Variable Speed of Light due to Space-Time Curvature Difference

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Abstract

In special relativity speed of light is constant for all observers at any frame of reference but as Einstein proved later in some of his papers [1] this is not the same case in general relativity when you have an accelerated frame of reference i.e. a deference in space-time curvature then the speed of light will be different for only a non-local observers, so by following this line of work I manage to confirm and develop Einstein work.

I found that the minimum mass to affect space-time is half Planck mass and I name it At-Tariq condition because in black hole the multiples of this ratio will create a higher-time dimensions and it will act as if the event horizon hammering towards the singularity

Then I use it to solve some important problems in general relativity such as

- Calculate the cosmological constant using the quantum field fluctuations with an accuracy of (93.5%) of the average accepted experimental results i.e. theoretical calculations($\Lambda \cong -1.4028 \times 10^{-9}$ $(\mathrm{J.m^{-3}})$.
- A proper solution to the vacuum catastrophe.
- Calculating the dark matter density using third order quantum field fluctuations within high accuracy from the average accepted experimental results i.e. theoretical calculations.

$$; \text{Dark matter density} = 5.3964586 \times 10^{-27}; \left(\mathrm{kg.m^{-1}.(s.c)^{-(4)}}\right) \equiv (\mathrm{kg.m^{-3}})$$

Experimentally the dark matter density in the universe is around $(5.423 \times 10^{-27}; (\mathrm{kg.m^{-3}}))$ in the assumption of a flat universe then this will put our results to be within an accuracy of [96%] from the average current experimental values.

- Proving the effect of the gravitational blue shift of a gravity well, on the electric permittivity of free space ($\varepsilon_\circ$)through both mathematical derivation and experimental evidence using a vertical variation of the Michelson-Morley experiment.
- Finding a definite mathematical solution for the black hole singularity.
- Finding a definite mathematical solution for the big bang singularity at $(t \leq 0)$ in cosmological constant form and driving the gravitational constant from it.
- Constructing new black hole thermodynamics and finding the entropy of the vacuum.
- Constructing Newton universal law of gravity from the Schrödinger equation.
- A way for altering and manipulating space-time through cooperation between the relativistic mass and Schwarzschild metric to increase its curvature through what I like to name "the hoofing effect".

2. Introduction:

Historically special relativity deals with flat space-time i.e. constant velocities so it cannot describe acceleration and in particular the acceleration of frame of references since gravity is equvilant to the acceleration of frame of references[2].

So Einstein upgrade his theory of special relativity to contain the acceleration of frame of references, Einstein name it general relativity since it's a generalization for the special relativity.

In special relativity the speed of lght is allways the same for all observer but in general relativity then we have a littel difrent situation according to Einstein, in his scientific research paper entitled 'On the influence of gravity on the propagation of light' published in Annalen of Physiks (Volume 35) in June 1911, for a photon

[1] A. Einstein, On the ınfluence of gravitation on the propagation of light. Annalen of Physiks 35, 898-908 (1911). (http://www.relativitycalculator.com/pdfs/On_the_influence_of_Gravitation_on_the_Propagation_of_Light_English.pdf)

[2] This is known as the equivalence principle.

traveling from the surface of a gravitational force like the Sun to some point (O) in distance space then it has to overcome a gravitational potential to reach over there,

Then the total energy for this photon is the summation of its kinetic energy and its gravitational potential energy

$$\mathrm{E_T = E_k + E_P = hv - G\frac{mM}{r} = hv - \frac{hv}{c^2}\frac{GM}{r} = hv\left(1 - \frac{GM}{rc^2}\right)}$$

$$\text{for a photon } \mathrm{E_T = hv} \therefore\Rightarrow \mathrm{hv_g = hv_{bo}\left(1 - \frac{GM}{rc^2}\right)} \therefore\Rightarrow \mathrm{v_g = v_{ob}\left(1 - \frac{GM}{rc^2}\right)} \therefore\Rightarrow \mathrm{t_g = t_{ob}\left(1 - \frac{GM}{rc^2}\right)}$$

$; v_g \& \mathrm{t_g}$ *are the proper time and frequency at the surface of the gravity source*

$; v_{ob} \& \mathrm{t_{ob}}$ *are the proper time and frequency at the observer point*

$$\therefore\Rightarrow c' = \mathrm{c}\left(1 - \frac{\mathrm{MG}}{\mathrm{r\,c^2}}\right); \mathrm{c_o} \text{ is the speed of light in that distance point (O)}$$

The obve equation is equation number $\boxed{3}$ in that research and it was in the next form

$$c' = \mathrm{c}\left(1 - \frac{\mathrm{MG}}{\mathrm{r\,c^2}}\right)$$

Einstein suggested that the speed of light is faster in curved space-time if measured by an observer at infinity "i.e. observer in a flat space-time observing an event in a curve space time or an observer in a relatively flat space-time", in simple words the speed of light in a vacuum is influenced by difference due to gravity between flat space-time and curved space-time or any difference in space-time curvature such that this difference will increase with a deeper curve in compear to more flat curve if measured between these two regions and this phenomenon is the acceleration of the frame of references or perspective from a non-local observer.

Einstein consider it as a matter of directions and not a matter of distances since that the speed of light is a scalar quantity and not a vector quantity so his work was a very good estimation and not exact while Schwarzschild treated it as a pure scaler quantity

Where Schwarzschild came to the conclusion for time dilation to be

$$t_g = t_{ob}\sqrt{1 - 2\frac{GM}{rc^2}}$$

$; \mathrm{t_g}$ *is the proper time at the surface of the gravity source*

$; \ \mathrm{t_{ob}}$ *is the proper time at the observer point*

And for gravitional red shift as

$$\lambda_{ob} = \lambda_g\sqrt{1 - 2\frac{GM}{rc^2}}$$

$; \lambda_g \& \lambda_{ob}$ *are respectivle wave length at emeter and observer perspective*

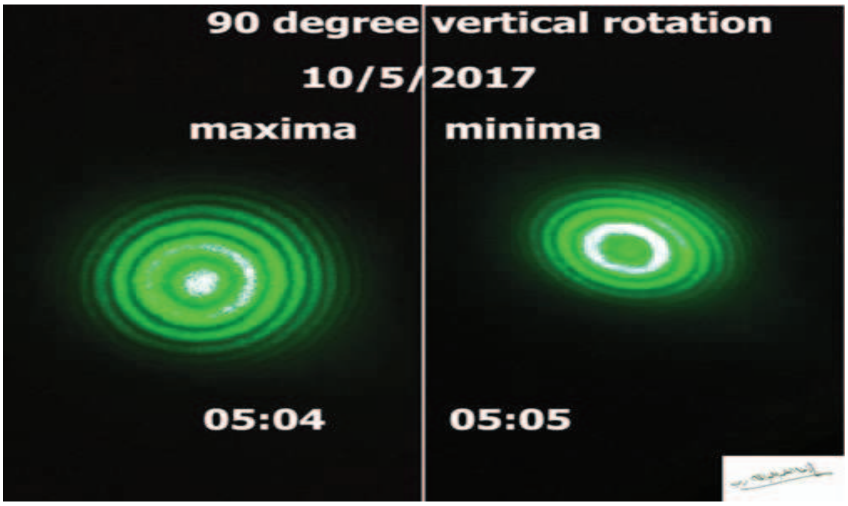
While Einstein came to the following conclusions for gravitional time dilation and the gravitional red shift to be as

$$\therefore\Rightarrow t_g = t_{ob}\left(1-\frac{\mathrm{MG}}{\mathrm{r\,c^2}}\right) \;\&\; \lambda_{ob} = \frac{\lambda_g}{\left(1-\frac{MG}{r\,c^2}\right)}$$

As I will show in this paper both mathematically and experimentally that Einstein approach is almost true but it needs some factor correction to be quite true, actually the speed of light for a local observer nearby gravity well is always constant but only for local observer and it will be diffrent for a non-local observer i.e. the speed of light at that gravity source should be differs by a factor of $\left[\left(1-\frac{\mathrm{r_s}}{\mathrm{r}}\right)^{-1/2}\right]$ as long as the measuring is for photon approaching the gravity well but it will differs by a factor of $\left[\left(1-\frac{\mathrm{r_s}}{\mathrm{r}}\right)\right]$ as long as the measuring is for aphoton distancing away from the gravity well as long as both measurements are taken by an observer at infinity

In short words speed of light is not constant between two regions of space as long as these regions have a difference in space-time curvature actually its gravitational blue shift and gravitational red shift phenomenon but since the time for the photon is zero then the gravitational time dilation will not compensate to keep the speed of light constant as for other mass particles and I will prove this mathematically also.

Since the original Michelson-Morley experiment does not change the distance between the interferometer and the nearby gravity well (i.e. The Earth) then there is no change in the space-time curvature so nothing will happen until we conduct a vertical variation of the Michelson-Morley experiment then we will get different results as I did and get in the experimental part.



This is not a new thing it has ben observed expermentaly in 1953 by Pound and Rebka experiment on gravitational red-shift in nuclear resonance

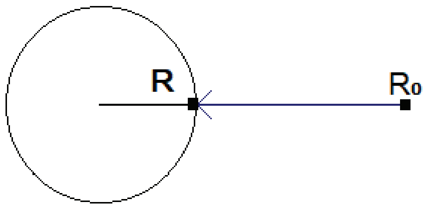
This is has nothing to do with the special relativity and does not violet it since special relativity does not deal with an accelerated reference frame it only deals with a non-accelerated frame of references this is about general relativity phenomena and not special relativity

Then as we will see these results are the most usefull to calculate the cosmological constant using the quantum field fluctuations within an accuracy of [93.5%] from the average current experimental results i.e.($\Lambda \cong -1.4028 \times 10^{-9}$ $(\mathrm{J.\,m^{-3}})$ and to solve so many other problems in general relativity.

3. Gravitational blueshift and the electric permittivity of the free-space $(\varepsilon_\circ)$

If we have gravity well with a radiuse (R) and a photon with a wavelength equal to $(\lambda_\circ)$; $(\lambda_\circ = R_\circ)$ falling in this gravity well from a point with a distnce of $(R_\circ)$ from the surface of the same gravity well, then for an observer at infinity, the photon should have a gravitational blueshift as follow.

$$\therefore \lambda_{\text{blueshift}} = \lambda_\circ \left(1 - \frac{r_s}{r}\right)^{\frac{1}{2}}$$



$\because$ R, $R_\circ$ are real points in space separated by real distances and despite of this we have a gravitational blue shift $\therefore\Rightarrow$ space itself gets shortened due to gravity by a factor of $\left(1 - \frac{r_s}{r}\right)^{\frac{1}{2}}$

$$\therefore\Rightarrow \left(r = r_\circ \left(1 - \frac{r_s}{R}\right)^{\frac{1}{2}}\right)$$

; $r_\circ$ & r *are respectively* the radius of imaginary sphere in space as measured by a local observer and the radius of same imaginary sphere in space as measured by a non-local observer i.e. observer at infinity i.e. observer in a flat space-time i.e. observer in a relatively flat space-time i.e. are all the same thing

Then, if we have an electric charge in the center of this imaginary sphere in an empty space under the gravity influence and since the imaginary photon electric charge is affected by gravity as we know from general relativity then the electric field will occupy a smaller space due to a shortening in its radius only in respect to non-local observer such that it will change the electric flux only in respect to a non-local observer as follows

$$\because (\Phi_E) = E4\pi r^2 \;\; \therefore\Rightarrow \Phi_E' = \frac{E4\pi r_\circ^2}{\left(1 - \frac{r_s}{R}\right)}$$

Since the electric charge is allways conserved, then for a non-local observer this will affect the electric permittivity of the free space $(\varepsilon_\circ)$ as follows:

$$\because \;\varepsilon_\circ = \frac{q}{\Phi_E} = \frac{q}{E4\pi r^2} \therefore \text{under gravity} \Rightarrow \; \varepsilon_\circ' = \frac{q}{\frac{E4\pi r_\circ^2}{\left(1 - \frac{r_s}{r}\right)}} \Rightarrow \varepsilon_\circ' = \varepsilon_\circ \left(1 - \frac{r_s}{R}\right) \because r_s < R \therefore\Rightarrow \varepsilon_\circ' < \varepsilon_\circ$$

$$; (\varepsilon_\circ') \equiv \textit{Vacuum permittivity under gravity as only observed from infinty}$$

This does not apply to the magnetic permeability of the free space since it is a fully geometrically characterized entity as follows.

