that the energy of those Photons would reduce their energy. That energy would not simply disappear, it is surely a reasonable postulate it would add to the Mass of any matter particles in its vicinity. There is, of course, a parallel equation in On the Electrodynamics of Moving Bodies:

$$m' = m/(1-v^2/c^2)^{.5}$$

The above equation has been confirmed in numerous particle accelerators.

So consider the following: the slowing of Photons (and presumably all Bosons) would mean an increase in the energy of matter particles. Conservation of matter/energy is one of the most fundamental tenets in all of Physics. So matter particles (presumably in General as well as Special Relativity) would gain Kinetic energy and begin moving faster. While there velocity would be limited to light speed, their mass could not be limited to anything. The matter particles could never have an infinite mass – there would be no theoretic limits to that mass.

What that would also mean is that, quite aside from the General Relativistic argument, if an object had no limit to its momentum/kinetic energy, there would be no escape velocity that could not be overcome. It is a Galilean fundamental that greater massed objects do not accelerate at a greater rate than the lesser ones. Just as an example, let us consider at what velocity an object would have to be to have twice the mass it would at an idealized rest perspective. It will be a simple equation, presuming the rest mass to be 1.0E0g and the Relativistic mass to be 2.0g:

$2.0E0g = 1.0E0g / (1 - v^2/c^2)^{½}$

$2.0E0g/1.0E0g = 1/ (1 - v^2/c^2)^{½}$

$2.0E0 * (1 - v^2/c^2)^{½} = 1$

$4.0E0 * (1 - v^2/c^2) = 1$

$4.0E0 - 4.0E0*v^2/c^2 = 1$

$- 4.0E0*v^2/c^2 = -3.0E0$

$4.0E0*v^2/c^2 = 3.0E0*c^2$

$v^2 = 3.0E0*c^2/4.0E0 = .75 * c^2$

$v = .75^{1/2}*c$

$v = 2.59627884E8$

Thus, the above body would have the momentum to overcome gravity of the body it was escaping from. Again, conservation of matter||energy would mean that the object would have a light speed escape momentum. As the object slowed its kinetic energy would always go down, but part of that kinetic energy would be its loss in mass. We know that it takes continually greater amounts of energy to accelerate matter particles, because more and more of the energy applied to that object goes to an increase in its mass. So the input of energy (at all velocities!) is results partly in its velocity, and partly in its mass. We also know that a greater mass object does not have a greater acceleration towards another object. It is simply because while the gravitational force for the object increases, it increases at exactly the same pace as the momentum of the object. For Relativistic objects, the acceleration would be the same whatever level of mass the object would be at. But that would mean that there would be a simple momentum loss would contradict one of the most fundamental aspects of our reality. So the object would slow in its escape, but not at the same pace as it would were there no relativistic distortion. It is a reasonable postulate that its Relativistic momentum would allow its escape. Fundamentally, the Big Bang does not require a completely unobserved spontaneous space expansion. The alternate explanation for observations of increasing red shift values with increasing distance is argued in **Frequency Decay Through Electromagnetic Radiation Absorption and re-Emission by Inter-Galactic Gases as an Alternate Explanation For the Hubble Constant** at http://vixra.org/abs/1402.0012.

3.0 A Proposed Matter Production Device

As proposed above, there would always be a limit of escape velocity to light speed. Though because of the fundamental difference in the equations, there would be no limit in the gravitational force. Let us simply examine the consequences of an object with a proposed Universe mass of 1.0E53 kg [$Universe_{Mass}$]. Though that number is unreferenced, it is a valid theoretical approximation of a value we have no direct information of. That Universe is in its maximum state of Entropy: it is solely energy, confined within the Schwarzschild barriers.

