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Space-Time Tearing

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Abstract The idea behind space-time tearing is that under huge gravity the fabric of space-time, may tear apart. In this paper the method of detection or the consequences of space-time tearing is mentioned.

Keywords Entropy, Black hole Mechanics, Hawking Radiation, Space-Time Fabric, Event Horizon

1. Introduction

General Relativity is the geometric theory geometric theory of gravitation which describes the gravitation in modern physics. It also states that under gravity the space-time fabric bends. But can the fabric of space-time tear and what are the consecquences? To solve the question a case of a black hole is taken under consideration and a point in space-time fabric is considered to be torn, but what is the consequences of tearing and how can it be detected? For calculation purpose 3 points on the space-time is taken and entropy at those point is calculated.

a. Event horizon
b. Torn portion
c. Singularity

It is known that energy flows from low entropy to high entropy.

From:

$$S_{bh} = \kappa_b A/4lp^2$$

It is known that entropy is directly proportional to area: hence under conformal situation energy flows from singularity to the Event horizon. But as and when the space-time fabric tears and area of torn portion exceeds area of the event horizon thereby increasing entropy of the torn portion than the event horizon hence energy starts to flow from singularity to the torn portion.

SYMBOLS - a. Sbh - Entropy

1. SS – Entropy of Singularity
1. SS – Entropy of Singularity
2. SE - Entropy of Event Horizon
3. ST - Entropy of Torn Portion
   b. κb - Boltzmann's Constant
   c. 4lp2- Planck's Length
   d. κ - Surface Gravity
   e. M - Mass
   f. Ω - Angular Velocity
   g. J - Angular Momentum
   h. ϕ - Electrostatic Poential
   i. Q - Charge
   j. c - Speed of Light
   k. A – Area
1. AS – Area of Singularity
2. AE - Area of Event Horizon
3. AT - Area of Torn Portion

2. Space-Time Tearing

To calculate entropy of a black hole requires the help of the profound theories on black hole that is Hawking Radiation. It is known that energy flows from low entropy to high entropy. Hence under normal condition energy flows from the core (singularity) towards the event horizon (that clearly suggests that the core is in a state of low entropy whereas the event horizon is at high entropy. As and when space-time fabric tears the torn portion acquires highest entropy state. Hence diverting the direction of flow of energy in the form of radiation towards the torn portion. After space-time fabric tears the energy flows from the core towards the torn portion. Hence the pattern of flow of energy is from low entropy towards high entropy.