$$\because \mu_\circ = \frac{B}{H} \therefore H = \frac{B}{\mu_\circ} \therefore\Longrightarrow H = \frac{\left(\frac{B}{\left(1-\frac{r_s}{R}\right)}\right)}{\mu_\circ}$$

$$\therefore\Longrightarrow \mu_\circ{}' = \frac{\left(\frac{B}{\left(1-\frac{r_s}{R}\right)}\right)}{\frac{\left(\frac{B}{\left(1-\frac{r_s}{R}\right)}\right)}{\mu_\circ}} \therefore\Longrightarrow \mu_\circ{}' = \mu_\circ \frac{\left(\frac{B}{\left(1-\frac{r_s}{R}\right)}\right)}{\left(\frac{B}{\left(1-\frac{r_s}{R}\right)}\right)} \therefore\Longrightarrow \mu_\circ{}' = \mu_\circ$$

Since the speed of light is not a vector quantity and it is a scalar quantity that is independent on the direction of the moving source nor the observer and it is only dependent on the nature of the empty space itself:

$$\because c = \frac{1}{\sqrt{\varepsilon_\circ \mu_\circ}}$$

$$\therefore\Rightarrow c' = \frac{1}{\sqrt{\varepsilon_\circ \mu_\circ \left(1-\frac{r_s}{R}\right)}}$$

$$\therefore\Rightarrow c' = c\left(1-\frac{r_s}{R}\right)^{-1/2} \ldots \boxed{1.3}$$

for continuity considerations we will take equation $\boxed{1.3}$ tob e in the next form

$$\therefore\Rightarrow c' = c\left(1-\frac{r_s}{r}\right)^{-1/2} \ldots \boxed{1.3}$$

$\therefore$ for observer at infinity i. e. in flat space time observing the speed of light in a curved space time $c' > c$

Since electric flux affected by gravity and since the electric charge is conserved, then this will change the electric permittivity of the empty space itself ($\varepsilon_\circ$) such that a photon will keep falling towards the black hole and the event horizon will always keep running away from it until it reaches the singularity:

$$\therefore \text{at event horizon and at singularity } \left(r_s < r \Rightarrow \frac{r_s}{r} < 1 \right)$$

Thus, the Schwarzschild metric will always be valid all the way to the singularity, so that the event horizon itself is the singularity at the center of the black hole

If we consider the angle of incidence to be zero ($\theta = 0$) i.e. Schwarzschild line element in two-dimensions then the Schwarzschild metric is as follows:

$$\Rightarrow ds^2 = \left(1-\frac{r_s}{r}\right) c^2 dt^2 + \frac{d{r_s}^2}{\left(1-\frac{r_s}{r}\right)}$$

Since the space-time anomaly at the event horizon is restricted to the event horizon area with zero time (because of the gravitational time dilation goes to infinity at the event horizon):

$$\therefore \text{at the event horizon } r_s = r \therefore\Longrightarrow \left(1-\frac{r_s}{r}\right) \to 0 \therefore\Longrightarrow ds^2 = \frac{d{r_s}^2}{\left(1-\frac{r_s{}'}{r_s}\right)}$$

; $r_s \equiv$ Schwarzschild radius & $r_s' \equiv$ the upgraded Schwarzschild radius due to $c' = c_\circ \left(1 - \frac{r_s}{r}\right)^{-\frac{1}{2}}$

$$\therefore\Longrightarrow ds^2 = \frac{{dr_s}^2}{\left(1 - \frac{r_s'}{r_s}\right)} = 4\pi\, {r_s'}^2$$

$$\because\ \left({dr_s}^2\right) = dr_s.\, dr_s\ \therefore\Longrightarrow \frac{dr_s.\, dr_s}{\left(1 - \frac{r_s'}{r_s}\right)} = 4\pi\, {r_s'}^2\ \ \therefore\Longrightarrow \frac{dr_s.\, dr_s}{\left(1 - \frac{r_s'}{r_s}\right) 4\pi\, {r_s'}^2} = 1$$

$$\therefore\Longrightarrow \frac{dr_s}{2\sqrt{\pi}\, r_s' \sqrt{\left(1 - \frac{r_s'}{r_s}\right)}} = 1$$

$$\text{By integration} \Longrightarrow \frac{\ln\left(\sqrt{\left(1 - \frac{r_s'}{r_s}\right)} + 1\right) + 2r_s\left(\sqrt{\left(1 - \frac{r_s'}{r_s}\right)}\right) - \ln\left(\left|\sqrt{\left(1 - \frac{r_s'}{r_s}\right)} - 1\right|\right)}{4\sqrt{\pi}} + C = r_s + D$$

When C=D

$$\therefore \ln\left(\sqrt{\left(1 - \frac{r_s'}{r_s}\right)} + 1\right) - \ln\left(\left|\sqrt{\left(1 - \frac{r_s'}{r_s}\right)} - 1\right|\right) = 4\sqrt{\pi}\, r_s - 2r_s\left(\sqrt{\left(1 - \frac{r_s'}{r_s}\right)}\right)$$

$$\frac{\left(\sqrt{1 - \frac{r_s'}{r_s}} + 1\right)}{\left(\left|\sqrt{\left(1 - \frac{r_s'}{r_s}\right)} - 1\right|\right)} = e^{\left(4\sqrt{\pi}\, r_s - 2r_s\left(\sqrt{\left(1 - \frac{r_s'}{r_s}\right)}\right)\right)}$$

$$\frac{\left(\sqrt{1 - \frac{r_s'}{r_s}} + 1\right)}{\pm\left(\sqrt{\left(1 - \frac{r_s'}{r_s}\right)} - 1\right)} = e^{\left(4\sqrt{\pi}\, r_s - 2r_s\left(\sqrt{\left(1 - \frac{r_s'}{r_s}\right)}\right)\right)}$$

At the singularity:

Each time a photon reaching the event horizon the speed of light itself get increased as I proved before in this formula$\left(c' = c\left(1 - \frac{r_s}{r}\right)^{-\frac{1}{2}}\right)$ so we have here a step counter (r_s& r_s') so when the photons reach (r_s') it's become the new (r_s) until the collapsing steps reach the singularity

$$\text{At the singularity for local observer } (r_s' = 0) \therefore\Longrightarrow \left(c' = c\left(1 - \frac{0}{r}\right)^{-\frac{1}{2}}\right) \therefore\Longrightarrow c' = c \ldots.\boxed{2.3}$$

$$\text{At the singularity for local observer} \because c' = c \Longrightarrow r_s' = 0 \therefore\Longrightarrow \left(1 - \frac{0}{r_s}\right) = 1 \ldots.\boxed{3.3}$$

$$\text{The singularity for nonlocal observer } (r_s = r_s') \therefore\Rightarrow \left(1 - \frac{r_s'}{r_s}\right) = 0 \ldots.\boxed{4.3}$$

$$\therefore\Longrightarrow \pm 1 = e^{(4\sqrt{\pi}\, r_s)} \text{ (for non} - \text{local observer)} \begin{cases} \because\ 1 = e^{2i\pi} \ \therefore\Rightarrow e^{2i\pi} = e^{4(\sqrt{\pi})r_s} \ \therefore\Longrightarrow r_s = i\dfrac{\sqrt{\pi}}{2} \\ \text{or} \\ \because\ -1 = e^{i\pi} \ \therefore\Rightarrow e^{i\pi} = e^{4(\sqrt{\pi})r_s} \ \therefore\Longrightarrow r_s = i\dfrac{\sqrt{\pi}}{4} \end{cases}$$

$$\because\ r_s > r_s' \ \therefore\Longrightarrow r_s = i\frac{\sqrt{\pi}}{2}\ ,,, r_s' = i\frac{\sqrt{\pi}}{4}\ ;\ i\frac{\sqrt{\pi}}{2} \& i\frac{\sqrt{\pi}}{4} \equiv \text{ratio radii i.e. line element,}$$

I will refer to the short ratio radius as $\left(r_T = i\frac{\sqrt{\pi}}{4}\right)$

$$;\, r_T \equiv \text{length element at the singularity i.e. At} - \text{Tariq ratio radius}$$

$$\because\ r_s > r_s' \ \therefore\Longrightarrow r_s = i\frac{\sqrt{\pi}}{2}\ ,,, r_s' = i\frac{\sqrt{\pi}}{4} \ \therefore\Longrightarrow \frac{r_s'}{r_s} = \frac{i\frac{\sqrt{\pi}}{4}}{i\frac{\sqrt{\pi}}{2}} = \frac{1}{2}$$

$$\text{for local observer i.e. } (r_s' \to 0)\ \because\ c' = \frac{c}{\sqrt{\left(1 - \frac{r_s'}{r_s}\right)}} = \frac{c}{\sqrt{\left(1 - \frac{0}{r}\right)}} = c \therefore c_s' = c; r_s \text{ is minimum}$$

$$\therefore \text{ line element is the radius here } \therefore dr_s{}^2 = r_s'.r_s'$$

Since the photon geodesic is a null curve and at Θ=0:

$$\therefore\Longrightarrow ds^2 = -\left(1 - \frac{r_s'}{r_s}\right) c^2 dt^2 + \frac{\left(i\frac{\sqrt{\pi}}{4}\right)^2}{\left(1 - \frac{r_s'}{r_s}\right)} = 0$$

$$\therefore\Longrightarrow \left(1 - \frac{1}{2}\right) dt_s{}^2 = \frac{\left(i\frac{\sqrt{\pi}}{4}\right)^2}{c^2\left(1 - \frac{1}{2}\right)} \ \therefore\Longrightarrow \left(\frac{1}{2}\right) dt_s{}^2 = \frac{\left(i\frac{\sqrt{\pi}}{4}\right)^2}{c^2\left(\frac{1}{2}\right)}$$

$$\therefore\Longrightarrow dt_s{}^2 = \frac{\left(i\frac{\sqrt{\pi}}{4}\right)^2}{c^2\left(\frac{1}{2}\right)^2} = \frac{4\left(i\frac{\sqrt{\pi}}{4}\right)^2}{c^2} = -\frac{\pi}{c^2 4}$$

$$\therefore\Longrightarrow ds^2 = -\left(\frac{1}{2}\right) c^2 \left(-\frac{\pi}{c^2 4}\right) + \frac{\left(i\frac{\sqrt{\pi}}{4}\right)^2}{\left(\frac{1}{2}\right)} \ \therefore\Longrightarrow ds^2 = \left(\frac{\pi}{8}\right) - \left(\frac{\pi}{8}\right) = 0$$

$$\therefore \text{ at singularity } \Longrightarrow ds^2 = 0 \equiv \text{the real space} - \text{time interval at singularity}$$

$$\text{since } r > r_s' > 0 \ \therefore\Longrightarrow r_s - r_s' \neq 0 \ \therefore\Longrightarrow \Delta r_s \neq 0$$

$$\because\ c' = \frac{c}{\sqrt{\left(1 - \frac{r_s'}{r_s}\right)}} \therefore r > r_s'$$

i.e.(r_s) always will be bigger than ($r_s{}'$) it's indeed a hammering effect from the event horizon all the way dawn to the singularity

$$\because 0 < \frac{r_s}{r} < 1 \therefore\Longrightarrow \text{chaing in position } \neq 0 \therefore\Longrightarrow r - r_s{}' \neq 0 \equiv \text{uncertainty in position}$$

Since we have mass with an uncertain position between zero and one $\left(0 < \frac{r_s}{r} < 1\right)$, then this is a normalized wave function this is only happening under the Heisenberg uncertainty principle:

$$\therefore\Longrightarrow \triangle r_s \triangle P_s \geq \frac{\hbar}{2}$$

This is reasonable since we are reaching such a tiny scale:

$$\text{at singularity } \left(r_s = r_T = i\frac{\sqrt{\pi}}{4}\right) \therefore i\frac{\sqrt{\pi}}{4} = \frac{2MG}{c^2}$$

$$\therefore\Longrightarrow M = ic^2\frac{\sqrt{\pi}}{8G} \text{ ; for a local observer at singularity } \Longrightarrow c' = c$$

$$\text{when } r_s{}' \to 0 \therefore\Longrightarrow i\frac{\sqrt{\pi}}{4}.ic^2\frac{\sqrt{\pi}}{8G}c \geq \frac{\hbar}{2} \text{ ; } \left(r_s Mc = n\frac{\hbar}{2}\right)$$

$$\therefore\Longrightarrow i\frac{\sqrt{\pi}}{4}.ic^2\frac{\sqrt{\pi}}{8G}c = n\frac{\hbar}{2}$$

$$\therefore\Longrightarrow \frac{c^3}{\hbar G}i\frac{\sqrt{\pi}}{4}.i\frac{\sqrt{\pi}}{4} = n$$

; n is the number of Schwarzschild radii steps of the event horizon

due to the effect of gravity on empty space

$$\text{at } n = 1 \therefore\Longrightarrow \frac{c^3}{\hbar G}\left(i\frac{\sqrt{\pi}}{4}\right)^2 = 1$$

$$\therefore\Longrightarrow \frac{\left(i\frac{\sqrt{\pi}}{4}\right)^2}{{l_p}^2} = 1 \therefore\Longrightarrow i\frac{\sqrt{\pi}}{4} = l_p \text{ ; } l_p \equiv \text{Planck length}$$

$$\therefore\Longrightarrow n = \frac{r_s}{l_p} \text{at } n = 1 \therefore\Longrightarrow \frac{r_s}{l_p} = 1 \therefore\Longrightarrow \frac{2GM}{c^2 l_p} = 1$$

$$\frac{2GM}{c^2 l_p} = 1 \therefore M = \frac{c^2}{2G}\sqrt{\frac{G\hbar}{c^3}} = \frac{1}{2}\sqrt{\frac{c\hbar}{G}}$$

$$\therefore\Longrightarrow M = \frac{m_p}{2} \text{ ; } m_p \equiv \text{Planck mass}$$

$$\therefore\Longrightarrow \frac{m_p}{2} \text{ is the least required mass to form a black hole}$$

$$\therefore\Longrightarrow \frac{m_p}{2} \text{ is the least mass considered as a gravity well}$$

since energy is quantized

$$\therefore\Longrightarrow M = n\frac{m_p}{2} \ ; n = 1,2,3 \dots, \dots \boxed{5.3}$$

This is the least mass condition required to form a black hole, I would like to name it At-Tariq condition since the event horizon runing a way from any thing falling in it like a hammer and At-Tariq in arabic means hammerer, I will denote it with (T) .