Surely it is agreed that such an S.O. could never have a light speed escape velocity. So if you presume an infinite reality, there would eventually come a time where, completely by chance, a spontaneous S.O. would form. For instance, we will presume that the mass of energy in the Universe using Dr. Einstein's classic matter/energy equivalence equation. The Schwarzschild radius of such an object would be:

$$Schwarzschild\ Radius_{Universe} = 2*G* Universe_{Mass} / c^2$$

So (presuming a Gravitational Constant – G – value of 6.67384E-11) the arithmetic form of that equation would be

$$Schwarzschild\ Radius_{Universe} = 2*6.67384E\text{-}11m^{3}\cancel{kg^{-1}s^{-2}}*1.0E53\cancel{kg}/(299\ 792\ 144\cancel{m}/\cancel{s})^2$$

$$Schwarzschild\ Radius_{Universe} = 1.48513280E26m$$

Or approximately: 15,697,882,535ly. The gravity at that point for a 1 kilogram object would be:

Gravity at $Schwarzschild_{Universe}$ = G* $Universe_{Mass}$ /Schwarzschild $Radius^2$

Gravity at $Schwarzschild_{Universe}$ = 6.67384E-11m^3~~$kg^{-1}s^{-2}$~~*1.0E53~~kg~~/(1.48513280E26~~m~~)^2

Gravity at $Schwarzschild_{Universe}$ = 3.02583478E-10m/s^2

According to current theory, the Relativistic distortion would be infinite at that point. The distortion at the S.O. plus one Planck length would be (presuming "Time" to be 1 second and a Planck length to be 1.616199*10^-35m). This is not at all a declaration for the real values in our Universe, simply a theoretical argument against the <u>absolute</u> validity of the General Relativity Time distortion equation:

Distortion at S.O. Plus $Plancklength_{Universe}$ = ~

1/(1 – 2*6.67384E-11m^3~~$kg^{-1}s^{-2}$~~*1.0E53~~kg~~/(1.48513280E26~~m+~~1.616199E-35~~m~~)* ~

(299,792,144^2)~~m~~/~~s~~)^{½}

Distortion at S.O. Plus $Plancklength_{Universe}$ = 3.03134403E30

The distortion one metre from the S.O. would be:

Distortion at S.O. Plus One $metre_{Universe}$ = ~

1/(1 – 2*6.67384E-11m^3~~$kg^{-1}s^{-2}$~~*1.0E53~~kg~~/(1.48513280E26~~m+~~1.0E0~~m~~)* ~

(299,792,144^2)~~m~~/~~s~~)^{½}

Distortion at S.O. Plus One $metre_{Universe}$ = 1.21866025E13

A slowdown in Time must lead to a reduction in the velocity of EM by the same factor. So what current theory is saying is that the velocity of EM radiation will be distorted by a factor of 3.03134403E30 to 9.88974332E-23m/s^2. Though that distortion will reduce to 1.21866025E13 one metre less 1 Planck Length farther out, and the velocity of the EM will accelerate to 2.46001414E-5m/s.

The above reasoning does not lead to a dismissal of Classic Relativity. What it suggests is that Relativistic distortion must be different from the perspective of the distorted body. That principal is incontestable. Consider that if Time slows in Special Relativity, then the apparent velocity from the Perspective of the moving body would be distorted to be greater than it was from an undistorted perspective. So that velocity could not be used. In my paper **The General Relativistic Perspective**[a] at http://vixra.org/abs/1306.0103 the equations are completely from an undistorted viewpoint – the gravitational constant, "G"; the mass of the body, "M"; the radius of the body, "r"; and the speed of light. Again, leave all the other variables aside and consider the fundamental Gravitational constant. There is debate as to the nature of the Gravitation Boson – the Graviton – but surely gravitational distortion would distort the energy of that force. In the paper referred to above, there is an equation that defines that distortion. It is reasoned directly from the General Relativistic time distortion equation.

$G_{nonGRPD}$ – the Gravitational Constant – G = 6.674286700~00E-11m^3 kg^{-1} s^{-2} – theoretically presumed exact to 100 decimal places when under no Relativistic distortion.

G_{GRPD} – the Gravitational force constant under Relativistic slowdown.

