Article

Using Lorentz violation for early universe GW generation due to black hole destruction in the early universe as by Freeze

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Abstract: **We are using information from a paper deriving** a Lorentz-violating energy-momentum relation entailing an exact mo_mentum cutof as stated by G. Salesi . Salesi in his work allegedly defines Pre Planckian physics, whereas we restrict our given application to GW generation and DE formation in the first 10^-39s to 10^-33s or so seconds in the early universe. This procedure is inacted due to an earlier work whereas referees exhibited puzzlement as to the physical mechanism for release of Gravitons in the very early universe. The calculation is meant to be complementary to work done in the Book "Dark Energy" by M. Li, X-D. Li, and Y. Wang, and also a calculation for Black hole destruction as outlined by Karen Freeze, et. al. The GW generation will be when there is sufficient early universe density so as to break apart Relic Black holes but we claim that this destruction is directly linked to a Lorentz violating energy-momentum G. Salesi derived, which we adopt, with a mass m added in the G. Salesi energy momentum results proportional to a tiny graviton mass, times the number of gravitons in the first 10^-43 seconds

Keywords: Minimum scale factor, cosmological constant, DE,

1. Introduction

What we are doing here is to utilize having the results of Salesi [1] as to a given actual Lorentz-violating energy-momentum relationship which we utilize to elucidate graviton contributions to an early universe derivation of DE, and the cosmological constant. The idea for this is based upon a referee and academic editor who felt puzzled as to the work done earlier [2] which postulated the existence of a breakup of primordial black holes as by itself contributing to DE, and this publication is intended to fill in the actual conceptual gaps which lead to [2] having such a rocky reception. [2] was initiated specifically because work done in [3] as to a multiverse, was not well received, for reasons the author was told as in the eight equation of [3] one reviewer made the utterly outrageous statement that the author was modeling the Universe as a harmonic oscillator which is a canard since that equation was comparing the first integral of the Einstein- Hilbert action to an action for an initial spherical well, as by John Klauder as cited by the author in [4] so called enhanced quantization techniques[5].

In a nutshell, the author is trying to defuse mythologies which are in the way of a treatment of DE, which have been put in place by reviewers and a particular academic editor and the latest would allow for understanding the author's use of Miao Li, et.al. [6]

In particular, the author hopes that judicious use of [1] will allow as to the use of [7] Which several academic editors and reviewers took out of context and trivialized

This will lead us to utilize the statement given by [8] linking the cosmological constant and massive gravity as given by

 doi:10.20944/preprints202104.0657.v1

$$m_g = \frac{\hbar\sqrt{\Lambda}}{c} \tag{1}$$

This release of conditions for massive gravity should be in line with what is in Freeze [7]

$$\rho_{BH-breakup-density} = \frac{M_P^4}{32\pi}\cdot\left(\frac{M_P^4}{m^4}\right)\cdot\frac{1}{\left|1+3\omega_Q\right|} \tag{2}$$

If the conditions of an early universe, are greater than this value, for Eq.(2)[6] then according to Freeze, et.al. primordial black holes would break apart. We state that this break up of primordial black holes would be enough to create an initial "sea" of gravitons, due to Eq. (1) which would then add up to be in effect a value for a sufficient number of early universe gravitons, which would be added up per unit volume, to in fact sum up to an energy density equivalent to Eq.(1) so we have massive gravitons and DE. Hence we will be adding up the number of gravitons which may be released due to Eq. (2) and [9] which states the number of gravitons which may be emitted due to a black hole as given in it's page 47 is .1 percent of emitted energy from a nonrotating black hole. Keep in mind that this is for black holes, as given in [9] with mass

$$M_{primordial-black-hole} \approx 10^{15}\cdot\left(\frac{t}{10^{23}s}\right) grams \tag{3}$$

For a **10^-5 gram** black hole, t would have to be about **10^-43** seconds, and according to inflation expands space by a factor of 10^26 over a time of the order of **10^-43** to **10^-32** seconds. Meaning we had 10^-5 gram black holes at the start of inflation, and at the time the density of space would be greater than Eq. (2) we would have a breakup of black holes if we had space-time density greater than or equal to about Eq. (2) then we have .1 % of the mass of the broken BH contributing to gravitons, which after we review it may be relevant to Eq. (1) above. One Planck mass is about 10^-5 grams. And it is worth noting in our development when we go past inflation, that we have Black holes growing to the value of about 1 grams, after 10^-40 seconds which is for a radii of approximately 1 centimeter , whereas we can and will define Black holes of 10^-5 grams which would be for less than a centimeter radii just after the start of inflation.

