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Understanding Black Holes: Exploring Their Destruction, SpaceTime Geometry, and the Theory of Relativity

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Abstract: ***This paper is about the destruction of a black hole, along with the concepts of space time geometry. And it also focuses on the theory of relativity.***

Keywords: Light – Space time symmetry – black hole – relativity

1. Introduction

Breaking of the Schwarzschild symmetry:

$$c < \vartheta < \sqrt{2}c$$

$$c^2 d\tau^2 = \left(1 - \frac{r_s}{r}\right) c^2 dt^2 - \frac{dr^2}{1 - \frac{r_s}{r}} - r^2 d\theta^2 \qquad \text{...... (1.1)}$$

We know that sunlight cannot escape from a blackhole due to the strong gravitational forces of attraction which collapses into a singularity.

And to escape one should travel at a speed which is $\sqrt{2}$ times the speed of light. But the Schwarzschild Symmetry would be broken and the black hole will not remain a black hole it will loose all connections with other universes through its singularity and would be nothing other than a mass with distorted space-time. So, one should travel at a speed which is greater than the speed of light but less than $\sqrt{2c}$, to escape from a black hole to another universe.

2. Bending of Light

$$\varphi = \int \frac{\mathrm{dr}}{\mathrm{r}^2 \sqrt{\frac{1}{\mathrm{b}^2} - \left(1 - \frac{r_s}{\mathrm{r}}\right)\frac{1}{\mathrm{r}^2}}}$$

$$\mathrm{d}\varphi \approx \frac{2\mathrm{r_s}}{\mathrm{b}} = \frac{4\mathrm{GM}}{\mathrm{c}^2\mathrm{b}} \qquad \text{........ (2.1)}$$

where $b = r_3\sqrt{\frac{r_3}{(r_3 - r_s)}}$

Sunlight's deviation is 1.75 arcseconds.

$$\Rightarrow \frac{2r_s}{b} = \frac{4GM}{c^2 b}$$

$$\Rightarrow r_s = \frac{2GM}{c^2}$$

$$\Rightarrow \partial\varphi = \frac{4GM}{c^2 b}$$

$$\Rightarrow \int \partial\varphi = \int \frac{4GM}{c^2 b}\ \partial\varphi$$

$G = \frac{G^{\mu\vartheta}}{8\pi K^2 T^{\mu\vartheta}}$ is the gravity affecting curvature

$$\Rightarrow G \propto \frac{1}{K^2}$$

Assuming curvature to be radius of a black hole,

$$\Rightarrow G \propto \frac{1}{R^2}$$

$$\Rightarrow G = \frac{G^{\mu\vartheta}}{8\pi R^2 T^{\mu\vartheta}} \qquad \text{....... (2.2)}$$

Where, $T^{\mu\vartheta} = \left[F^{\mu}_{\alpha} F^{\vartheta}_{\beta} - \frac{1}{4}\eta\, F_{\alpha\beta}F^{\alpha\beta}\right]$

$$and\ \eta = \begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

We know,

$$2c^2 = \frac{4GM}{R} \qquad \Rightarrow R = \frac{2GM}{c^2}$$

Substituting value of R in equation (2.2), we get

$$\Rightarrow G = \frac{G^{\mu\vartheta}}{8\pi\left(\frac{2GM}{c^2}\right)^2 T^{\mu\vartheta}} \qquad \text{........ (2.3)}$$

$$R = \frac{2GM}{c^2} \quad \Rightarrow c^2 = \frac{2GM}{R} \quad \Rightarrow c = \sqrt{\frac{2GM}{R}}$$

$$\Rightarrow \sqrt{2}c = \sqrt{2}\sqrt{\frac{2GM}{R}}$$

$$\Rightarrow 2c^2 = \frac{4GM}{R}$$

Schwarzschild symmetry is destroyed. Thus, the curvature of a black hole gets distorted when light at a speed $\sqrt{twice}$ its own speed enters into the black hole.

So, we can travel when, $c < \vartheta < \sqrt{2}c$.

Even at such velocities, the black hole will get distorted but travelling would be possible and when the velocity (ϑ) equals $\sqrt{2}c$ the black hole is destroyed.