Now the speed of light at singularity for an observer at infinity is:

$$\therefore \ c.(T) = \frac{c}{\left(\sqrt{1-\frac{1}{2}}\right)^{\frac{2M}{m_p}}} = \frac{c}{\left(\frac{1}{\sqrt{2}}\right)^{\frac{2M}{m_p}}} \ ; (T) = \left(\sqrt{2}\right)^{\frac{2M}{m_p}} \ \therefore\Longrightarrow c_T = c\left(\sqrt{2}\right)^{\frac{2M}{m_p}} \dots \boxed{6.3}$$

⟹A black hole is any mass that will increase the speed of light on its surface by at least a factor of $(\sqrt{2})$ only in respect to a non-local observer

A gravity well is any mass is equal or biger than half Planck mass.

$$\because \ gravitational\ time\ dilation \equiv \ t_g = t_{ob}\sqrt{1-2\frac{GM}{rc^2}}$$

$$\therefore \ for\ ablack\ hole\ gravitational\ time\ dilation \Rightarrow t_g = t_{ob}\left(\sqrt{2}\right)^{\frac{2M}{m_p}} \dots \boxed{7.3}$$

4. Space-time curvature and Schwarzschild radii from local-perspective for rotating and non-rotating black-holes and space-time hoofing:

A non-rotating black-holes of mass (M) will have multiple different Schwarzschild radii depending on the observers such that we have here two observers each one will report a different Schwarzschild radius.

The first observer is the particles that falling in the event horizon and I will denote the Schwarzschild radius in this perspective as (r_{Sf}).

The second observer is an observer at infinity i.e. observer in flat space-time and in this perspective, the black hole will have the ordinary Schwarzschild radius in which we all know and love$\left(r_s = \frac{2GM}{c^2}\right)$.

The first observer is the falling particle in the event horizon the speed of light at this region will be increased by a factor of $\left(\sqrt{2}\right)$ in compare with the speed of light in flat space-time then the Schwarzschild radius will shrink in the same ratio i.e. a factor of (2) due to squaring the speed of light $\left(r_s = \frac{2GM}{c^2}\right)$.

But since the particle is a local observer then it will not have a difrence in the space-time curvetuer then the speed of light here is the same but the mass of the black hole will be difrent in the same ratio since the particle has allrady crosed our event horizon so the mass of the black hole in the particle perspective will be decreased in the same ratio as follows

$$\therefore\Longrightarrow \ r_{Sf} = \frac{2Gm_T}{c^2}; \ m_T = \frac{M}{(2)^{\left(\frac{2M}{m_p}\right)}}; \frac{2M}{m_p} \geq 1 \dots \boxed{1.4}$$

; M is the mass of the black hole as observed from flat space–time

This is very reasonable since when the particle reaches event horizon will have a space-time curvature behind it start from infinity caused by the black hole itself then the speed of the fall will be increased by a factor of (2) but the curvature will be less by the same factor and as the particle will fall towards the black hole at each step it will leave behind it more curved space-time and this curvature behind the particle will decrease the total curvature of the space-time of the black hole itself in the falling particle perspective.

This is nothing but changing of energy from potential to kinetic energy in simple words when you fall from a one-story building is really different from when you fall from a ten-story building.

For a rotating black-hole we should add the relative mass due to the rottational velocity as folow

$$\therefore\Longrightarrow\ r_{Sf}=\frac{2Gm_{\circ T}}{c^2};\ m_{\circ T}=\frac{M(\gamma\cos(t))}{(2)^{\left(\frac{2M}{m_p}\right)}};\frac{2M}{m_p}\geq 1;\gamma=\frac{1}{\sqrt{1-v^2/c^2}};0\leq t\leq\frac{\pi}{2};\ldots.\boxed{2.4}$$

$$at\ (t)=\frac{\pi}{2}\therefore\Rightarrow r_{Sf}=0\ldots.\boxed{3.4}$$

i.e. black holes are drilled from the pools to the center with cylinder of a radius of Planck length

Since the Schwarzschild radius will always run away from anything falling in the black hole, such that the virtual particles at mostly will not be separated and it fall together in the black hole and when it reaches the center it should leave through this drill which penetrates the black hole from the center to its poles since at the poles all the way to the center Schwarzschild radius is zero

This is appropriate solution for losing matter to the black hole singularity, the information paradox and the relativistic jets.

Space-time hoofing:

For a local observer in an ordinary gravity well any mass that exceeds At-Tariq condition moving at a relativistic speed then the relativistic mass will be added to the total mass as follows:

$$\therefore\Longrightarrow t_g=t_{ob}\sqrt{(1-\frac{r_B}{r})};r_B=\frac{2GM}{c^2};\mathrm{M}\ =\ m_\circ(\gamma\cos(t));\gamma=\frac{1}{\sqrt{1-v^2/c^2}};0\leq t\leq\pi;\ldots.\boxed{4.4}$$

We will have a different rate of gravitational time dilation that's vary with angle and this will create a gravity around the accelerated mass i.e. artificial gravity or artificial antigravity

This effect just looks to me like a mule's hoof or a donkey's hoof pushing in a run.

5. Constructing Newton's universal law of gravity from the Schrödinger equation:

From equations ($\boxed{5.3}$&$\boxed{6.3}$&$\boxed{7.3}$) we know that the least mass to create a curvature in space-time is half Planck mass and this curvature in space-time is happening due to the energy density difference created by wave function of half Planck mass and this energy density difference is due to uncertainty principle of the half Planck masses.

Now I will use this knowledge to construct Newton universal law of gravity from the Schrödinger equation

Since mass have a certain space to exist in then we could describe it with Schrodinger equation for infinite square well then we apply equation $\boxed{3.3}$ on it

$$-\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2}\psi + V\psi = E\psi$$

$$\text{we use half Planck mass} \therefore\Rightarrow -\frac{\hbar^2}{m_P}\frac{\partial^2}{\partial x^2}\psi + V\psi = E\psi$$

We know that the wave function for infinite square well is

$$\psi_n(x) = \sqrt{\frac{2}{a}}\sin\left(n\frac{\pi}{a}x\right)$$

Since the mass will act gravitationally the same way near absolute zero and near nuclear fusion temperature then energy levels is neglect able and our wave function will be as follows

$$\because\ n = 1 \Rightarrow \psi_n(x) = \sqrt{\frac{2}{a}}\sin\left(\frac{\pi}{a}x\right) \Rightarrow \frac{\partial^2}{\partial x^2}\psi = -\frac{\sqrt{2}(\pi)^2\sin\left(\frac{\pi x}{a}\right)}{a^2\sqrt{a}}$$

$$a = l\begin{cases} ; l = 2x \Rightarrow \psi_n(x) = \sqrt{\frac{2}{l}} \Rightarrow \frac{\partial^2}{\partial x^2}\psi = -\frac{\sqrt{2}(\pi)^2}{l^2\sqrt{l}} \\ ; l = 4x \Rightarrow \psi_n(x) = \sqrt{\frac{1}{l}} \Rightarrow \frac{\partial^2}{\partial x^2}\psi = -\frac{(\pi)^2}{l^2\sqrt{l}} \end{cases}$$

Where (l) is the distance separating the half Planck masses from each other then it's not a real distance it's just a way to describe the total distribution of mass in corresponding to half Planck masses condition and the total density of the body.

Since (m_P) is fixed then density will change with the distance separating the half Planck masses from each other and since gravity is an act in 4d space-time we need to express density through 4d surface volume to make the 3d Newton gravity compatible with the 4d general relativity

$$\Rightarrow \frac{m_P}{4\pi^2 l dl} = 3M\frac{1}{4\pi r^3} \Rightarrow \frac{4\pi^2 l^3 dl}{m_P} = \frac{4\pi r^3}{3M} \Rightarrow l = r\left(\frac{2}{3\pi n dl}\right)^{\frac{1}{3}}; n = \frac{2M}{m_P}$$

For $l = 2x$

$$\frac{\hbar^2}{m_P}\frac{\sqrt{2}(\pi)^2}{l^2\sqrt{l}} = E\sqrt{\frac{2}{l}} \Rightarrow E = \frac{\hbar^2}{m_P}\frac{(\pi)^2}{l^2}; l = r\left(\frac{2}{3\pi n dl}\right)^{\frac{1}{3}}; n = \frac{2M}{m_P}$$

For $l = 4x$

$$\frac{\hbar^2}{m_P}\frac{(\pi)^2}{l^2\sqrt{l}} = E\sqrt{\frac{1}{l}} \Rightarrow E = \frac{\hbar^2}{m_P}\frac{(\pi)^2}{l^2}; l = r\left(\frac{2}{3\pi n dl}\right)^{\frac{1}{3}}; n = \frac{2M}{m_P}$$

As we know the gravitational potential is as follows

$$E = \frac{GM^2}{r} \therefore\Rightarrow \frac{GM^2}{r} = n\frac{\hbar^2}{m_P}\frac{(\pi)^2}{l^2}; l = r\left(\frac{2}{3\pi n dl}\right)^{\frac{1}{3}}; n = \frac{2M}{m_P}$$

$$\therefore\Rightarrow E = \frac{GM^2}{r} = n\frac{\hbar^2}{m_P}\frac{(\pi)^2}{r^2\left(\frac{2}{3\pi ndl}\right)^{\frac{2}{3}}}; n = \frac{2M}{m_P}$$

$$\therefore\Rightarrow \frac{2}{3\pi ndl} = \left(\frac{2}{GM}\frac{\hbar^2}{(m_P)^2}\frac{(\pi)^2}{r}\right)^{\frac{3}{2}}; n = \frac{2M}{m_P}$$

$$\therefore\Rightarrow dl = \left(\frac{2}{3\pi\frac{2M}{m_P}\left(\frac{2}{GM}\frac{\hbar^2}{(m_P)^2}\frac{(\pi)^2}{r}\right)^{\frac{3}{2}}}\right)$$

$$\therefore\Rightarrow E = n\frac{\hbar^2}{m_P}\frac{(\pi)^2}{r^2\left(\frac{2}{3\pi n\left(\frac{2}{3\pi n\left(\frac{2}{GM}\frac{\hbar^2}{(m_P)^2}\frac{(\pi)^2}{r}\right)^{\frac{3}{2}}}\right)}\right)^{\frac{2}{3}}};\; n = \frac{2M}{m_P} \ldots.\boxed{1.5}$$

$$\therefore\Rightarrow E = \frac{GM^2}{r} \ldots Q.E.D$$

6. Black hole thermodynamics and the entropy of the vacuum:

Lets consider a hypothetical isolated thermodynamic system of a single test particle with a single microstate reaching event horizon of a black hole, then according to Boltzmann entropy law, the entropy for such particle or system is zero as follows:

$$S = k_B \ln\Omega = k_B \ln 1 = 0$$

Since this test particle falling towards a black hole, then it will have a time dilation on the event horizon as in equation $\boxed{7.3}$

$$\left[t_g = t_{ob}\sqrt{2} \ldots.\boxed{7.3}\right]$$

Since the entropy is a time arrow then the time dilation will affect the entropy in this system and increase it by the time dilation factor and the Boltzmann entropy law should be upegraded for what behind the event horizion as follows

$$\therefore S = k_B \ln\sqrt{2}\,\Omega \ldots.\boxed{1.6}$$

$$\therefore\Rightarrow U = k_B\, K\, ln(\sqrt{2})\Omega \ldots.\boxed{2.6}$$

But since the speed of light will be increased by a factor of square root of two then when a particle reach event horizon the Schwarzschild radius will shrink by a factor of two and that's mean nothing could ever cross the event horizon

$$\because\ r_{sf} = \frac{2Gm_T}{c^2};\ m_T = \frac{M}{\left(\sqrt{2}\right)^{\left(\frac{2M}{m_p}\right)}};\frac{2M}{m_p} \geq 1 \ldots . \boxed{1.4}$$

And as long as nothing could ever cross the event horizon as we saw with equation $\boxed{1.4}$, then it is safe to claim that what is located behind event horizon is nothing but empty space, even when it is not.