Unfortunately due to an unnamed editor, this picture as attested by Karen Freeze was deemed insufficiently rigorously motivated, and the fact it was put up and deemed allegedly not rigorous, means that we will be forced to have the backup done by [1] as stated. It is important to keep in mind that this was put in to give substance to the modeling given by [6] which is in both [2] and [3]

$$\begin{aligned}&\frac{1}{2}\cdot\sum_i \omega_i \equiv V(volume)\cdot\int_0^{\hat{\lambda}}\sqrt{k^2+m^2}\,\frac{k^2dk}{4\pi^2}\approx\frac{\hat{\lambda}^4}{16\pi^2}\\ &\xrightarrow[\hat{\lambda}=M_{Planck}]{}\rho_{boson}\approx 2\times10^{71}GeV^4\approx10^{119}\cdot\left(\rho_{DE}=\frac{\Lambda}{8\pi G}\right)\end{aligned} \tag{4}$$

In stating this we have to consider that $\rho_{DE}=\frac{\Lambda}{8\pi G}\approx\hbar\cdot\frac{(2\pi)^4}{\lambda_{DE}^4}$, so then that the equation we

have to consider is a wavelength $\lambda_{DE}\approx10^{30}\ell_{Planck}$ which is about 10^{30} times a Plank radius

of a space-time bubble which we discuss in [2] as a start point for a nonsingular expansion point for Cosmology, at the start of inflation with the space-time bubble of about a Plank length radius we have

to consider is a wavelength $\lambda_{DE}\approx10^{30}\ell_{Planck}$ which is about 10^{30} times a Plank length radius

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of a space-time bubble [3] as a nonsingular expansion point for Cosmology, at start of inflation with the space-time bubble of about a Plank length radius in size. . Having said that

$$\lambda_{DE} \approx 10^{30} \ell_{Planck} \tag{4a}$$

And then we can write up having

$$\rho_{DE} = \frac{\Lambda}{8\pi G} \approx \hbar \cdot \frac{(2\pi)^4}{\lambda_{DE}{}^4} \tag{4b}$$

This is going to create difficulties which is going to lend us to utilize [1] directly and more so we have a way to refine the argument given in Eq. (4), Eq. (4a) and Eq. (4b). The UNKNOWN academic editor is making this next step compulsory

2. Making Use of [1] and the use of Lorentz violation, as in [1] to define more precisely the contribution of Gravitons to both DE, due to the breakup of Black Holes

To do this we need to review the Lorentz violating energy-momentum relationship. In short we have that

$$E^2 = p^2 + m^2 - \tilde{\lambda} p^3 \tag{5}$$

Where the positive LV parameter $\tilde{\lambda}$ is usually assumed of the order of Planck mass, λ ~ 1/M(Planck.mass). This Lorentz violating energy-momentum relationship leads to, according to [1]

$$d\rho = \frac{8\pi p^3 c}{h} \cdot \frac{\sqrt{1 + \frac{m^2}{p^2} - \tilde{\lambda} p}}{\exp\left(\left[\frac{cp}{k_B T_{temp}}\right] \cdot \sqrt{1 + \frac{m^2}{p^2} - \tilde{\lambda} p}\right) - 1} \cdot dp \tag{6}$$