3. Comparing a Black Hole to the Universe

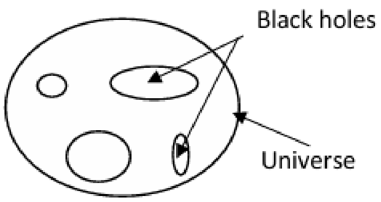
$$=> \frac{R^2cA+4S\hbar G}{R^2} = \frac{8G_pcKA+4\Lambda S\hbar G}{3K}$$
$$=> R^2 = \frac{3R^2KcA+12SK\hbar G}{8G_pcKA+4\Lambda S\hbar G}$$
$$=> R = \sqrt{\frac{3R^2KcA+12SK\hbar G}{8G_pcKA+4\Lambda S\hbar G}}$$

Radius of our universe. ....*(3.1)*

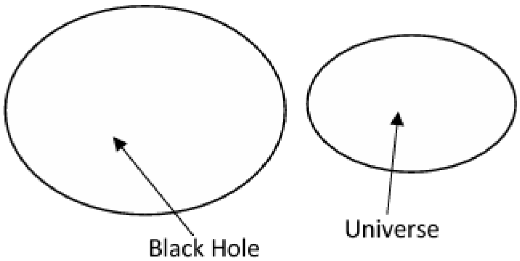
If $R_{B=}R_{u}$,

R = $\frac{2GM}{c^2}$, Radius of a black hole,

Now, there are many black holes present in the universes, which implies $R_B < R_u$.



But what if $R_B > R_u$,



$$\left(\frac{R'}{R}\right)^2 - \frac{8}{3}G_p - \frac{1}{3}\Lambda c^2 = -\frac{Kc^2}{R^2}$$
$$=> \left(\frac{R'}{R}\right)^2 - \frac{8}{3}G_p - \frac{1}{3}\Lambda c^2 = -\frac{Kc^2}{R^2} \quad .... \quad (3.2)$$

$$S = \frac{c^3KA}{4\hbar G}$$
$$=> c^3 = \frac{4S\hbar G}{KA} \qquad => c^2 = \frac{4S\hbar G}{cKA}$$

Substituting c^2 in equation (3.2)

$$=> \left(\frac{R'}{R}\right)^2 - \frac{8}{3}G_p - \frac{1}{3}\Lambda\left(\frac{4S\hbar G}{cKA}\right) = -\frac{K\left(\frac{4S\hbar G}{cKA}\right)}{R^2}$$

$$=> \left(\frac{R'}{R}\right)^2 - \frac{8}{3}G_p - \frac{1}{3}\Lambda\left(\frac{4S\hbar G}{cKA}\right) = -\frac{4S\hbar G}{cR^2A}$$

$$=> \left(\frac{R'}{R}\right)^2 + \frac{4S\hbar G}{cR^2A} = \frac{8}{3}G_p + \frac{1}{3}\Lambda\left(\frac{4S\hbar G}{cKA}\right)$$

$$=> \frac{R'^2cA + 4S\hbar G}{cR^2A} = \frac{8G_pcKA+4\Lambda S\hbar G}{3cKA}$$

$$=> \frac{R'^2cA + 4S\hbar G}{R^2} = \frac{8G_pcKA+4\Lambda S\hbar G}{3K} \quad ...... (3.3)$$

Also,

$$2m_0c^2(h\vartheta - h\vartheta') = 2(h\vartheta)(h\vartheta') - 2(h\vartheta)(h\vartheta')cos\phi$$
$$=> 2h(\vartheta - \vartheta')m_0c^2 = 2h^2\vartheta\vartheta'(1 - cos\phi)$$

$$Or, \frac{\vartheta-\vartheta'}{\vartheta\vartheta'} = \frac{h}{m_0c^2}(1 - cos\phi)$$

$$=> \frac{1}{\vartheta'} - \frac{1}{\vartheta} = \frac{h}{m_0c^2}(1 - cos\phi)$$

$$=> \lambda' - \lambda = \frac{h}{m_0c^2}(1 - cos\phi) \; .... (3.4)$$

$$tan\phi = \frac{\vartheta\phi Sin\theta}{(\vartheta-\vartheta')Cos\theta} \quad ...... (3.5)$$

$$=> \delta\varphi = \frac{2P}{b}\frac{1}{\sqrt{c^4}}$$

$=> \delta\varphi = \frac{2P}{b}\frac{1}{c^2}$ divergence of light related to the speed of light .... *(3.6)*

$=> \delta\varphi = \frac{2P}{b}\frac{1}{2GE}$ divergence of light related to the visible energy of a black hole ....*(3.7)*