So such a mathematical formula should represent the vacuum entropy as follows.

$$\therefore S = k_B \ln\sqrt{2}\,\Omega \therefore \text{at } \Omega = 1 \Rightarrow S_H = k_B \ln\sqrt{2} \ldots . \boxed{3.6}$$

$$; S_H \equiv \textit{vacuum entropy}$$

We could generalize it for black holes as follow:

$$\therefore S_T = k_B \ln\left(\Omega\left(\sqrt{2}\right)^{\frac{2M}{m_p}}\right) = k_B\left(\ln\Omega + \ln\left(\sqrt{2}\right)^{\frac{2M}{m_p}}\right)$$

$$\therefore S_T = k_B \frac{2M}{m_p} \ln\sqrt{2} + k_B \ln\Omega \ldots . \boxed{4.6}$$

$$\textit{For local observer } \left(\frac{2M}{m_p} = 0\right) \therefore S_T = k_B \ln\Omega \ldots . \boxed{5.6}$$

$$\text{since nothing could cross the event horizon} \therefore\Rightarrow \Omega = 1 \therefore S_T = k_B \frac{2M}{m_p} \ln\sqrt{2} \ldots . \boxed{6.6}$$

$$\text{at } \frac{2M}{m_p} = 1 \therefore \text{vacuum entropy } S_H = S_T = k_B \ln\sqrt{2}$$

$$\therefore\Rightarrow U = k_B K \ln\sqrt{2} \therefore \text{at } K = 1 \therefore U_H = k_B \ln\sqrt{2} \ldots . \boxed{7.6}$$

∴ Landauer's principle should be corrected.

Then, even when we have no entropy, we will have this entropy for nothing just due to space-time nature

This happened since nothing could cross the event horizon:

$$\text{since } S_T = \frac{\Delta U}{K} \therefore K = \frac{\Delta U}{S_T} = \frac{M(c_T)^2}{k_B \frac{2M}{m_p} \ln\sqrt{2}}, \text{at} \left(\frac{2M}{m_p} = 1\right) \Rightarrow K_T = \frac{m_p c^2\left(\sqrt{2}\right)^2}{2\, k_B\, \ln\sqrt{2}}$$

$$\therefore\Rightarrow K_T = \frac{m_p c^2}{k_B \ln\sqrt{2}}$$

$$\therefore\Rightarrow K_T = \frac{K_p}{\ln\sqrt{2}} \ldots . \boxed{8.6}$$

$$; K_p = \text{Planck temperature}\ ; K_T \equiv \text{event horizon temperature}$$

$$K_T = \frac{1.416785 \times 10^{32}}{\ln\sqrt{2}} = 4.0879 \times 10^{32} \text{ Kelvin}$$

The outer surface temperature of a black hole is unrelated to its mass; it is always constant and this is very reasonable since nothing could ever cross the event horizon. This is because, for anything going towards the event horizon, the speed of light is always increasing$\left(c_T = c\sqrt{2}\right)$, so that the event horizon will always run away from whatever is approaching; it's like chasing an elusive mirage and the Schwarzschild radius in the falling perspective will be described by equation number $\boxed{1.4}$.

$$\therefore\Rightarrow\ r_{sf} = \frac{2Gm_T}{c^2};\ m_T = \frac{M}{(2)^{\left(\frac{2M}{m_p}\right)}};\frac{2M}{m_p} \geq 1 \ldots.\boxed{1.4}$$

7. Calculating the cosmological constant using the quantum field fluctuations within an accuracy of [93.5%] from the average current experimental results.

The expansion of the universe is an anti-gravitational act and as I have shown in equations $\left(\boxed{5.3}\&\boxed{6.3}\&\boxed{7.3}\right)$ space-time can only be affected by masses equal to or larger than half Planck mass and since gravity and anti-gravity both described in general relativity by Einstein field equation as the same, but with different signs then they are obeying the same condition too.

So we should only consider quantum fluctuation with frequencies that are coherent with half Planck mass, then such a quantum field frequencies should be responsible for the universe expansion.

If we take virtual particles in the time-energy uncertainty principle corresponding to energies of half Planck mass, and we try to figure out its effect on space-time, then we should consider three important factors to reach the right mathematical pattern.

- We take one dimension for the space between two points representing the creating point and the annihilation point of the virtual particles since virtual particles oscillate between existence and nonexistence that's mean we could exclude any inner path because we could safely presume that it just didn't happen in the first place, so that will leave us with only one space dimension and that's between the creating point and annihilation point of the virtual particles.

- That will leave us with two remaining dimensions, in fact, these two dimensions are time-disguised dimensions as space dimensions since space-time interval has a term for time-disguised as space dimensions by multiplying the time term by the speed of light so if we consider the angle of incidence to be zero i.e. $(\theta = 0)$to consider the only the line element of the metric to facilitate calculations.

$$\therefore\Rightarrow ds^2 = -\left(1 - \frac{r_s}{r}\right) dt^2c^2 + \left(1 - \frac{r_s}{r}\right)^{-1} dr^2$$

Its dual-time dimensions disguised as space dimensions because the first time-disguised dimension is due to the accelerated frame of reference of the virtual particles where the speed of light in this frame will be unchanged ;(c'=c) in respect to the virtual particles and another time dimension related to the non-accelerated frame of reference of the observer such that the speed of light of the virtual particles in respect to the observer frame of reference will be changed in a factor of the square root of two$\left(; \acute{c} = c\sqrt{2}\right)$.

That's mean the virtual particles will have dual light speed measurements one in its own frame of reference and the other one is in the observer frame of reference and that will give the virtual particles in these conditions dual time-disguised dimensions as space dimensions.

Now: since photon geodesic is a null geodesic $\therefore\Rightarrow\ ds^2 = 0$

$$\text{at } \theta = 0 \Rightarrow 0 = -\left(1 - \frac{r_s'}{r_s}\right) dt^2c^2 + \left(1 - \frac{r_s'}{r_s}\right)^{-1} dr^2$$

$$\text{at } \frac{2M}{m_p} \leq 1 \Rightarrow r_s' = 0 \text{ , I already proved this mathematically in equations}(\boxed{2.3}\&\boxed{3.3})$$

$$\therefore\Rightarrow \left(1 - \frac{r_s'}{r_s}\right) = \left(1 - \frac{0}{r_s}\right) = 1; \; dr = i\frac{\sqrt{\pi}}{4}$$

this is the line element of the virtual particles in the observer frame of reference

$$ds^2 = 0 \therefore\Rightarrow dt^2c^2 = dr^2 \Rightarrow dt^2c^2 = dr^2 \therefore\Rightarrow dt^2 = \frac{dr^2}{c^2}$$

$$dt^2 = \frac{dr^2}{c^2} \Rightarrow dt = \frac{dr}{c} \Rightarrow dt = \frac{i\sqrt{\pi}}{4c} \therefore\Rightarrow \text{the first disguised time dimension} = \frac{i\sqrt{\pi}}{4}$$

$$\text{at } \left(1 - \frac{r_s}{r}\right) = \frac{1}{2} \Rightarrow r_s' = i\frac{\sqrt{\pi}}{4} \;\; ; \; dr = i\frac{\sqrt{\pi}}{2} \text{ line elementin in the observer frame of reference}$$

since photon geodesic is a null geodesic and at $\Theta = 0 \;\therefore\Rightarrow\; ds^2 = 0$

$$\therefore\Rightarrow \left(\frac{1}{2}\right) dt^2c^2 = \left(\frac{1}{2}\right)^{-1} dr^2 \therefore\Rightarrow \left(\frac{dt^2c^2}{2}\right) = 2dr^2 \therefore\Rightarrow dt^2 = 4\frac{dr^2}{c^2}$$

$$dt^2 = \frac{4dr^2}{c^2} \Rightarrow dt = \frac{2}{c}dr \Rightarrow dt = \frac{2}{c}i\frac{\sqrt{\pi}}{2} = i\frac{\sqrt{\pi}}{c}$$

$$\therefore\Rightarrow dt = i\frac{\sqrt{\pi}}{c} \therefore\Rightarrow \text{the second disguised time dimension} = i\sqrt{\pi}$$

For $\left(\frac{2M}{m_p} > 1\right)$ for each step we will have a different speed of light i.e. an extra time dimension $\therefore\Rightarrow$ the second disguised time dimension in the observer frame of refrence $\equiv \left(\frac{2M}{m_p}\right) i\sqrt{\pi}$

For the space dimension we have the following

$$\frac{2M}{m_p} = 1 \therefore\Rightarrow M = \frac{m_p}{2} \therefore\Rightarrow r_s = \frac{2G\frac{m_p}{2}}{c^2} = \frac{Gm_p}{c^2} = \frac{6.6743 \times 10^{-11} \times 2.176435 \times 10^{-8}}{(299792458)^2}$$

$$= \frac{14.5261801205 \times 10^{-19}}{(89875517873681764)} = 1.616 \times 10^{-35} \equiv l_p$$

We should use an upgrade to Lorentz factor and I will denote it as (γ_T) for the virtual particles in the reference frame of the observer and I will name it as At-Tariq factor, it will affect the length and time dimension in this frame of reference

$$;\gamma_T = \left(1 - \left(\frac{v}{c\left(\sqrt{2}\right)^{\left(\frac{2M}{m_p}\right)}}\right)^2\right)^{-\frac{1}{2}} \; ; \frac{2M}{m_p} \geq 1$$

Expansion of the universe is an increase in entropy so we could represent it mathematically we should use the entropy law for empty space that I derived before in equation

$$\because \textit{equation}\ \boxed{2.6}\ i.e.\left[E = k_B K\ \ln(\sqrt{2}\,)\Omega\right]$$

Then to obtain the energy density in which represent the cosmological constant we should divide it on the space-time volume in which I derived it mathematically above

$$\therefore\Rightarrow \Lambda = \frac{k_B K\ \ln(\sqrt{2}\,\Omega)}{\frac{4}{3}\pi\left(\left(\frac{2M}{m_p}\right)(i\sqrt{\pi}\,\gamma_T)\left(i\frac{\sqrt{\pi}}{4}\gamma\right)\left(\frac{l_p}{\gamma_T}\right)\right)}\ \therefore\Rightarrow \Lambda = \frac{k_B K\ \ln(\sqrt{2}\,\Omega)}{\frac{4}{3}\pi\left(\left(\frac{2M}{m_p}\right)i\sqrt{\pi}\left(i\frac{\sqrt{\pi}}{4}\gamma\right)l_p\right)}$$

$$\text{at } \frac{2M}{m_p} = 1 \therefore\Rightarrow \Lambda = \frac{-3\,k_B\,K\ln(\sqrt{2}\,\Omega)}{\pi^2\ \gamma\, l_p} \ldots.\boxed{1.7}$$

$$\therefore\Rightarrow \Lambda = \frac{-3(1.38\times10^{-23})(2.7)[(0.346)+\ln(\Omega)]}{(9.869)(1.616\times10^{-35})}\left(\frac{1}{\gamma}\right)$$

By taking the appropriate relative velocity for Lorentz factor and the appropriate multiplicity(Ω) we will get energy density exactly equal to the experimental value of the cosmological constant

For example, if we take the multiplicity$\{\Omega = 4\}$ and the relative velocity very close to the speed of light with 34 digits after the comma to be compatible with Planck length in the equation as follows

$$v = 299{,}792{,}457.999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}8\ {}^{m}/_{s}$$

$$\therefore\Rightarrow \left(\frac{v}{c} = 99.99999999999999999999999999999999999999933287181\%\right)$$

$$\therefore\Rightarrow \frac{1}{\gamma} = 1.1551001605\times10^{-21}$$

$$\therefore\Rightarrow \Lambda = -1.4028\times10^{-9}\ \ (J.m^{-1}.s^{-2}.c^{-2} \equiv J.m^{-3})$$

This value is in (93.5%) from the average experimental accepted value.