$p \approx 1/\tilde{\lambda}$ is used if we integrate, Eq. (6) and if we use the first order Romberg numerical integration scheme as given in [10], page 695, so then for high temperature

$$\begin{aligned} \rho &\approx \frac{8\pi M_P{}^3 c}{h} \cdot \frac{\sqrt{\frac{m^2}{M_P{}^2}}}{\exp\left(\left[\frac{cp}{k_B T_{temp}}\right] \cdot \sqrt{\frac{m^2}{M_P{}^2}}\right) - 1} \\ &\approx \frac{4 M_P^2 c}{\hbar} \cdot \left(\left[\frac{cm}{k_B T_{temp}}\right] - \frac{1}{2}\left(\frac{cm}{k_B T_{temp}}\right)^2 \right) \\ &\xrightarrow[k_B = c = \hbar = M_P = 1]{} 4 \cdot \left(\left[\frac{m}{T_{temp}}\right] - \frac{1}{2}\left(\frac{m}{T_{temp}}\right)^2 \right) \end{aligned} \tag{7}$$

We will then in the next section interpret Eq. (7) when we set

$$m \approx m_g \cdot N_g \tag{7a}$$

3. Interpreting Eq. (7) when Eq. (7a) is used, so as to ascertain the number of Gravitons

We are then looking at [1]

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$$\rho \approx \frac{4M_P^2 c}{\hbar} \cdot \left(\left[\frac{cm_g N_g}{k_B T_{temp}} \right] - \frac{1}{2} \left(\frac{cm_g N_g}{k_B T_{temp}} \right)^2 \right) \tag{7b}$$

Using the Planck units renormalized such that $k_B = c = \hbar = M_P = 1$, we have that we are looking at resetting Eq. (7b) so that the above will be roughly

$$\rho \approx 4 \cdot \left(\left[\frac{10^{-65} N_g}{\left(T_{temp} / T_P\right)} \right] - \frac{1}{2} \left(\frac{10^{-65} N_g}{\left(T_{temp} / T_P\right)} \right)^2 \right) \approx 10^{-60} \tag{7c}$$

We then can up to a modeling round off make the following approximation

$$\left(\frac{10^{-57} N_g}{\left(T_{temp} / T_P\right)} \right)^2 - 2 \cdot \left[\frac{10^{-57} N_g}{\left(T_{temp} / T_P\right)} \right] + 4 \cdot 10^{-60} \approx 0 \tag{7d}$$

'This value of Eq. (7d) will lead to approximately if $\left(T_{temp} / T_P\right) \sim 1$

$$N_g \approx 10^{57} \cdot \left(1 \pm \left(1 - 2 \cdot 10^{-60}\right)\right) \approx 2 \cdot 10^{57} - 2 \cdot 10^{-3} \tag{8}$$

What is Eq. (8) saying ? We ascertain Eq. (8) especially if Eq. (7c) is set to reflect upon the number of Gravitons which may give us Dark Energy. In evaluating Eq. (8) we have that $T_{temp} \le T_P$ for reasons we will go into in the next section

4. Interpreting Eq. (7) and Eq. (8) in terms of Dark Energy, if Gravitons produce DE and how this ties in with the Freeze suggestion as to the breakup of Black holes for gravitons in first 10^-27 seconds.

Roughly put, it means that there is about 1000 to 10,000 mini black holes , in between 10^-43 seconds to 10^-32 seconds which would be destroyed so as to release about 10^57 gravitons, equivalent to about 1 Planck mass. In terms of space-time this would be commensurate to a density of $7 \times 10^{-30} g / cm^3$, or having a radii of 1000 kilometers for a volume of space for about $7 \times 10^{-6} g / (1000km)^3$ of density for approximately 10^57 gravitons to have one Planck mass of gravitons released in a volume of space for a radii of about 1000 kilometers after 10^-32 seconds

This would be about 1000 to 10,000 destroyed mini black holes in less than 1.057 times 10^-10 of a light year in radial distance for 1 Planck mass of radiated gravitons, in far less than 10^-1 seconds in cosmological expansion

The Universe was once just the radius of the Earth-to-the-Sun, which happened when the Universe was about a trillionth (10^–12) of a second old, ,i.e. a sphere of 149.6 million km and the region for about 10^-43-10^-40 seconds was about 10^3 kilometers in radial size

It is important to keep these figures in line and visualize how a sphere of about 10^3 kilometers in radial size would be able to have 10^57 gravitons released in order to have DE formed and possibly then the Cosmological constant. Keep in mind the assumed radii of the universe today is 4.4 × 10^23 km