$Velocity_{GRPDescape}$ – the General Relativistic Escape velocity as measured from the distorted perspective.

$$G_{noGRPD} = G_{GRPD}/(1 + Velocity_{GRPDescape}^2/c^2)^{½}$$

In some ways, the G_{noGRPD} variable may seem illogical. How could a variable that must be measured in an environment where there is no Relativistic distortion – no gravity – be a valid measurement? In an ideal Gravitational measurement site, there could be no matter or energy to facilitate the measurement. But any contest of the above must also recognize that measuring the velocity of light is never done anywhere that there is no distortion. The distortion will match exactly the change in the measurement. While from an outside,

[a] **The General Relativistic Perspective**, http://vixra.org/abs/1306.0103

undistorted perspective, the constant will reduce, in some ways, that reduction would not be measurable from a point from within the distorted perspective.

This writer will not go into any further detail on development of the General Relativistic Perspective equations, but will repeat for emphasis. A theory reasoning a distortion of 3.03134403E30 at a point in space with a gravitational force of 3.02583478E-10m/s^2 is an incontestable argument that the theory is either wrong or incomplete. The above equation argues that the Relativistic Boson distortion is something that will happen gradually, reaching an infinite degree only when the radius of the object is zero – a supposition that is enormously more in the logic environment of Special Relativity. As there is such an enormous body of evidence that Dr. Einstein's equations are valid for non-Relativistically observation points it is perfectly reasonable to declare that they are valid - but incomplete. Though that particular for all human knowledge has been true for the entire history of learning.

3.1 An Argument for a Relativistic Mechanism for the Formation of Matter.

The speed of light is one of the most important constants in our Reality. While it defines the constants in the formation of energy from matter, a constant that has been confirmed throughout the existence of the theory, there has never been mechanism reasoned from it that offers an alternate. That is, a mechanism for the primary formation of matter from nothing but pure energy. The following proposition is not declared as the only fundamental mechanism for matter formation. But the criterions set in this mechanism are argued to be the absolute limits for occurrence of that transition.

The Planck constants are considered by some to be the most fundamental possible description of our reality. No aspect of our environment can be described with greater precisions than the precisions defined by the Planck Constants. If that were denied, then the most fundamental foundations of Quantum theory must be discarded from human thinking. Another fundamental that must be declared is velocity. It would not matter what mass you assign an object, it is not an object from the human perspective until there is motion associated with the object. That motion association includes any object within a distance that a Planck level interaction can take place. It would also have to include any Planck level motions within the components of the object.

So, like all Bosons, all matter particles must have a motion associated with them. What is the minimum motion of a matter particle? Would it be valid to say that it were the inverse of the maximum speed of reality? The inverse of a Boson could surely be argued to be a matter particle. There are forces, events & Relativistic distortions that increase the mass of matter particles. So the following proposal does not insist itself to be the only mechanism. But it is proposed as the inarguable basic mechanism, a theory for the beginning of the existence of matter. The Planck constants are defined in measurements made by matter objects. Simple energy does not reduce other energy. While there is a direct addition of any number of energies, there is no observed||theorized situation where two energy signals[ES]||Bosons opposite in direction and frequency will eliminate one another. There will be a Planck moment when the energies will disappear from observations. But the instant that Planck moment passes; the energies will re-appear, travelling apart from one another. Though if in

that Planck Moment a measurement were made of the opposing ES||Bosons , they would be reduced by whatever energy it took to make the measurement.

So let us propose a Planck level of energy. When the energy is at an undetectable level. Because of the Preservation of Matter/Energy, that energy must have a matter configuration. So what is the Planck velocity? It would seem an easy calculation: the Planck Length divided by the Planck Time:

$$\text{Planck Length} = (\hbar G/c^3)^{1/2} \cong 1.616199(97)\text{E-}35\text{m}$$
$$\text{Planck Time} = (\hbar G/c^5)^{1/2} \cong 5.39106(32)\text{E-}44\text{s}$$

$$\text{Planck Velocity} = \text{Planck Length} / \text{Planck Time}$$
$$\text{Planck Velocity} = (\hbar G/c^3)^{1/2} / (\hbar G/c^5)^{1/2}$$
$$\text{Planck Velocity}^2 = (\cancel{\hbar G}/c^3) / (\cancel{\hbar G}/c^5)$$
$$\text{Planck Velocity}^2 = c^2$$
$$\text{Planck Velocity} = c$$

But that calculation determines what we know through experimentation and theory to be the maximum possible velocity. So the Planck velocity is the maximum velocity for Bosons. It is then reasonable to postulate that the minimum possible velocity is the inverse: 1/c.