Black hole is an increase in the speed of light by a factor of $\left((\sqrt{2})^{\left(\frac{2M}{m_p}\right)}\right)$and as I show that the virtual particles increasing the speed of light in only one spatial dimension by a factor of $(\sqrt{2})$ that's mean one thing

Each pair of virtual particles is nothing but a virtual line black hole i.e. a black hole in one space dimension disappears with the inhalation of the virtual particles appears and disappears again due to its virtual nature and its linear since it's acting only in one spatial dimension.

If we took my previous calculations for the cosmological constant as a reference estimation point then in the Planck level due to the effects of the quantum field there are roughly (449,792) virtual linear black holes in every cubic centimeter of vacuum these are the source of universe expansion and dark energy.

The most suitable, convenient name in Arabic for such quantum field is the word (Eyde) which means in Arabic the mighty firmness, where the (Eyde) quantum field is responsible for the universe expansion and very suitable for cosmic inflation as I will show.

8- Solving the vacuum catastrophe:

If we generalize equation $\boxed{1.7}$ for quantum field fluctuations frequencies corresponding to energies of than half Planck mass i.e.$\left(\frac{2M}{m_p}\right) > 1; \left(\frac{2M}{m_p}\right) \to \infty$.

Then for each higher frequency we will get an extra disguised time dimension in the denominator and this will drain out the infinite energy frequencies fluctuations of the quantum field and this will prevent the vacuum catastrophe.

$$\Lambda_n = \frac{-3\, k_B K\ ln\left(\sqrt{2}\,\Omega\right)}{(\pi)^2\left(i\frac{\sqrt{\pi}}{4}\right)^{n-1}\left((\gamma_{T2})(\gamma_{T3})(\gamma_{T4})\cdots\cdots(\gamma_{Tn})\right)(l_p)(\gamma)};\left(J.m^{-1}.(s.c)^{-(n+1)}\right);\left(\frac{2M}{m_p}n \to \infty\right)\ldots.\boxed{1.8}$$

In simple words, it seems that there are infinite energies from the quantum field fluctuations fighting against infinite time dimensions and this will bring the quantum field into balance and prevent the vacuum catastrophe.

Without this balance, everything will explode into oblivion and we will have nothing but black holes or impossibly rapid fast expansion due to the infinite energies of the quantum field's fluctuations.

Energies resulting from higher frequencies of (Λ_G) formula are distorting space-time with a factor of $\left(\sqrt{2}^{\left(\frac{2M}{m_p}\right)}\right)$ in Planck level and even lower than that such that it will let other virtual particles to move faster than the speed of light in respect to us but in their frame of reference they move less than there speed of light and they follow the updated factor (γ_T) and updated transformations it's exactly as Lorentz transformations but with an, increased speed of light because of the updated factor(γ_T).

$$;\gamma_T = \frac{1}{\sqrt{1-\left(\frac{v}{c\left(\sqrt{2}\right)^{\left(\frac{2M}{m_p}\right)}}\right)^2}};\frac{2M}{m_p} \geq 1\ldots.\boxed{2.8}$$

We should note that for mass bigger than half Planck mass there are extra relative time-disguised dimensions for each step and it all depends on the observer's point of view.

We saw that high energy do not reveal higher space dimensions, but reveal extra relative time-disguised dimensions and all that about measuring the speed of light differently between two frames of reference one of them accelerated in relative to the other one that's mean there is no extra higher space dimension.

The amount of time is determined by the speed of light and the difference between two differently accelerated frames of reference.

The direction of time is determent by the entropy.

That means space-time didn't come from the big bang since there is no enough high energy that will generate more space-time without original space-time and we observed that both in black hole singularity and in the cosmological constant equations.

9. Calculating the dark matter density using third-order quantum field fluctuations within an accuracy of [96%] from the average current experimental accepted values:

We have a convenient solution here for the quantum vacuum at $\left(\frac{2\mathrm{M}}{\mathrm{m_p}} = 3\right)$ such that instead of negative energy and pressure we will get an old fashion attracting graviton effect that agree with dark matter phenomenon

$$\text{at}\left(\frac{2\mathrm{M}}{\mathrm{m_p}} = 3\right) \Rightarrow \Lambda_3 = \frac{3(4)^2\ k_B K\ \ ln\left(\sqrt{2}\,\Omega\right)}{(\ i)^4\ (\pi)^3(\gamma_{T2})(\ \gamma_{T3})\left(l_p\right)(\ \gamma)};\left(J.m^{-1}.(s.c)^{-(4)}\right)\ldots.\boxed{1.9}$$

$$\because m = \frac{E}{c^2} \therefore\Rightarrow Dark\ matter\ density = \frac{\Lambda_3}{c^2}$$

$$\Lambda_3 = \frac{3(4)^2\ k_B K\ \ ln\left(\sqrt{2}\,\Omega\right)}{(\ i)^4\ (\pi)^3(\gamma_{T2})(\ \gamma_{T3})\left(l_p\right)c^2(\ \gamma)};\left(kg.m^{-1}.(s.c)^{-(4)}\right)$$

Extra time dimensions are not about extra space at all it's just about the difference in curvature of the empty space itself i.e. the units here in principle doesn't matter; $\left(kg.m^{-1}.(s.c)^{-(4)}\right) \equiv \left(kg.m^{-1}.(s.c)^{-(2)}\right)$

$$Dark\ matter\ density = \frac{\Lambda_3}{c^2} = \frac{3(4)^2\ k_B K\ \ ln\left(\sqrt{2}\,\Omega\right)}{(c^2)\ (\ i)^4\ (\pi)^3(\gamma_{T2})(\ \gamma_{T3})\left(l_p\right)(\ \gamma)}$$

$$at\left(\frac{2M}{m_P} = 2\right) \Rightarrow \mathrm{c_{T2}} = \mathrm{c}\left(\left(\sqrt{2}\right)^2\right) = 599{,}584{,}916\,\frac{\mathrm{m}}{\mathrm{s}}$$

By taking the virtual particle speed in the second extra time disguised dimension as follow

$$\mathrm{v_{T2}} = 593{,}320{,}000\ \frac{\mathrm{m}}{\mathrm{s}}, \text{at}\left(\frac{2\mathrm{M}}{\mathrm{m_p}} = 2\right)$$

$$at\left(\frac{2M}{m_P} = 3\right) \Rightarrow c_{T3} = c\left(\left(\sqrt{2}\right)^3\right) = 847{,}941{,}120.00153295549577643436342\ \frac{m}{s}$$

By taking the virtual particle speed in the third extra time disguised dimension as follow

$$v_{T3} = 839{,}081{,}190.8272047543550179538481\,\frac{m}{s}$$

$$\therefore\Rightarrow \gamma_{T2} = \gamma_{T3} = 0.1441816003705216436389$$

$$\therefore\Rightarrow Dark\ matter\ density = 5.3964586 \times 10^{-27} \times 10^{-27};\left(kg.m^{-1}.(s.c)^{-(4)}\right) \equiv (kg.m^{-3})$$

Experimentally the dark matter density in the universe is around $(5.423 \times 10^{-27}; (kg.m^{-3})\ )$[3] in the assumption of a flat universe then this will put our results to be within an accuracy of [96%] from the average current experimental values.

[3] https://wmap.gsfc.nasa.gov/universe/uni_matter.html

10. Finding the equation for the big bang singularity at $(\mathbf{t} \leq \mathbf{0})$ and the Planck era and driving the gravitational constant from it:

If we inflict $(\Lambda_\circ)$ formula upon the Planck era we could easily rolls out the temperature from the equation as follows:

$$\because \Lambda = \frac{-3\,k_B\,K\ln\left(\sqrt{2}\,\Omega\right)}{\pi^2\ \gamma\,l_p} \therefore\Rightarrow \Lambda_P = \frac{-3\,k_B\,K_P\ln\left(\sqrt{2}\,\Omega\right)}{\pi^2\ \gamma\,l_p}; K_P = \text{Planck temperature}$$

$$\therefore\Rightarrow \Lambda_p = -\frac{3\,k_B\frac{m_p c^2}{k_B}\ \ln\left(\sqrt{2}\,\Omega\right)}{\pi^2\left(l_p\right)}\frac{1}{\gamma} = -\frac{3 m_p c^2\ \ln\left(\sqrt{2}\,\Omega\right)}{\pi^2\left(l_p\right)}\frac{1}{\gamma} = -\frac{3\,c^4\ \ln\left(\sqrt{2}\,\Omega\right)}{\pi^2\,G}\frac{1}{\gamma}$$

$$\therefore\Rightarrow \Lambda_p = -\frac{3\sqrt{\frac{\hbar c}{G}}\,c^2\ \ln\left(\sqrt{2}\,\Omega\right)}{\pi^2\ \sqrt{\frac{\hbar G}{c^3}}}\frac{1}{\gamma}$$

$$\therefore\Rightarrow \Lambda_p = -\frac{3c^4\ \ln\left(\sqrt{2}\,\Omega\right)}{\pi^2\,G\,\gamma}, or,\ \Lambda_p = -\frac{3\,F_P\ \ln\left(\sqrt{2}\,\Omega\right)}{\pi^2\,G\,\gamma} \dots.\boxed{1.10}$$

$$\therefore\Rightarrow G = \frac{3c^4\ \ln\left(\sqrt{2}\,\Omega\,\right)}{\pi^2\,\Lambda_p}\frac{1}{\gamma} \dots..\boxed{2.10}$$

$$\therefore\Rightarrow G = \frac{3c^4\ \ln\left(\sqrt{2}\,\Omega\,\right)}{\pi^2\,0.7361\times10^{23}}\frac{1}{\gamma}$$

$$\text{at } \Omega = 4\ \&\ \text{at } v = 299792457.999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}8\ \text{m/s}$$

$$\therefore\Rightarrow\ \frac{v}{c} = 99.99999999999999999999999999999999999999933287181\%$$

$$\frac{1}{\gamma} = 1.1551\times10^{-21}$$

$$\therefore\Rightarrow \Lambda_P = -0.7361\times10^{23}\ \ (\text{J}.\text{m}^{-1}.\text{s}^{-2}.\text{c}^{-2} \equiv \text{J}.\text{m}^{-3})$$

From the same formula and the same conditions we have

$$G = \frac{3c^4\ \ln\left(\sqrt{2}\,\Omega\,\right)}{\pi^2\,0.7361\times10^{23}}\frac{1}{\gamma} \therefore\Rightarrow G = 6.6947\times10^{-11}\left(\frac{\text{m}^3}{\text{kg}.\text{s}^2}\right)$$

Since we canceled out both the temperature and the Planck length from our consideration by the Planck era trick and by using vacuum entropy then we could easily calculate it for the big bang singularity at $(t \leq 0)$

At $(t \leq 0)$there is nothing there is no prior causality i.e. there is no Lorentz factor or (γ_T) factor and there is nothing to have any multiplicity so we could only use vacuum entropy and of curse that's mean the temperature is exactly the absolute zero then we will have only two things flat & smooth space-time

Flat space-time i.e. there is no energy equal or bigger than half Planck mass and smooth space-time means there is no energy at all and the temperature is exactly the absolute zero.

There is nothing except the initial conditions of the universe before the rupture in the space-time that's represented by the big bang

From Planck era cosmological constant we will get

$$\because \Lambda_p = -\frac{3c^4\ \ln(\sqrt{2}\,\Omega)}{\pi^2\, G\, \gamma} \therefore\Rightarrow \Lambda_\circ = -\frac{3\,c^4\ \ln(\sqrt{2}\,)}{\pi^2\, G} \therefore\Rightarrow \Lambda_\circ = -\frac{3\ \ln(\sqrt{2}\,)}{\varepsilon_\circ{}^2\mu_\circ{}^2\pi^2\, G} \dots \boxed{3.10}$$

$$\therefore\Rightarrow \Lambda_\circ = -1.2749 \times 10^{43}\,(\mathrm{J.m^{-3}})$$

We could calculate the gravitational constant as follows:

$$\therefore\Rightarrow G = \frac{3\ \ln(\sqrt{2}\,)}{\varepsilon_\circ{}^2\mu_\circ{}^2\pi^2\,(-\Lambda_\circ)} \dots \boxed{4.10}$$

$$\therefore\Rightarrow G = \frac{3\ \ln(\sqrt{2}\,)}{\varepsilon_\circ{}^2\mu_\circ{}^2\pi^2\,(-\Lambda_\circ)} = \frac{3c^4\ ln(\sqrt{2}\,\Omega\,)}{\pi^2\,(-\Lambda_p)}\frac{1}{\gamma}$$

$$\therefore\Rightarrow \frac{\ln(\sqrt{2}\,)}{(-\Lambda_\circ)} = \frac{ln(\sqrt{2}\,\Omega\,)}{(-\Lambda_p)}\frac{1}{\gamma} \therefore\Rightarrow \frac{1}{(-\Lambda_\circ)} = \frac{1+\ ln(\,\Omega\,)}{(-\Lambda_p)}\frac{1}{\gamma} \therefore\Rightarrow \Lambda_\circ = \frac{\Lambda_p}{1+\ ln(\,\Omega\,)}\gamma \cdots \boxed{5.10}$$

11. Nature of time and the higher dimensions:

Black hole is an increase in the speed of light by a factor of $(\sqrt{2})^{\left(\frac{2M}{m_p}\right)}$ and as I show that the Eyde virtual particles increasing the speed of light in only one spatial dimension by a factor of $(\sqrt{2})$ that's mean one thing

Each pair of Eyde virtual particles is nothing but a virtual line black hole i.e. a black hole in one space dimension disappears with the inhalation of the Eyde virtual particles appears and disappears again due to its virtual nature and its linear since it's in one spatial dimension act.