5. What 10^57 gravitons in a radius of 1000 kilometers means in terms of DE and a Cosmological constant calculation

We will first of all refer to an early universe treatment of the uncertainty principle is, in the startup of inflationary cosmology [11]

Set $$a(t) = a_{initial} t^{\gamma} \tag{9}$$

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$$\rho \approx \frac{\dot{\phi}^2}{2} + V(\phi) \equiv \frac{\gamma}{8\pi G} \cdot t^2 + V_0 \cdot \left\{ \sqrt{\frac{8\pi G V_0}{\gamma(3\gamma - 1)}} \cdot t \right\}^{\sqrt{\frac{\gamma}{4\pi G}} - \sqrt{\frac{8\pi G}{\gamma}}} \quad (10)$$

$$V = V_0 \cdot \left\{ \sqrt{\frac{8\pi G V_0}{\gamma(3\gamma - 1)}} \cdot t \right\}^{\sqrt{\frac{\gamma}{4\pi G}} - \sqrt{\frac{8\pi G}{\gamma}}} \quad (11)$$

Also we will set

$$\rho \approx \frac{\dot{\phi}^2}{2} + V(\phi) \equiv \frac{\gamma}{8\pi G} \cdot t^2 + V_0 \cdot \left\{ \sqrt{\frac{8\pi G V_0}{\gamma(3\gamma - 1)}} \cdot t \right\}^{\sqrt{\frac{\gamma}{4\pi G}} - \sqrt{\frac{8\pi G}{\gamma}}} \quad (12)$$

The value of time t will be set as t ~ (10^-32 s/ t(Planck)) whereas we can utilize the ideas of having Planck time set ~ 5 x 10^-44 seconds, hence, t ~ 10^12, in Planck Units, whereas $\hbar = G = \ell_P = m_P = k_B = 1$, so then we will have, in this situation , Eq.,(12) as reset as [11]

$$\rho \approx \frac{\gamma \cdot (10^{24})}{8\pi} + V_0 \left\{ \frac{8\pi \cdot V_0 \cdot (10^{12})}{\gamma \cdot (3\gamma - 1)} \right\}^{\frac{1}{2}\left(\sqrt{\frac{\gamma}{\pi}} - 4 \cdot \sqrt{\frac{\pi}{\gamma}}\right)} \approx \frac{E_{effective}}{(1000 Km)^3} \quad (13)$$

$$\approx \frac{E_{effective}}{(6.25 \times 10^{40} (\ell_P = 1))^3}$$

The interesting thing, is that the factor of roughly 10^-120 shows up in this situation so as to imply that there may be some linkage between setting the effective energy as roughly some proportional power value of Planck Mass. Taking into consideration as to what was done in terms of an earlier document as to Planck mass, consider the afore mentioned DE density

$$10^2 m_P(gravitons) \Rightarrow 10^{67} gravitons \quad per \quad 10^5 m_P(black - hole) \quad (14)$$

6. Making DE equivalent to a sea of initial gravitons, in regime 10^-43 to 10^-32 seconds

Roughly put, one hydrogen atom is about 1.66 times 10^-24 grams. The weight of a Massive graviton is about 10^-65 grams [8][9], hence we are talking about 10^-22 grams, or about 10^44 gravitons, with each graviton about 6×10^{-32} **eV/c^2 After 10^-27 seconds, the following in the set of equations given below are Equivalent, and that these together will lead to a cosmological Constant,** Λ of the sort which we will be able to refer to later

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$$1 \quad graviton \approx 10^{-65}\, g \tag{14a}$$

$$M_{PBH}\left(10^{-32}\right) \approx 10^{15} \times \left(\frac{10^{-32}\, s}{10^{-23}\, s}\right) g \approx 10^{6}\, g \approx 10^{11} M_{P} \tag{14b}$$

$$M_{PBH}\left(10^{-38}\right) \approx 10^{15} \times \left(\frac{10^{-38}\, s}{10^{-23}\, s}\right) g \approx 10^{0}\, g \approx 10^{5} M_{P} \tag{14c}$$