That Relativistic distortions slow the velocity of Bosons is an uncontestable fact in most of modern science. Though the degree and effects of that slowdown is something that will likely be contested at some level for the entire existence of learning. Gravity is a force that will both slow up and speedup down the velocity of Bosons in an entirely Classic Physics fashion – the only limits on that slowdown/speedup being zero velocity and light speed. Currently, there is no direct laboratorial evidence of either a velocity proceeding backwards in time, or a velocity greater than "c", though there endless pronunciations of their possibility.

So take the simple fact of the lessening of Boson velocity with gravitational force – at the same time, the slowing of Bosons with Relativistic force. Though it would add to the argument Readers do not need to consult the earlier referenced **The General Relativistic Perspective**

for reasonable consideration of the following postulate. The most maximally uncertain, maximally entropic reality possible with the above supposed [1.0E53kg] mass would be the distribution of that mass evenly through the volume of its S.O. sphere. The volume of that sphere would be:

$$\text{Volume Schwarzschild}_{\text{Universe}} = 4/3 * \pi * \text{Schwarzschild Radius}_{\text{Universe}}^3$$

$$\text{Volume Schwarzschild}_{\text{Universe}} = 4/3 * 3.14159265 * (1.48513280\text{E}26\cancel{\text{m}})^3$$

$$\text{Volume Schwarzschild}_{\text{Universe}} = 1.37209594\text{E}79\text{m}^3$$

So the density of that object would be:

$$\text{Density Schwarzschild}_{\text{Universe}} = \text{Mass}_{\text{Universe}} \,/\, \text{Volume Schwarzschild}_{\text{Universe}}$$

$$\text{Density Schwarzschild}_{\text{Universe}} = 1.0\text{E}53\text{kg} \,/\, 1.37209594\text{E}79\text{m}^3$$

$$\text{Density Schwarzschild}_{\text{Universe}} = 7.28812009\text{E-}27$$

Alternately, the density of that "Cosmic Egg", at the beginning moment of our reality, with a single Planck length diameter would be

$$\text{Volume}_{\text{Cosmic Egg}} = 4/3 * \pi * (\text{Diameter}_{\text{Planck Length}}/2)^3$$

$$\text{Volume}_{\text{Cosmic Egg}} = 4/3 * 3.14159265 * (1.616199\text{E-}35\text{m}/2)^3$$

$$\text{Volume}_{\text{Cosmic Egg}} = 2.21046236\text{E-}105\text{m}^3$$

Its density would be

$$\text{Density}_{\text{Cosmic Egg}} = \text{Universe}_{\text{Mass}} / \text{Volume}_{\text{Cosmic Egg}} /$$

$$\text{Density}_{\text{Cosmic Egg}} = 1.0\text{E}53\text{kg} / 2.21046236\text{E-}105\text{m}^3$$

$$\text{Density}_{\text{Cosmic Egg}} = 4.52394042\text{E}157\text{kg/m}^3$$

Its gravitational force would be

$$Gravity_{Cosmic\ Egg} = G^* Universe_{Mass} / (Diameter_{Planck\ Length}/2)^2$$
$$Gravity_{Cosmic\ Egg} = G^* 1.0E53kg / (1.616199E\text{-}35\cancel{m}/2)^2$$
$$Gravity_{Cosmic\ Egg} = 1.02198875E113m/s^2$$