If we took my previous calculations for the cosmological constant as a reference estimation point then in the Planck level due to the effects of the Eyde quantum field there are roughly (449,792) virtual linear black holes in every cubic centimeter of vacuum that distorting space-time with a factor of $(\sqrt{2})$ exclusively in Planck level and that will let other virtual particles to move faster than the speed of light in respect to us but in their frame of reference they move less than there speed of light and they follow At-Tariq factor (γ_T) and At-Tariq transformations it's exactly as Lorentz transformations but with At-Tariq factor (γ_T)

$$;\gamma_T = \frac{1}{\sqrt{1-\left(\frac{v}{c(\sqrt{2})^{\left(\frac{2M}{m_p}\right)}}\right)^2}};\frac{2M}{m_p} \geq 1$$

We should note that for At-Tariq condition higher than one there are extra time-disguised dimensions for each step.

We saw that high energy do not reveal higher space dimensions, but reveal extra time dimensions and all that about measuring the speed of light differently between two frames of reference one of them accelerated in relative to the other one that's mean there is no extra higher space dimension and any theory relying on extra higher space dimension should be excluded and should be considered as nothing but unnecessary mathematical fantasy.

The amount of time is determined by the speed of light and the difference between two differently accelerated frames of reference.

The direction of time is determent by the entropy.

That means time didn't come from the big bang since there is no enough high energy that will generate more space-time without original space-time and we observed that both in black hole singularity and in the Eyde quantum field.

12-Experimental results:

Since the speed of light is independent of the direction of the moving source and the observer i.e. it is only dependent on the nature of the empty space itself:

$$c = \frac{1}{\sqrt{\varepsilon_\circ \mu_\circ}} \; ; \varepsilon_\circ = \frac{q}{\Phi_E} = \frac{q}{E 4\pi r^2}\hat{r} \; ; \; \mu_\circ = \frac{B}{H}$$

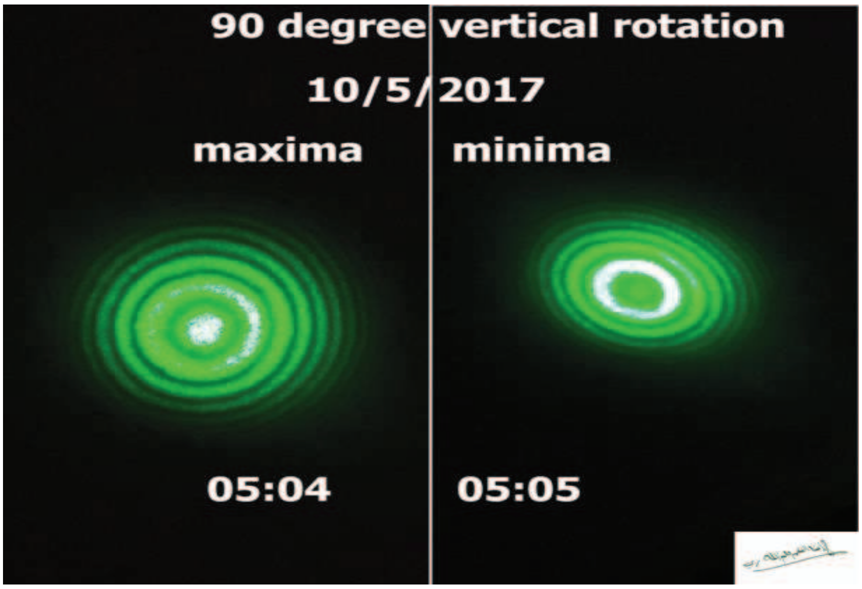
Then, changing the distance from a large gravity well and not the direction this will change the nature of the empty space itself due to gravitational blueshift, thus, we should detect a notable interference pattern.

We could detect this by setting up a vertical Michelson-Morley experiment relative to the Earth (and not parallel to the Earth or horizontally). In this way, when we rotate the Michelson's interferometer 90 degrees; we should get a significant change due to gravitational redshift and blueshift, which responds to the change in the speed of light as follows:

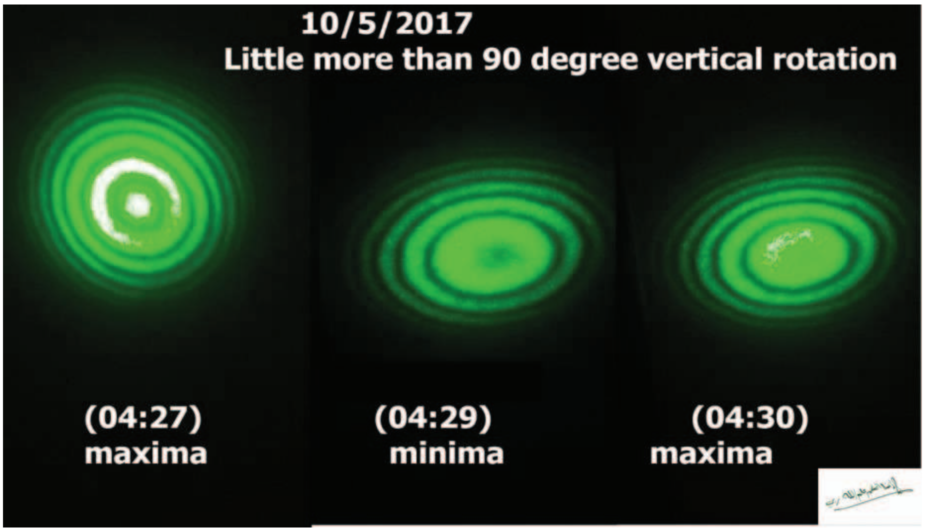
$$c' = \frac{1}{\sqrt{\varepsilon_\circ \mu_\circ \left(1 - \frac{r_s}{r}\right)}} \therefore\Rightarrow c' = c\left(1 - \frac{r_s}{r}\right)^{-1/2}$$

This is not a new thing it's made before in Pound-Rebka experiment.

For the 90°rotation, I have a confirmed positive change in the central interference pattern from maxima to minima as follows.



For more than 90° rotation I have a positive chnge in the central interference pattern from maxima to minima to maxima in the central interference pattern



We could make an ordinary horizontal Michelson-Morley experiment, but next to a large mountain-chain so that the mass of the mountain-chain will act like a runaway gravity well and we will still get a positive change in the interference pattern.

However, detecting the space-time hoofing is much harder since it's depending on the movement of the earth so a vertical non-rotating interferometer in which it's horizontal arm oriented to the north or south to eliminate the Sagnac effect should be enough to do it

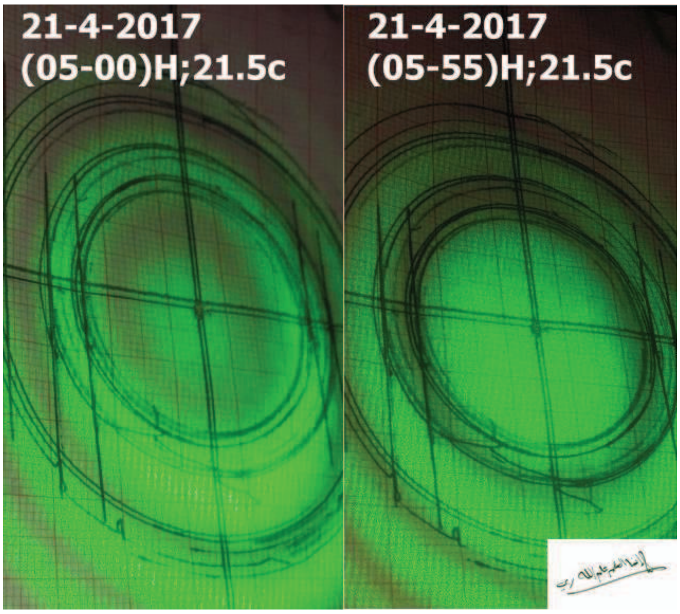
The justification for this is as follow

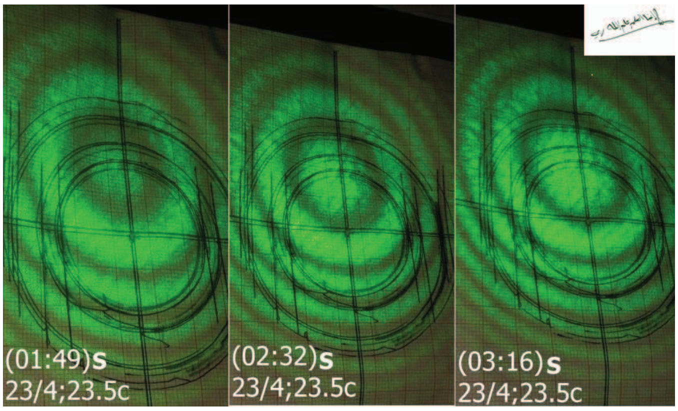
The earth is a gravity well and since its revolving around the sun then it should gain a relative mass and according to my work the gravitational potational should be different for a fixed observer but since the earth revolving around itself then the velocity rate of this movement is relative to an observer on the surface of the earth is changing with this rotation as in equation 4.4.

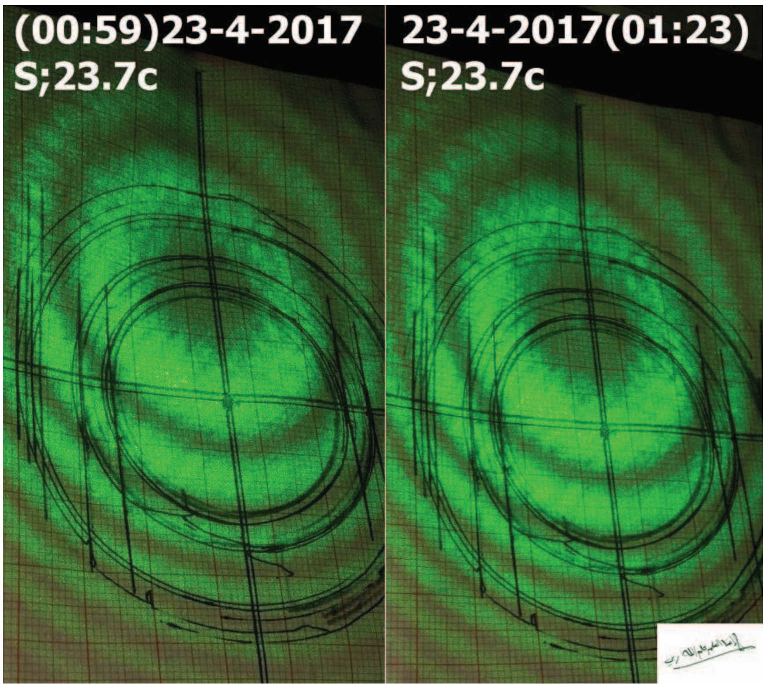
$$\therefore \Longrightarrow t_g = t_{ob}\sqrt{(1-\frac{r_B}{r})}\,; r_B = \frac{2GM}{c^2}; \mathrm{M} = m_\circ(\gamma\, cos(t)); \gamma = \frac{1}{\sqrt{1-{v^2}/{c^2}}}; 0 \le t \le \pi; \ldots . \boxed{4.4}$$

I got a lot of results considering the same temperature and the minimum time elapsed to remove as possible the earth tilting effect and any thermal effect on the interferometer

The folowing are some of these results


21-4-2017
(05-00)H;21.5c
21-4-2017
(05-55)H;21.5c


(01:49)s
23/4;23.5c
(02:32)s
23/4;23.5c
(03:16)s
23/4;23.5c


(00:59)23-4-2017
S;23.7c
23-4-2017(01:23)
S;23.7c

13. Conclusions

1. An observer at infinity or an observer in a flat space-time observing an event in a curve space-time or an observer in a relatively flat space-time observing an event in a curve space time,mathmaticly all are the same thing and we call this in general reativity a non-local observer , in such a circumstances the differences in space-time curvature due to gravity will affect the electric flux and since the electric charge is conserved and since light and virtual photons have zero time and zero rest mass then time dilation will not adjust to correct this change as it happens to other elementary particles then this will affect the electric permittivity of free space in which will affect the speed of light only for a non-local observer as follows.