If so then, using Eq. (14c), a 10^5 Planck mass sized black hole if it has 1/1000 of its mass converted into gravitons, would have 10^2 time Planck mass = 10^63 gravitons, i.e. for 10^63 gravitons which would occur for 10^-38 seconds.To match the restrictions as given in Eq. (7d) and Eq.(8) we need to look at what would allow for 10^57 gravitons, instead of 10^63 gravitons. This would entail having

$$M_{PBH}\left(10^{-43}\right) \approx 10^{15} \times \left(\frac{10^{-43}\, s}{10^{-23}\, s}\right) g \approx 10^{-5}\, g \approx 1 M_{P} \tag{14d}$$

Eq.(14d) is in fidelity with having , if 1/1000 of its mass converted to gravitons, a situation where there would be 10^57 gravitons. At a time of 10^-43 seconds. We are then examining what happens at the end of inflation.

The supposition I have is that one can use 1/1000 of the mass as given in Eq. (14d) for Gravitons and to thereby have 10^-8 g for Gravitons, per black hole of mass 10^-5 g

If one has say 10^57 gravitons , for a 1000 kilometer regime as say in the first 10^-32 Seconds we then have for 10^-65 g per graviton, we are then having for gravitons a value of to be diverted to 10^-8 g per black hole

TABLE 1, inputs into forming DE if one is

Assuming uniform distribution of BH to

Be broken up by Karen Freeze model as

Given in the following Table 1

Table 1, summary of infiationary and post inflationary information

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Number of black holes,	Mass of black hole of size 1 Planck mass set aside for gravitons	Mass of black hole for 10^8 gravitons	Radii of proto universe
10^8	10^-8 grams	10^-5 g = 1 Planck mass	1000 Kilometers
Volume of Universe is 10^3 kilometers, cubed	Starting range for Mass of black hole for Gravi-tons	Assumed to be starting range of BH masses, at about 10^-43 seconds	From less than a meter to 1000 Kilometers for constructing black holes which may be torn asunder by Karen Freeze's criteria

Assuming that gravitons contribute to the Dark Energy value will lead to us using the Karen Freeze model, with gravitons being released in the early universe by the breakup of early universe black holes which have a maximum value of about 1 g, as opposed to the value of the Sun which has about 10^33 grams, in first 10^-32 seconds. The divergence from the standard model can be seen in postulating a non singular start to the universe and a simple way to do it, as follows Assume at the beginning, one has a spherical shell defined by a volume in the regime of radial space defined by $a-\in \leq r \leq a+\in$ [12]

$$V_{\in} = \frac{8\pi \in}{3} \cdot \left(3a^2 + \in^2\right) \qquad (15)$$

And then for when one has if one has a heat strength of A, for this radial 'shell' $S_{\in}$

$$\delta_{A,\in}(r) = \begin{cases} A/V_{\in} & if\ r\varepsilon S_{\in} \\ 0 & otherwise \end{cases} \qquad (16)$$

Then one has the following "integration" in the region of 'space-time'

$$\int_0^{2\pi}\int_0^{\pi}\int_{a-\in}^{a+\in} \delta_{A,\in}(r)\tilde{r}^2 \sin\phi\, d\tilde{r}\, d\phi\, d\theta = A \qquad (17)$$

Following the line of reasoning, we will be examining briefly how this bubble-shell start to cosmology could commence, and how to interpret both Eq. (16) and Eq. (17) and how to make the reset value of when the universe started, and its subsequent inflation in sync

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with all the formulas in this document: This value of A would be say the beginning set of values of say the point of astrophysics for the breakup of black holes after the end of the inflationary era

7. What 10^57 gravitons in a radius of 1000 kilometers means if we Go to the Rosen early universe cosmology.

Let us first recall the Shalyt-Margolin and Tregubovich (2004, p.73) [13] , Shalyt-Margolin (2005, p.62) [14], [15]

$$\begin{aligned}
&\Delta t \geq \frac{\hbar}{\Delta E} + \gamma t_P^2 \frac{\Delta E}{\hbar} \Rightarrow (\Delta E)^2 - \frac{\hbar \Delta t}{\gamma t_P^2}(\Delta E)^1 + \frac{\hbar^2}{\gamma t_P^2} = 0 \\
&\Rightarrow \Delta E = \frac{\hbar \Delta t}{2\gamma t_P^2} \cdot \left(1 + \sqrt{1 - \frac{4\hbar^2}{\gamma t_P^2 \cdot \left(\frac{\hbar \Delta t}{2\gamma t_P^2} \right)^2}} \right) = \frac{\hbar \Delta t}{2\gamma t_P^2} \cdot \left(1 \pm \sqrt{1 - \frac{16\hbar^2 \gamma t_P^2}{(\hbar \Delta t)^2}} \right)
\end{aligned} \tag{18}$$

