The black hole catastrophe paradox

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Based on Einstein's field equations (Fig. 1), mass curves space time and curvature of space-time dictates the gravitational field around the mass. This article tries to show a paradox that leads to the conclusion that if the gravitational field increases in a local region of the universe ,anti –gravity must increase throughout the universe to prevent a catastrophe that might lead to the end of space-time and information.

$$R_{\mu\nu} - \frac{1}{2} R\, g_{\mu\nu} + \Lambda\, g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$

Fig. 1: The Einstein's field equation.

I. INTRODUCTION

The Einstein's field equation main interpretation is that mass & energy curve space-time and curvature of space time dictates the movement of objects, based on their shortest geodesic path in the curved space-time.

Let us now imagine a small low energetic universe model at a steady state equilibrium, meaning the gravitational curvature of space-time is flat at its edges and it is not expanding nor shrinking (collapsing). This small steady universe model can be described by the Einstein's field equation and it maintains space -time, mass, energy and information.

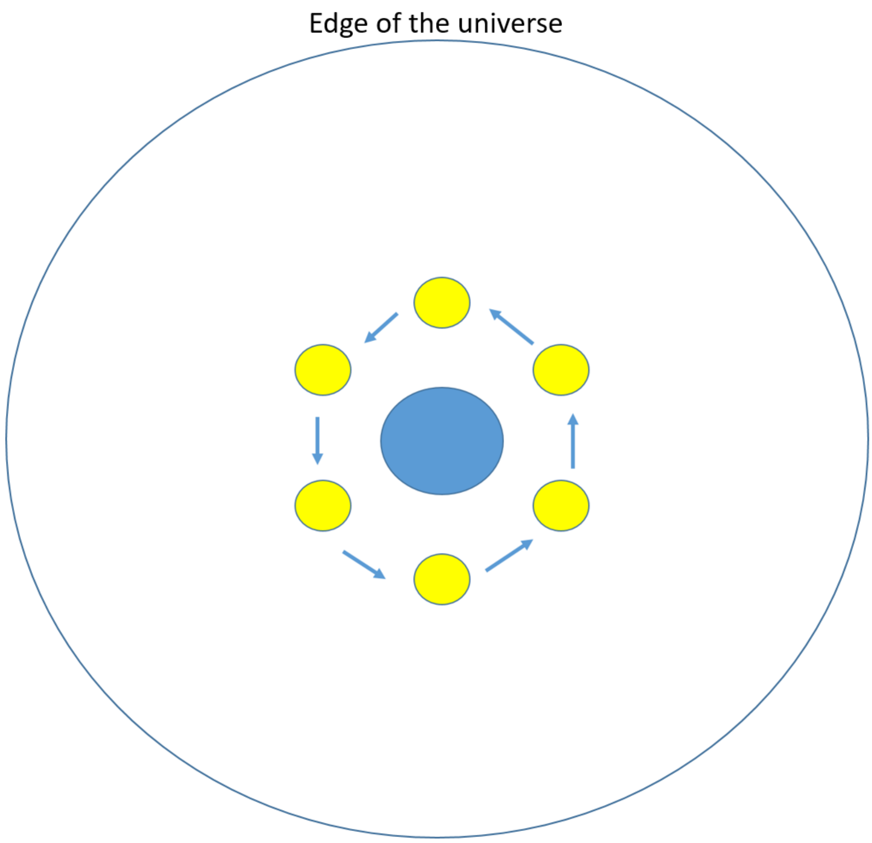

Fig. 2: the stable steady state universe model with only 1 star in the center and 6 planets orbiting around it in its gravitational field. This imaginary small stable universe is balanced between the gravitational curvature of space –time caused by mass and energy and the expansion of space –time caused by the Einstein cosmological constant.

II. THE BLACK HOLE CATASTROPHE

Let’s imagine now that a force is applied on each of the 6 planets towards the central star (Fig.3). As these planets get closer to the star the gravitational pull increases and their kinetic energy towards the star increases.