$$\because (\Phi_E) = E4\pi R^2 \ \therefore\Rightarrow \Phi_E{}' = \frac{E4\pi R_\circ{}^2}{\left(1-\frac{r_s}{r}\right)}$$

$$\because \ \varepsilon_\circ = \frac{q}{\Phi_E} = \frac{q}{E4\pi R^2} \therefore \text{under gravity} \Rightarrow \ \varepsilon' = \frac{q}{E\frac{4\pi R_\circ{}^2}{\left(1-\frac{r_s}{r}\right)}} \ \Rightarrow \varepsilon' = \ \varepsilon_\circ\left(1-\frac{r_s}{r}\right) \because r_s < r \therefore\Rightarrow \varepsilon' < \ \varepsilon_\circ$$

for a black hole in respect to an observer from flat space-time, we have

$$\left[c_T = c\left(\sqrt{2}\right)^{\frac{2M}{m_p}}\right]$$

2. Since space-time interval at the black hole singularity is well defined to be equal to zero as I show before then space-time is a continuous physical entity and not discrete.

$$\because \text{space–time interval at singularity} \equiv ds^2 = -\left(\frac{1}{2}\right)c^2\left(-\frac{\pi}{c^2 4}\right) + \frac{\left(i\frac{\sqrt{\pi}}{4}\right)^2}{\left(\frac{1}{2}\right)} \therefore\Rightarrow ds^2 = \left(\frac{\pi}{8}\right) - \left(\frac{\pi}{8}\right) = 0$$

We observed that at the center of the black holes with the previous equations such that we have a smooth transition from Planck length to half Planck length to less than that until we reach zero without generating singularities

$$near\ singularity\ ;\ r_s = l_p \Rightarrow length\ element\ at\ the\ singularity = i\frac{\sqrt{\pi}}{4} = \frac{l_p}{2}$$

3. Spae-time is not aether because its non-draggable entity it only changes under gravity i.e. differences in space-time curvature due to gravity and this is what separate space-time from the aether i.e. At-Tariq condition and At-Tariq ratio

$$\therefore\Rightarrow c' = \frac{1}{\sqrt{\mu_\circ\varepsilon_\circ\left(1-\frac{r_s}{r}\right)}} \therefore\Rightarrow c' = c\left(1-\frac{r_s}{r}\right)^{-1/2} \ldots.. \boxed{1.3}$$

$$\therefore \ c.(T) = \frac{c}{\left(\sqrt{1-\frac{1}{2}}\right)^{\frac{2M}{m_p}}} = \frac{c}{\left(\frac{1}{\sqrt{2}}\right)^{\frac{2M}{m_p}}} \ ; (T) = \left(\sqrt{2}\right)^{\frac{2M}{m_p}} \ \therefore\Rightarrow c_T = c\left(\sqrt{2}\right)^{\frac{2M}{m_p}} \ldots. \boxed{6.3}$$

4. Gravity is nothing but curvature of space-time created by the probability distribution of the wave function of masses equal or bigger than half Planck mass, i.e. it's not a force its a reaction to the three other forces of nature as long these three forces act at minimum as half Planck mass $\left(M = \frac{m_P}{2}\right)$ and this is the minimum requirements to create curvature in space-time fabric in which we identify it as gravity,

I already proved this when I constructed Newton universal law of gravity from the Schrödinger equation using the half Planck mass condition as follows.

$$\because \frac{GM^2}{r} = n\frac{\hbar^2}{m_P}\frac{(\pi)^2}{r^2\left(\frac{2}{3\pi n dl}\right)^{\frac{2}{3}}}; dl = \left(\frac{2}{3\pi\frac{2M}{m_P}\left(\frac{2}{GM}\frac{\hbar^2}{(m_P)^2}\frac{(\pi)^2}{r}\right)^{\frac{3}{2}}}\right)$$

$$\& \because \ c.(T) = \frac{c}{\left(\frac{1}{\sqrt{2}}\right)^{\frac{2M}{m_P}}}; (T) = \left(\sqrt{2}\right)^{\frac{2M}{m_P}} \therefore\Longrightarrow c_T = c\left(\sqrt{2}\right)^{\frac{2M}{m_P}}$$

In principle, gravity is not a weak interaction "gravity is not just a curvature in space-time it's the difference between a curved and flat space-time i.e gravity depends on the difference of curvature and the relative depth of this curvature and this difference will increase as long as you have two things first a little difference between Schwarzschild radius and the dimensions of the mass in question and second the measurement point location to be at infinity or more specifically in a flat space-time

i.e. how much the difference in the space-time curvature between the measurement point and observer point and thats why its appear to us in most cases as a weak interaction due to the difference between Schwarzschild radius and the dimensions of the mass in question so when the diffrence between Schwarzschild radius and the dimensions of the mass in question become small the gravity efect become bigger and in dramatic way.

$$\text{for black hole : space time contraction factor} \equiv \frac{1}{\sqrt{2}}; \frac{r_s'}{r_s} = \frac{i\frac{\sqrt{\pi}}{4}}{i\frac{\sqrt{\pi}}{2}} = \frac{1}{2}$$

$$\text{for other gravity wells : space time contraction factor} \equiv \left(1 - \frac{r_s}{r}\right)^{-1/2}; r \gg r_s$$

i.e. elementary particles do not meet half Planck mass so it cannot affect space-time until space-time affected by a mass scale bigger than or equal to half Planck mass i.e. $\left(M = \frac{m_P}{2}\right)$ or its equivalent of energy and that's mean a gathering of molecule reaching half Planck mass will curve space-time but the atoms and the elementary particles that make this molecule will not.

In simple words, an electron traveling through a double-slit experiment will not affect space-time but a cluster of molecules with a mass equal to or bigger than half Planck mass will bend space-time as its traveling through space and when it passes through the double-slit its wave function will change and its gravity effect will change too

5. Dark energy is nothing but First -order At-Tariq condition quantum field fluctuations $\left(\frac{2M}{m_P} = 1\right)$ and it's calculated as follows

$$\Lambda = \frac{-3\ k_B K\ \ln(\Omega\sqrt{2}\,)}{\pi^2 l_p}\left(\frac{1}{\gamma}\right)$$

By taking the appropriate relative velocity for Lorentz factor and the appropriate multiplicity(Ω) we will get energy density exactly equal to the experimental value of the cosmological constant For example if we take the multiplicity$\{\Omega = 4\}$ and the relative velocity very close to the speed of light with 34 digits after the comma to be compatible with Planck length in the equation as follow

$$(V = 299{,}792.457{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}8\ {}^{m}/_{s})$$

$$\therefore\Rightarrow \left(\frac{v}{c} = 99.9999999999999999999999999999999999999933287181\%\right)$$

$$\therefore\Rightarrow \Lambda = -1.4028 \times 10^{-9}\ \ (\mathrm{J.m^{-1}.s^{-2}.c^{-2}} \equiv \mathrm{J.m^{-3}})$$

This value is in (93.5%) from the average current experimental accepted values

6. Generalizing the cosmolgical constant formula($\Lambda_\circ$) to include higher energies this will prevent the vacuum catastrophe since the infinite fluctuations of the quantum field will fight against high numbers of $\left(\frac{2M}{m_p}\right)$ in which will bring it all to zero.

$$\Lambda_n = \frac{-3\ k_B K\ \ln(\sqrt{2}\,\Omega)}{(\pi)^2\left(i\frac{\sqrt{\pi}}{4}\right)^{n-1}\left((\gamma_{T2})(\gamma_{T3})(\gamma_{T4})\cdots\cdots(\gamma_{Tn})\right)(l_p)(\gamma)};\ (J.m^{-1}.(s.c)^{-(n+1)});\ \left(\frac{2M}{m_p}n \to \infty\right)\ldots.\boxed{1.8}$$

7. Since the cosmological constant formula is temperature-dependent then the expansion of the universe was bigger in the past due to the early universe high temperatures so it could help us to solve cosmic inflation problem for example if we input Planck temperature to see how the cosmological constant act in the Planck era then we will have really a different expansion by a factor of (10^{32}) if we took my previous result as an estimation reference point then:

$$\therefore\Rightarrow \Lambda_p = -\frac{3c^4\ \ln(\sqrt{2}\,\Omega)}{\pi^2\ G\,\gamma}$$

$$\therefore\Rightarrow G = \frac{3c^4\ \ln(\sqrt{2}\,\Omega\,)}{\pi^2\ 0.7361 \times 10^{23}}\frac{1}{\gamma}$$

$$\text{at } \Omega = 4\ \&\ \text{at } v = 299792457.999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}8\ \text{m/s}$$

$$\therefore\Rightarrow\ \frac{v}{c} = 99.9999999999999999999999999999999999999933287181\%$$

$$\frac{1}{\gamma} = 1.1551 \times 10^{-21}$$

$$\therefore\Rightarrow \Lambda_p = -0.7361 \times 10^{23}\ \ (\mathrm{J.m^{-1}.s^{-2}.c^{-2}} \equiv \mathrm{J.m^{-3}})$$

Since the temperature effect the expansion then the universe will never stop expanding since the absolute zero is impossible basically the big bang is not a repeatable event at anyway.

8. Dark atter is nothing but third-order At-Tariq condition quantum field fluctuations $at\left(\frac{2M}{m_P}=3\right)$

$$Dark\ matter\ density=\frac{\Lambda_3}{c^2}=\frac{3(4)^2\ k_B K\ \ ln\left(\sqrt{2}\,\Omega\right)}{(c^2)\ (\ i)^4\ (\pi)^3(\gamma_{T2})(\ \gamma_{T3})\left(l_p\right)(\ \gamma)};\left(kg.m^{-1}.(s.c)^{-(4)}\right)\equiv(kg.m^{-3})$$

$$at\left(\frac{2M}{m_P}=2\right)\Rightarrow \mathrm{c_{T2}}=\mathrm{c}\left(\left(\sqrt{2}\right)^2\right)=599{,}584{,}916\,\frac{\mathrm{m}}{\mathrm{s}}$$

By taking the virtual particle speed in the second extra time disguised dimension as follow

$$\mathrm{v_{T2}}=593{,}320{,}000\ \frac{\mathrm{m}}{\mathrm{s}},\mathrm{at}\left(\frac{\mathrm{2M}}{\mathrm{m_p}}=2\right)$$

$$at\left(\frac{2M}{m_P}=3\right)\Rightarrow c_{T3}=c\left(\left(\sqrt{2}\right)^3\right)=847{,}941{,}120.00153295549577643436342\ \frac{m}{s}$$

By taking the virtual particle speed in the third extra time disguised dimension as follow

$$v_{T3}=839{,}081{,}190.82720475435501795384 81\frac{m}{s}$$

$$\therefore\Rightarrow \gamma_{T2}=\gamma_{T3}=0.14418160037052164363 89$$

$$\therefore\Rightarrow Dark\ matter\ density=5.3964586\times10^{-27}\times10^{-27};\left(kg.m^{-1}.(s.c)^{-(4)}\right)\equiv(kg.m^{-3})$$

Experimentally the dark matter density in the universe is around $(5.423\times10^{-27};(kg.m^{-3})\ )$ in the assumption of flat universe then this will put our results to be within an accuracy of [96%] from the average current experimental values.

9. As we saw in generalized cosmological constant formula (Λ_G) when we add enormous energy then this will not reveal higher space dimensions instead of this it will only change the measure of the speed of light between a different accelerated frame of reference and this will be translated mathematically into disguised time dimensions and not a higher space dimensions.

$$\Lambda_n=\frac{-3\ k_B K\ \ ln\left(\sqrt{2}\,\Omega\right)}{(\pi)^2\left(i\frac{\sqrt{\pi}}{4}\right)^{n-1}\ \left((\gamma_{T2})(\gamma_{T3})(\gamma_{T4})\cdots\cdots(\gamma_{Tn})\right)\left(l_p\right)(\ \gamma)};\left(J.m^{-1}.(s.c)^{-(n)}\right);\left(\frac{2M}{m_p}n\to\infty\right)\ldots.\boxed{1.8}$$

10. The big bang singularity in expansion terms is as follows

$$\Lambda_\circ=-\frac{3\ \mathrm{c}^4\ \ \ln\left(\sqrt{2}\ \right)}{\pi^2\ \mathrm{G}}\ ;for\ the\ assumption\ of\ no\ prior\ causality\ ;(\Omega=1\ i.e.\equiv0)$$

$$\therefore\Rightarrow\Lambda_\circ=-1274.9\times10^{40}(\mathrm{J.m^{-3}})$$

$$;\ \Lambda_\circ\ \equiv\text{the cosmological constant at }(\mathrm{t}\le0).$$

i.e. space-time expansion is a property for both space-time and it caused by space-time and by virtual particles with energies equal to half Planck mass.

space-time is prior to the big bang itself.