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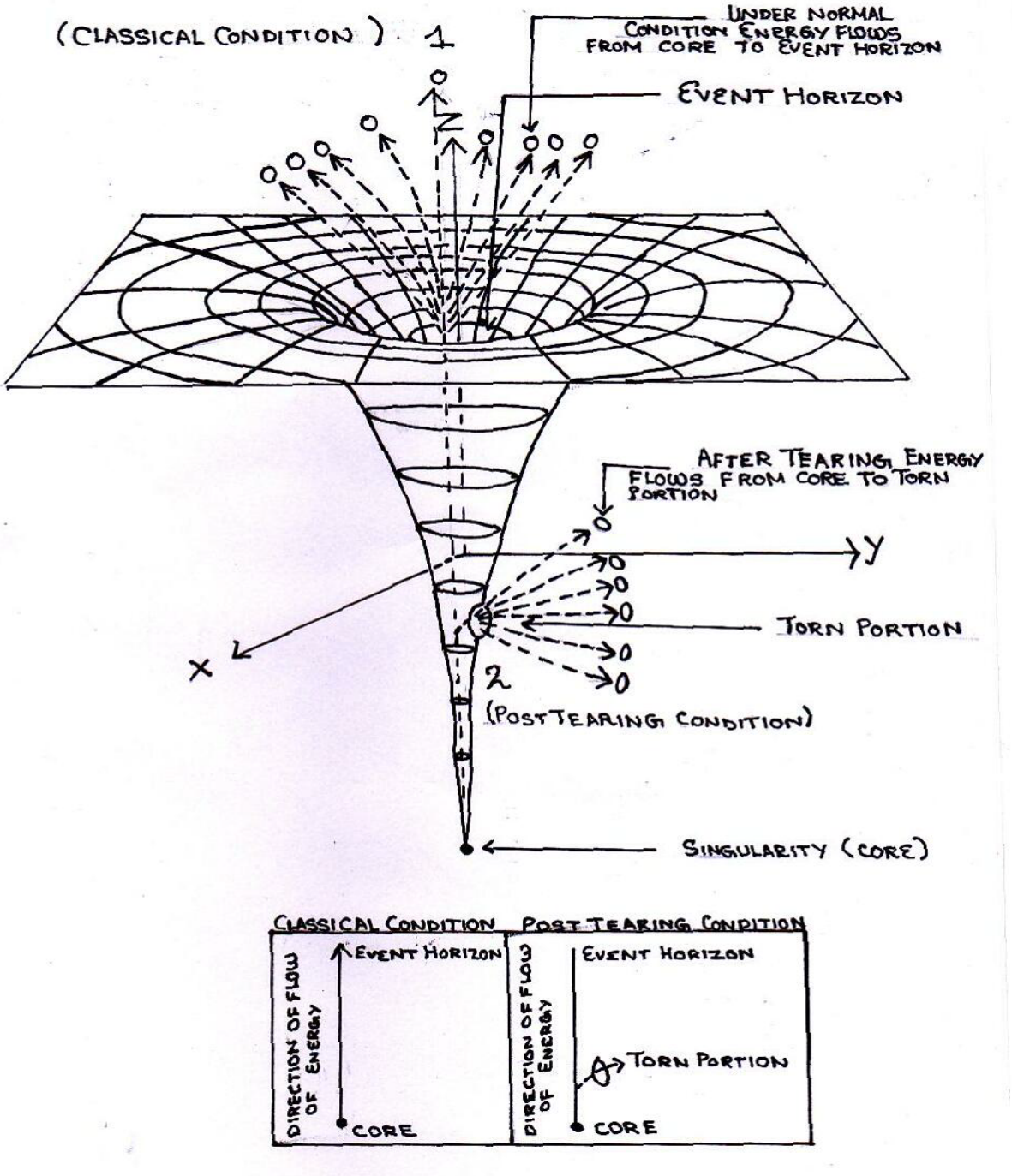

Figure 1.

3. Equations

$$\delta M = \kappa\delta A/8\pi G + \Omega\delta J + \phi\delta Q \quad (1.1)$$

$$\delta E/c^2 = \kappa\delta A/8\pi G + \Omega\delta J + \phi\delta Q \quad (1.2)$$

$$\delta E = c^2(\kappa\delta A/8\pi G + \Omega\delta J + \phi\delta Q) \quad (1.3)$$

$$\delta E = c^2\kappa\delta A/8\pi G + c^2\Omega\delta J + c^2\phi\delta Q \quad (1.4)$$

$$-c^2\kappa\delta A/8\pi G = c^2\Omega\delta J + c^2\phi\delta Q - \delta E \quad (1.5)$$

$$-\kappa\delta A/8\pi G = (c^2\Omega\delta J + c^2\phi\delta Q - \delta E)/c^2 \quad (1.6)$$

$$-\kappa\delta A/8\pi G = \Omega\delta J + \phi\delta Q - \delta E/c^2 \quad (1.7)$$

$$\kappa\delta A/8\pi G = \delta E/c^2 - \Omega\delta J - \phi\delta Q \quad (1.8)$$

$$\kappa\delta A = 8\pi G(\delta E/c^2 - \Omega\delta J - \phi\delta Q) \quad (1.9)$$

$$\delta A = 8\pi G(\delta M - \Omega\delta J - \phi\delta Q)/\kappa \quad (2.0)$$