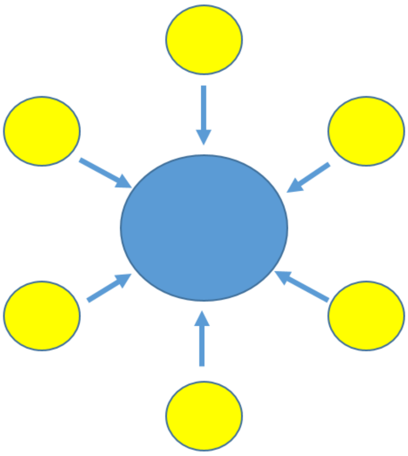

Fig. 3: Force is applied on the planets towards the central star.
Let us assume that when the planets collide with the star the total mass and the kinetic energy is high enough to collapse into a black hole.

Let us assume that this new emerging black hole with the total mass of the star, the 6 planets and their kinetic energy has a gravitational pull larger than the universal constant expanding push, causing the entire space-time to be sucked and crushed into the black hole's singularity (Fig. 4). This catastrophe is the end of this universe, the end of time, space and information.

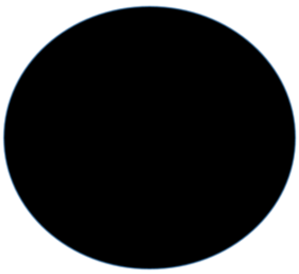

Fig. 4: The event horizon that is left behind after the entire universe was sucked and crushed into the black hole's singularity. For this unfortunate small universe it is the end of time, space and information.

Another puzzling thought is the uncertainty of this tragic ending since we could imagine applying the same force on each planet outwards (instead of inwards) from the central star (Fig. 5) and then the small universe will keep expanding forever due to the cosmological constant that is evenly spread throughout space and its expanding effect increases as the void of space increases. Is the universe final destiny a matter of probability (like for example the Schrodinger's cat)? Can we stop time? Can we make information disappear forever? Are these basic universal concepts un-stable, dictated by probability and chance?

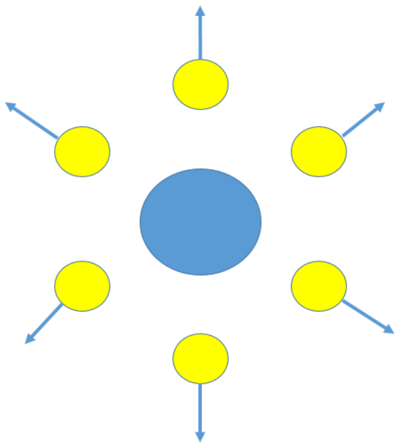

Fig. 5: Small force is applied on the planets outwards from the central star.

III. How to overcome the paradox

In order to define a universe that its destiny is not dictated by chance there should be a balance between the gravitational pull and the anti – gravitational push. This can be achieved through a correlation between Einstein's tensor which defines gravitational pull and the Cosmological constant which defines the anti-gravitational push (Fig. 6).

We predict that the Cosmological constant is caused by the anti – matter particles which are spread throughout space and are gravitationally correlated to the matter particles through the GRID dimensions ([1], [2], [3]).

So in our example, when the star and planets are transformed into a black hole through a collision, the Einstein tensor dictates an extreme curvature of space-time passed the black hole's event horizon (gravitational pull) while at the same time the anti – matter particles, which are spread throughout space and are gravitationally correlated to the matter particles , increase the cosmological constant (anti – gravitational push) and this correlated opposite force prevents from the black hole to swallow the rest of the universe and crush it to its singularity . With time as the black hole evaporates through Hawking radiation the Einstein tensor decreases it's curvature and simultaneously the correlated Cosmological constant decreases its expansion rate. This way space-time and information are not doomed to disappear into the singularity of the black hole.

$$G_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$

$G_{\mu\nu}$ = Einstein's tensor $\quad$ Λ = Cosmological constant

$$\Lambda = Function\ of\ (G_{\mu\nu})$$

Fig. 6: The cosmological constant (anti – gravitation expansion "push") is a function of the Einstein tensor (gravitation curvature "pull") in a way that they balance each other and prevent the universe from collapsing into singularity or from stretching and being torn apart.
As matter clusters together the expansion of the universe accelerates and as matter radiates into energy the expansion of the universe slows down. This explains why the expansion of the universe accelerates as the universe changed from a radiation dominant universe to matter dominant universe.