For sufficiently small γ. The above could be represented by[3] [14]

$$\begin{aligned}
&\Delta E \approx \frac{\hbar \Delta t}{2\gamma t_P^2} \cdot \left(1 \pm \left(1 - \frac{8\hbar^2 \gamma t_P^2}{(\hbar \Delta t)^2} \right) \right) \\
&\Rightarrow \Delta E \approx either \frac{\hbar \Delta t}{2\gamma t_P^2} \cdot \frac{8\hbar^2 \gamma t_P^2}{(\hbar \Delta t)^2}, or \frac{\hbar \Delta t}{2\gamma t_P^2} \cdot \left(2 - \frac{8\hbar^2 \gamma t_P^2}{(\hbar \Delta t)^2} \right)
\end{aligned} \tag{19}$$

This would lead to a minimal relationship between change in E and change in time as represented by Eq. (19), so that we could to first order, say be looking at something very close to the traditional Heisenberg uncertainty principle results of approximately

$$\Delta E \approx \frac{\hbar \Delta t}{2\gamma t_P^2} \cdot \frac{8\hbar^2 \gamma t_P^2}{(\hbar \Delta t)^2} \equiv \frac{4\hbar}{\Delta t} \tag{20}$$

Or

$$\Delta E \Delta t \approx 4\hbar \tag{21}$$

Having brought this up, let us then go to the Rosen [16] version of cosmology, and this needs explanation due to its rescaling of the values of the comology time and temperatures involved.

The key point of this mini chapter will be to summarize derivation of the space-time temperature [16]

$$T = (\rho_F / \sigma)^{1/4} \cdot \frac{\breve{a} r^7}{(\breve{a}^4 + r^4)^2} \tag{22}$$

With $\breve{a} = 10^{-3} cm$, $(\rho_F / \sigma)^{1/4} = 1.574 \times 10^{32} K (kelvin)$

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Then according to [2], the initial temperature is

$$T_{initial} = 2.65 \times 10^{-180} K\left(kelvin\right) \tag{23}$$

Whereas the temperature where one has the breakup of Primordial black holes starting is at

$$T_{black-hole-breakup-starts} = 7.41 \times 10^{31} K\left(kelvin\right) \tag{24}$$

Whereas we start the derivation of Eq. (22) in reference [2], and the extreme value of the temperature T for breaking up black holes, again by [2] leads to how black holes may contribute to the grown of DE if we have graviton production, so we consider when a body of mass m and radius R break apart. As given in [2] by an argument given by Freeze, we have then that if R(radius) is between 1 meter to say 1000 Kilometers this mass m breaks up for m as given by

$$m \approx \frac{8\pi R\left(radius\right)^{3} \cdot \rho}{3} \tag{25}$$

Here, the density function is given by Eq. (12) and Eq.(13), for our application and also we obtain for black holes a break up criteria for mass m Black holes if

$$m \approx -\left(\frac{4\pi\rho}{3}\right) \cdot \left(1 + 3 \cdot \frac{\rho_G}{p_G}\right) \cdot \frac{8m^3}{M_P^6} \tag{26}$$

So we can have the start of breakup of black holes, if we have gravitons from 1/1000 of the mass of given black holes, and if black holes contribute DE according to when pressure is approximately equal to the negative value of the density which would lead to a Black hole contribution of Eq. (27) to DE. As given below.

$$DE - from - black - holes = 7 \times 10^{-30} g / cm^3 = 7 \times 10^{-6} g / (1000km) \tag{27}$$

This rough value of DE, as given in Eq. (27) will be directly compared to what we can expect as far as applying in Eq.(21) as to comment directly on the Δt time interval for the active generation of DE in the early cosmos.