In a short word since I proved that the vacuum has entropy higher than zero with the vacuum entropy then space-time is prior to the big bang itself.

$$\text{vacuum entropy: } S_H = k_B \ln(\sqrt{2})$$

i.e. the universe has a beginning but the time has not.

11. We could drive gravitational constant from the original cosmological constant constant ($\Lambda_\circ$) since it's the most basic elementary equation in physics, infact it's the only equation in which act on a plane and smooth space-time and without prior physical causality there is no other equation act like this and there is no wonder about this we are talking about the first act of physics and the beginning of creation itself

$$\therefore\Rightarrow \Lambda_\circ = -\frac{3 \ \ln(\sqrt{2}\,)}{\varepsilon_\circ{}^2 \mu_\circ{}^2 \pi^2 \ G} \therefore\Rightarrow G = \frac{3 \ \ln(\sqrt{2}\,)}{\varepsilon_\circ{}^2 \mu_\circ{}^2 \pi^2 \ \Lambda_\circ}$$

If we use a less precise approach as Planck era expansion and we use my previous estimation as a reference point then

$$\therefore\Rightarrow \Lambda_p = -\frac{3\sqrt{\frac{\hbar c}{G}}\,c^2 \ \ln(\sqrt{2}\,\Omega)}{\pi^2 \ \sqrt{\frac{\hbar G}{c^3}}}\frac{1}{\gamma} = -\frac{3c^4 \ \ln(\sqrt{2}\,\Omega)}{\pi^2 \ G\,\gamma}$$

$$\therefore\Rightarrow G = \frac{3c^4 \ \ln(\sqrt{2}\,\Omega\,)}{\pi^2 \ 0.7361 \times 10^{23}}\frac{1}{\gamma}$$

$$\text{at } \Omega = 4 \ \& \text{ at } v = 299792457.999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}8 \text{ m/s}$$

$$\therefore\Rightarrow \ \frac{v}{c} = 99.9999999999999999999999999999999999999933287181\%$$

$$\frac{1}{\gamma} = 1.1551 \times 10^{-21}$$

$$\therefore\Rightarrow G \cong 6.6947 \times 10^{-11}\left(\frac{m^3}{kg.\,s^2}\right)$$

12. Time is the scale of causality transmion rate and the dissipation of its sequential order ;where its amount or its "causality transmion rate" decided by the speed of light and the relative speed of light in which decided by updeated factor (γ_T) $\left(\frac{2M}{m_p}\right)$condition inwhich decided by the following law

$$\because \ c' = c\ \left(1 - \frac{r_s}{r}\right)^{-\frac{1}{2}} \text{; as measured by observer at infinity}$$

$$c_T = c(\sqrt{2})^{\frac{2M}{m_p}}\text{ ; } M = n\frac{m_p}{2} \ \text{ ; } n = 1,2,3 \ldots.,$$

and its direction decided by my law of entropy the law of vacuum entropy

i.e. $[S = k_B \ln(\sqrt{2}\Omega)]$ &$[S_H = k_B \ln(\sqrt{2})]$

So an accelerated frame of reference that creating a variance in the speed of light will create a time-disguised dimension in relative to an observer at infinity in another frame of reference and since the speed of light in vacuum is decided by Maxwell law

$\left[c' = \frac{1}{\sqrt{\mu_\circ\epsilon_\circ\left(1-\frac{r_s}{r}\right)}}\right], \left[c_T = \frac{(\sqrt{2})^{\frac{2M}{m_p}}}{\sqrt{\mu_\circ\epsilon_\circ}}\right]$ Since the vacuum has an entropy.

$[S_H = k_B \ln(\sqrt{2})]$ then time exists before the big bang itself and time cannot be zero nor reversed even when entropy get lucky and arrange the system to be less random even in this case then due to vacuum entropy then the system will get more random, and thus time cannot be zero nor reversed.

13. For the experimental part, this is not a new thing it was done in Pound and Rebka gravitational red-shift in nuclear resonance experiment[4] and and this does not violet the special relativity simply because special relativity is exclusively for the non-accelerated frame of reference but here due to gravity we have an accelerated frame of reference.

14. Since the vacuum entropy $\left[S_H = k_B \ln\left(\sqrt{2}(\Omega)\right); \text{in vacuum } \Omega = 1\right]$, then both Boltzman entropy law and Landauer's principle should be revision.

15. The surface temperature of the black hole is as follows,

$$\left[K_T = \frac{K_p}{\ln\sqrt{2}}; K_T \equiv \text{the singularity temperature}\right]$$

16. Relativistic mass differs from gravitational mass and from the inertial mass by $\left(\frac{2M}{m_p}\right)$ condition such that every mass does not reach half Planck mass or more is not a gravitational mass.

17. Black hole entropy is vacuum entropy multiplied by $\left(\frac{2M}{m_p}\right)$ condition of that black hole

$$\left[S_T = \frac{2M}{m_p} k_B \ln\sqrt{2}\right]$$

18. The virtual particles with energy equal to half Planck mass are bending space-time at Planck level and elevating the speed of light by a factor of $\left(\sqrt{2}^{\frac{2M}{m_p}}\right)$ for an outside observer and that will let other virtual particles to move faster than the speed of light in respect to us but in there frame of reference they move less than there speed of light and they follow the updated factor (γ_T) and updated transformations it's exactly as Lorentz transformations but using the updated factor (γ_T)

$$; \gamma_T = \frac{1}{\sqrt{1 - \left(\frac{v}{c(\sqrt{2})^{\left(\frac{2M}{m_p}\right)}}\right)^2}}$$

[4] In fact, there is a german physics enthusiastic his name is Mr. Martin Grusenick he made the first working vertical moving Michelson–Morley experiment and his work should be noticed
But he couldn't figure it out he even put a full demonstration and documentation on youtube for his experiment with full results but his work was used by pseudoscience on the internet a lot (https://youtu.be/7T0d7o8X2-E)

19. Space-time is not aether because aether is a medium filling the vacuum and dragged by any mass moving through it while space-time is a physical fabric with special properties it could expand to infinity and constrict to zero in response to an exclusive wave function of masses that follows $\left(\frac{2M}{m_p}\right)$condition and unlike aether, it can not be affected with any mass less than half Planck mass condition, in fact, it affected exclusively by the wave function of masses equal or more than half Planck mass and I have proven this previously when I calculated the changing in the speed of light due to $\left(\frac{2M}{m_p}\right)$conditionin equation ($\boxed{5.3}$&$\boxed{6.3}$&$\boxed{7.3}$)

$$\left[M = n\frac{m_p}{2} \ \ ; n = 1,2,3 \ldots\right], \left[c_T = c\left(\sqrt{2}\right)^{\frac{2M}{m_p}}\right], \left[t_g = t_{ob}\sqrt{2}\right]$$

And it’s unlike aether it's un-draggable and it will only change its nature due to gravity.

20. Any gravity well moving in a relative speed should gain a relative mass and according to my work the gravitational potational should be different for a fixed observer as example observer on the serface of the earth since the earth revolving around itself then the velocity rate of this movement is relative to this observer is changing with this rotation as follows

$$\therefore\Rightarrow t_g = t_{ob}\sqrt{\left(1-\frac{r_B}{r}\right)}\,; r_B = \frac{2GM}{c^2}; \mathrm{M} \ = \ m_\circ(\gamma\, cos(t)); \gamma = \frac{1}{\sqrt{1-v^2/_{c^2}}}; 0 \le t \le \pi; \ldots.\boxed{4.4}$$

And this change in gravitational time dilation which direction dependent is nothing but an artificial gravity & artificial anti-gravity

We will have a different rate of gravitational time dilation that’s vary with angle and this will create a gravity around the accelerated mass i.e. artificial gravity or artificial antigravity

This effect just looks to me like a mule's hoof or a donkey’s hoof pushing in a run.

21. For a rotating black-hole the relative mass due to the rotational velocity will effect as follow

$$\therefore\Rightarrow \ \mathrm{r_{Sf}} = \frac{2\mathrm{Gm_{\circ T}}}{\mathrm{c^2}}; \ \mathrm{m_{\circ T}} = \frac{\mathrm{M}(\gamma\, cos(t))}{(2)^{\left(\frac{2M}{m_p}\right)}}; \frac{2M}{m_p} \ge 1; \gamma = \frac{1}{\sqrt{1-v^2/_{c^2}}}; 0 \le t \le \frac{\pi}{2}; \ldots.\boxed{2.4}$$

$$at\ (t) = \frac{\pi}{2} \therefore\Rightarrow r_{Sf} = 0 \ldots.\boxed{3.4}$$

i.e. black holes are drilled from the pools to the center with cylinder of a radius of Planck length

Since the Schwarzschild radius will always run away from anything falling in the black hole, such that the virtual particles at mostly will not be separated and it fall together in the black hole and when it reaches the center it should leave through this drill which penetrates the black hole from the center to its poles since at the poles all the way to the center Schwarzschild radius is zero

This is appropriate solution for losing matter to the black hole singularity, the information paradox and the relativistic jets.

22. The fine-structure constant does not affect by gravitational blue-shift or by the quantum field of energies equal to or bigger than half Planck mass since the fine-structure constant is considered a local observer,

$$\because \mathrm{c}' = \mathrm{c}\left(1-\frac{\mathrm{r_s}}{\mathrm{r}}\right)^{-1/_2}; (\mathrm{c}') \text{ as measured by an observer at infinity}$$

since elementary particles are local observer $\therefore\Rightarrow c' = c \ \therefore\Rightarrow \alpha$ constant

14. Key features

- $equation\ numbering\ is\ as\ follows\ \boxed{a.b};\ \boxed{a}\ is\ equation\ number\ and\ \boxed{b}\ is\ chapter\ number$
- $\varepsilon_\circ$ ≡ the electric permittivity of the free − space
- $\mu_\circ$ ≡ magnetic permeability of the free − space
- Φ_E ≡ electric flux
- q ≡ electric charge
- E ≡ electric field
- M ≡ mass of the gravity well
- Φ ≡ gravity potential
- G ≡ Gravitational constant
- r ≡ gravity well radius
- c' ≡ updated speed of light due to gravity as measured by an observer at infinity
- v ≡ photon frequency in free − space
- v_g ≡ photon frequency near a gravity well, i. e., blue − shifted
- t_g ≡ *the proper time at the surface of the gravity source*
- t_{ob} ≡ *the proper time at the observer point*
- λ ≡ wavelength
- λ_g ≡ wavelength near gravity well blue − shifted as measured by an observer at infinity
- R = shrinking length of space–time due to gravitational effects
- $R_\circ$ = ordinary length of space − time free of any effect of gravity
- ε' ≡ updated electric permittivity of the free − space due to gravity
- ds^2 ≡ space–time interval
- r_s ≡ Schwarzschild radius
- $r_s{}'$ ≡ updated Schwarzschild radius due to gravity as measured by an observer at infinity
- $dr_s{}^2$ ≡ line element squared in Schwarzschild metric
- $dt_s{}^2$ ≡ time element squared in Schwarzschild metric
- l_p ≡ Planck length

- $m_p \equiv$ Planck mass
- $M \equiv$ gravity well mass
- $\left(T = (\sqrt{2})^{\frac{2M}{m_p}}\right) \equiv$ At − Tariq ration and At − Tariq condition condition
- $c_T \equiv$ speed of light at event horizon or singularity calculated by an observer at infinity
- $\left(r_T = i\frac{\sqrt{\pi}}{4}\right) \equiv$ black hole or At − Tariq ratio radius
- $r_B \equiv Schwarzschild\ radius\ due\ to\ relativistic\ mass\ effect\ or\ space - time\ hoofing\ effect$
- $\hbar \equiv$ Planck reduced constant = $(h/2\pi)$
- $k_B \equiv$ Boltzmann constant
- $S \equiv$ entropy
- $S_H \equiv$ vacuum entropy i. e. empty space − time entropy or in arabic (al − hubook entropy)
- $\Omega \equiv$ microstates multiplicity
- $K_T \equiv$ blackhole Surface temperature for a local observer
- $S_T \equiv$ black hole entropy
- $U \equiv$ energy in thermodynamic part
- $\gamma \equiv$ Lorentz factor
- $\gamma_T \equiv$ At − Tariq factor
- $F_p \equiv$ Planck force
- $g \equiv$ surface gravity
- $\alpha \equiv$fine-structure constant and the graviton effects
- $\Lambda_\circ \equiv$ cosmologecal constant at $(t = o)$
- $\Lambda_P \equiv$ cosmologecal constant at Planck era
- $\Lambda_G \equiv$ Generalized cosmological constant for energies higher than half Planck mass

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