V. CONCLUTION

This article is focused on a basic question regarding Einstein's field equations. Assuming that there is no correlation between the Einstein tensor ($G_{\mu\nu}$) and the cosmological constant (Λ) , than we can show two different scenarios in which a small stable universe can either crush into a black hole singularity or expand forever by inserting a small energy into the entire universal system. Since the direction of this inserted energy can be dictated by quantized uncertainty fluctuations than the destiny of this universe is uncertain like the Schrodinger's cat experiment. In order to enable a more definitive stable universe we suggest that the cosmological constant and the Einstein tensor are correlated in a way that when the local curvature increases (the Einstein tensor), the expansion of space increases (the cosmological constant) and when the local curvature decreases (as mass becomes radiation), the expansion of space decreases. This will prevent in our example the scenario in which the universe collapses into a black hole's singularity on one hand and the scenario in which the universe accelerates its expansion forever on the other hand.

When $G_{\mu\nu}$ (caused by clustered matter particles) curvature increases the gravitational pull increases on one hand, but because of the correlation between matter and anti-matter particles, Λ (caused by spread anti-matter particles) increases the expansion of space on the other hand. Same thing the other way round, and this enables the stability of the universe and the prevention of the "black hole catastrophe"

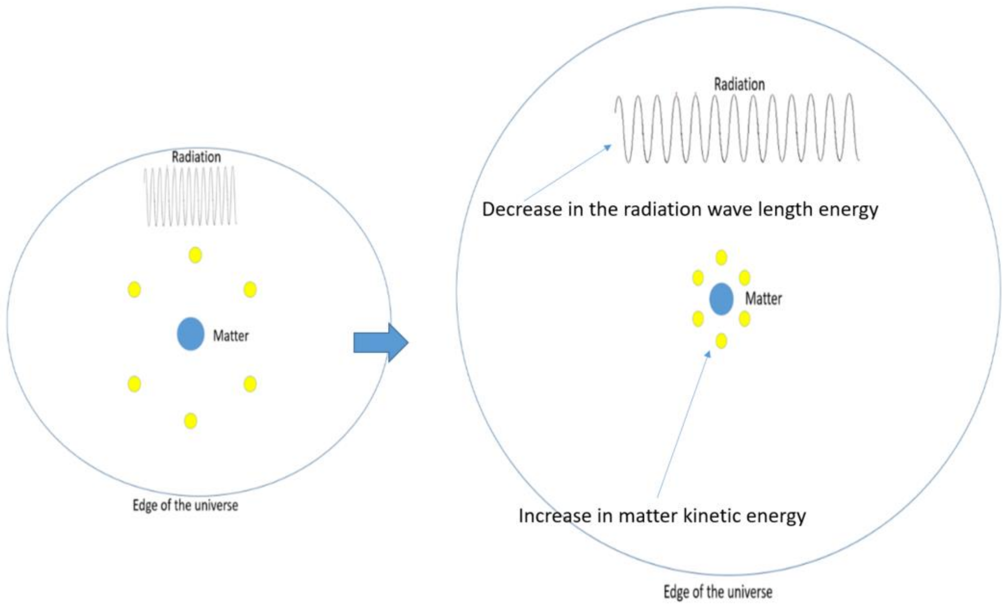

Fig. 7: On the left, a universe with matter spread apart applying low gravitational force on each other while a high frequency radiation wave is traveling across this universe. On the right, as matter starts clustering together the gravitational curvature grows ($G_{\mu\nu}$) , the matter kinetic energy increases and the correlated expansion of space (Λ), the cosmological constant, increases causing the entire space-time to accelerate its space –time expansion. The expansion of space expands the travelling radiation's wave length decreasing its energy. In our universe as radiation became matter and matter clustered together to stars, universe, universe clusters, and black holes, the kinetic energy increased, space accelerated its expansion while the background radiation decreased its energy until it reached the micro wave background radiation that we measure today. As our universe will become cold

and spread apart the black holes will start evaporating to Hawking radiation gravity will decrease and space will slow down its expansion rate.

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[1] Quantization of photonic energy and photonic wavelength

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[2] Anti-matters gravity paradox

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[3] Entanglement between matter and anti-matter particles

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