Keep in mind that J. W. Moffat in [17] postulated in the initial phases of cosmology a situation for which we have no conservation of energy, and in fact this is exactly the situation we could be portraying here , that is if [2] and the description of the Rosen cosmology as in [16] are not wrong

Quote, from [17]

The spontaneous symmetry broken phase will induce a violation of conservation of energy and explain the generation of matter in the very early universe

End of quote

This would be doable if the initial phases of creation of the Universe follow [16] and if we utilize, initially a near zero temperature start regime in the early universe, as in [16]. The early universe will have an energy input via thermal inputs of a value commensurate with[2]

$$E(thermal - energy) = \frac{d(\dim) \cdot k_B \cdot T_{universe}}{2} \tag{27}$$

8. Conclusion: Using Eq. (27) in conjunction with reference [16], [17] and Equation [5] for symmetry breaking and its possible tie in with DE

According to [17]

Quote

The spontaneous symmetry breaking mechanism in the vierbein gauge formalism has 3 massless degrees of freedom associated with the O(3) rotational invariance, and 3 massive degrees of freedom associated with the broken Lorentz "boosts". The massive quantum gravity in 3 + 1 dimensions can satisfy unitarity and be renormalizable, in contrast to the D = 4 quantum gravity which will violate unitarity if renormalizable [18]

End of quote

In short, the idea in the presentation I am doing is that there would be a massless situation until after the turn about point of thermal heating of the Big Bang universe, and this would correspond to symmetry breaking precisely due to the Eq. (27) formulation allowing for a massless regime of space-time before the end of inflation, whereas after the end of inflation, we can use the black hole destruction idea given in [7] directly so as to commence

After we have this value satisfied, set from Eq. (11) and Eq. (12) setting up the formulation of conditions for the creation of DE according to which we are looking at in the regime of space-time from less than a meter in radii to 1000 km in radii we have the formation of DE with the given frequency, for setting up DE, and then by default the Cosmological constant,.

$$V\left(\phi(t)\right) \approx \omega_{Graviton-generated-DE} \tag{28}$$

Using the ideas of [17] and [18], the Lorentz violation would ensue in this situation as largely a biproduct of the situation outlined in [17] whereas on page 4 of that article we have

Quote

At the Planck energy E(Planck) the local Lorentz vacuum symmetry is spontaneously broken. We postulate the existence of a field, φ, and assume that the vacuum expectation value (vev) of the field, < φ >, will vanish for for E = Ec < E(Planck) or or at a temperature T < Tc ∼ M(Planck)

End of quote

We argue that if the build up of temperature is commensurate with [16] occurs in an early universe and that if we have no DE before the end of inflation and that if DE commences in being created with the use of Eq. (28) for the start of DE and the breakup of black holes, via the mechanism brought up by [16]. Mofatt appeals to a generalization of the Wheeler De Witt equation, via complex time whereas our approach takes as its starting point for Lorentz symmetry breaking an influx of "heat" via [16] as well as then applying the nonlinear dispersion relationship given in Eq.(5) which is allowed to commence in full generality at the "turning point" of thermality which Rosen and Israelit conceived of.

Furthermore we should investigate if there is a linkage in any sense between Eq. (28) and the ideas brought up by Novello [8] which we regard as significant and worthy of review in their own right. And we will be investigating if [19] brings up issues which are relevant to future inquires in this matter so presented . We also state that we are now assuming an interlude of quantum involvement with this problem if and when Eq. (21), the deformed relativity modifications of the HUP are involved, as we claim they will be involved, especially after the turn about regime where temperatures of the Universe cease to be monotonically rising, and the breakup of primordial black holes commences.

The author is aware of prior refereeing, as in opposition to [2] and states that a timely use of Eq. (15), Eq. (16) and Eq. (17) may prove useful in ascertaining a linkage between a pre Planckian Universe state, and the Universe as of today. More of which may be introduced in a timely fashion by the author in future publications. Plus [20].

Acknowledgement: work is supported in part by National Nature Science Foundation of China grant No. 11375279

The author declares that there is no conceivable conflict of interest in this document

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