Its Escape velocity would be

$$Escape\_Velocity_{Cosmic\ Egg} = (2^*G^* Universe_{Mass} / (Diameter_{Planck\ Length}/2))^{½}$$
$$Escape\_Velocity_{Cosmic\ Egg} = (2^*G^* 1.0E53kg / (1.616199E\text{-}35\cancel{m}/2))^{½}$$
$$Escape\_Velocity_{Cosmic\ Egg} = 4.69540834E60m/s^2$$

Entropy is one of the most incontestable facts of our reality. Given that, it is completely unreasonable for the suggestion of a 1.0E53kg mass object to form spontaneously from a reality we observe to be have an overall density of 7.28812009E-27kg/m^3. The proportion of that Cosmic Egg object to a proposed Schwarzschild reality would be very high. Since there are an unknowable number of environmental and/or Scientific Dictates (i.e. "increasing" Universe expansion) to include in any analysis, we will simply calculate the probability of Bosons to congregate to that degree of density:

$$Probability_{Cosmic\ Egg} = Volume_{Cosmic\ Egg} / Volume\ Schwarzschild_{Universe}$$
$$Probability_{Cosmic\ Egg} = 2.21046236E\text{-}105m^3 / 1.37209594E79m^3$$
$$Probability_{Cosmic\ Egg} = 1.61101151E\text{-}184$$

The validity of the Relativistic Perspective equations will (and should!) be contested by any who wish the advance of Science. But consider that under General Relativistic Persepective equations:

a) As Bosons congregate at a Relativistic level, they will both decrease in velocity and (because of conservation in matter/energy) increase in number.
b) Under Relativistic Perspective principles, the escape velocity will never reach or exceed light velocity.
c) The gravity that will compact the Bosons will have no limit – because of the differences in the Force and Escape equations - meaning the slowdown and compression of those Bosons could endlessly increase.
d) If the above is accepted, then it is reasonable to postulate that at some point compression and the slowdown would lead to some form of matter. This writer refuses to speculate on what form it would be in, simply declare that the energy would go into a metamorphosis into matter. The object would no longer be White but Grey – halfway into a transition into a matter object.
e) While some of the free energy will go through that metamorphosis into matter, Fermat's Uncertainty Principle would dictate that not all of it would. Particularly when there are matter objects/particles there to endlessly absorb free energy.
f) So the newly formed matter would move more and more quickly, colliding an unknowable (but finite) number of time with other newly formed matter particles.
g) Until the particles reached a point where both their velocity and the freeness of space on the vector of that velocity would allow escape.
h) All the while this action was taking place, more and more Bosons surrounding the Grey (beginning to move, more and more, into a Black Schwarzschild) object would be absorbed and concentrated at the centre.

Depending on the density of matter/energy around the S.O., it would eventually reach the point where the amount of matter/energy it absorbed would equal the amount it expelled. That equinox status would remain, until the surrounding matter/energy around the S.O. changed, and it moved into an increasing or decreasing size status.

The would be occasion when the increasing size status would be increased by the spontaneous development of a new generation of independent S.O.'s formed from the expelled matter from existing ones. Together, they would form greater and greater gravitational engines for the creation of more Cosmological scale objects

4.0 Summary

The current favorite in Cosmology for the formation of this Universe from a single "Big Bang" purports the idea that there was an object of Planck dimensions that exploded at a hyper-Relativistic velocity. It proposes that single body (call it the "Cosmic Egg") was initially pure energy. Later in its expansion the energy of that Big Bang became disperse enough to form matter. Though the degree of that dispersion necessary for that formation is largely undefined. Even the proposals that offer purport some definitions do not meet in logic.

This paper reasons from the Classic Relativity equations a mechanism for that formation and offers a source of the energy needed for that formation. While it makes a very specific presumption that our Space-Time reality is infinite, that is surely more reasonable than assigning it the limits modern science does. It reasons a mechanism for the formation of matter bodies from an environment of nothing but pure energy over an indefinable span of time. Because of a light speed limit to escape velocity, and a presumed variance of matter/energy throughout our reality, there will be an infinite variance of times when the matter increases or the matter decreases. The data we have for reasoning aspects of our entire Cosmos will always be limited by whatever reliable observations we can make of our Local Universe.