From Hawking Radiation:

$$S_{bh} = \kappa_b A/4lp^2 \quad (2.1)$$

$$A = S_{bh}4lp^2/\kappa_b \quad (2.2)$$

$$\delta A = \delta(S_{bh} 4lp^2/\kappa_b) \quad (2.3)$$

$$1/\kappa_b\, \delta(s_{bh} 4lp^2) = 8\pi G(\delta M - \Omega\delta J - \phi\delta Q)/\kappa \quad (2.4)$$

$$\delta(s_{bh} 4lp^2) = \kappa_b\{8\pi G(\delta M - \Omega\delta J - \phi\delta Q)/\kappa\} \quad (2.5)$$

$$4lp^2(\delta S_{bh}) = \kappa_b\{8\pi G(\delta M - \Omega\delta J - \phi\delta Q)/\kappa\} \quad (2.6)$$

$$\delta S_{bh} = \kappa_b\{8\pi G(\delta M - \Omega\delta J - \phi\delta Q)/\kappa\}/4lp^2 \quad (2.7)$$

$$\delta S_{bh} = \kappa_b\{8\pi G(\kappa\delta A/8\pi G + \Omega\delta J + \phi\delta Q - \Omega\delta J - \phi\delta Q)/\kappa\}/4lp^2 \quad (2.8)$$

$$\delta S_{bh} = \kappa_b[\{8\pi G(\kappa\delta A/8\pi G)\}/\kappa]/4lp^2 \quad (2.9)$$

$$\delta S_{bh} = \kappa_b\{\kappa\delta A/\kappa\}/4lp^2 \quad (3.0)$$

$$\delta S_{bh} = \kappa_b\delta A/4lp^2 \quad (3.1)$$

4. Calculating Entropy for

a. Core (Singularity): Are of singularity = 0

By $\delta S_S = \kappa_b\delta A_s/4lp^2$

Therefore entropy in core or singularity is zero.

b. Event Horizon: $\delta S_E = \kappa_b\delta A_E/4lp^2$

c. Torn portion: $\delta S_T = \kappa_b\delta A_T/4lp^2$

5. Results

Entropy in the core or singularity is calculated to be zero. Thereby proving that singularity remains in a state of low entropy than the event horizon. Hence under classical situation energy in the form of radiation flows from the core (singularity) towards the event horizon but as and when tearing of space-time fabric will take place the direction of flow of energy will get deflected if and only if the area of the torn portion is more than that of the event horizon. Thereby keeping the torn portion at the highest entropy state. And as we know that energy flows from low entropy towards high entropy, therefore when the area of torn portion will be more than the event horizon, automatically the torn portion will acquire higher entropy than that of the event horizon and as soon as the torn portion will acquire higher entropy than the event horizon the direction of flow of energy will change. And then energy will flow from the core (singularity) towards the torn portion.

$$\mathbf{S_S < S_E < S_T} \quad \text{or} \quad \mathbf{A_S < A_E < A_T}$$

6. Conclusions

The equation used in this paper of mine clearly shows that the bigger is the area the greater is the entropy. It is known that area decreases as we reach towards the core or singularity region of the black hole. That clearly means that the area of event horizon will definitely be more than the core (singularity). Therefore the entropy at event horizon will be more than that of the core (singularity) and hence under classical conditions the energy in the form of radiation flows from the core(singularity) towards the event horizon. But if space-time tearing has taken place the deflection in the flow of energy can only be noticed if the area of torn portion is more than that of the event horizon. That is the torn portion is at higher entropy than the event horizon. Thereby enabling the energy flow to deflect. And flow from the core (singularity) towards the torn portion. Thereby following the law that energy flows from low entropy to high entropy. In this case there are three points who's entropy are to be calculated that is event horizon, torn portion and core. Out of these three core is the origin (the place from where the energy starts to flow). But as I have discussed before that the deflection will only take place if the area of the torn portion is more than that of the event horizon, thereby achieving higher entropy than that of the event horizon and thereby changing the path of flow of energy.

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