$=> \partial\varphi = \frac{2P}{b}\frac{1}{\sqrt[6]{\left(\frac{\Lambda}{3}+\frac{R^{\mu\vartheta}}{g^{\mu\vartheta}}-\frac{1}{6}R\right)\left(\frac{12G^2M^2g^{\mu\vartheta}}{G^{\mu\vartheta}}\right)}}$ divergence of light related to the dark energy of a black hole. .... *(3.8)*

$$2\frac{r_s}{b} = \frac{4GM}{c^2b} \qquad => \partial\varphi \approx \frac{2r_s}{b}$$
$$=> \partial\varphi = P\frac{2r_s}{b} \quad .... (3.9)$$

where P = a constant (undefined).

$$\varphi = \int \frac{dr}{r^2\sqrt{\frac{1}{b^2}-\left(1-\frac{r_s}{r}\right)\frac{1}{r^2}}}$$
$$=> \partial\varphi = \frac{2Pr_s}{b} = P\frac{4GM}{c^2b}$$
$$=> \partial\varphi = P\frac{4GM}{c^2b}$$
$$=> \partial\varphi = 2P\frac{2GM}{c^2b}$$
$$=> \partial\varphi = \frac{2P}{b}\frac{2GM}{c^2}$$

$=> \partial\varphi = \frac{2P}{b}\sqrt{\frac{G^\wedge\mu\vartheta}{8\pi GT^{\mu\vartheta}}}$ divergence of light inside the tensor fields of a black hole .... *(3.10)*

4. Energy Inside a Black Hole

$$G = \frac{G^{\mu\vartheta}}{8\pi\left(\frac{2GM}{c^2}\right)^2T^{\mu\vartheta}}$$

$$=> \left(\frac{2GM}{c^2}\right)^2 = \frac{G^{\mu\vartheta}}{8\pi GT^{\mu\vartheta}}$$
$$=> 8\pi G = \frac{G^{\mu\vartheta}}{\left(\frac{2GM}{c^2}\right)^2T^{\mu\vartheta}}$$
$$=> \frac{8\pi G}{c^4} = \frac{G^{\mu\vartheta}}{\frac{\left(\frac{2GM}{c^2}\right)^2T^{\mu\vartheta}}{c^4}}$$
$$=> \frac{8\pi GT^{\mu\vartheta}}{c^4} = \frac{G^{\mu\vartheta}}{\frac{\left(\frac{2GM}{c^2}\right)^2}{c^4}}$$
$$=> G^{\mu\vartheta} = \frac{G^{\mu\vartheta}c^4}{\left(\frac{2GM}{c^2}\right)^2}$$
$$=> \left(\frac{2GM}{c^2}\right)^2 = c^4$$
$$=> \frac{2GM}{c^2} = c^2$$

$=> 2GM = c^4 \quad => M = \frac{c^4}{2G}$ ……. *(4.1)*

$E = Mc^2$

Substituting M from equation *(4.1)*

$=> E = \frac{c^6}{2G}$ ……. *(4.2)*

$$=> \frac{8\pi G T^{\mu\vartheta}}{c^4} = \frac{G^{\mu\vartheta}c^4}{\left(\frac{2GM}{c^2}\right)^2}$$

$$=> R^{\mu\vartheta} - \frac{1}{2}Rg^{\mu\vartheta} + \Lambda g^{\mu\vartheta} = \frac{G^{\mu\vartheta}c^4}{\left(\frac{2GM}{c^2}\right)^2}$$

$$=> \Lambda g^{\mu\vartheta} = \frac{G^{\mu\vartheta}c^4}{\left(\frac{2GM}{c^2}\right)^2} - R^{\mu\vartheta} + \frac{1}{2}Rg^{\mu\vartheta}$$

$$=> \Lambda = \frac{G^{\mu\vartheta}c^4}{\left(\frac{2GM}{c^2}\right)^2 g^{\mu\vartheta}} - \frac{R^{\mu\vartheta}}{g^{\mu\vartheta}} + \frac{1}{2}R$$

$=> \frac{\Lambda}{3} = \frac{G^{\mu\vartheta}c^4}{3\left(\frac{2GM}{c^2}\right)^2 g^{\mu\vartheta}} - \frac{R^{\mu\vartheta}}{3g^{\mu\vartheta}} + \frac{1}{6}R$, is the dark energy inside a black hole ……*(4.3)*

$E = \frac{c^6}{2G}$ is the visible energy inside a black hole. ……… (4.4)

Therefore, total energy of a blackhole is :

$E_T = E_V + E_D = \left\{E + \frac{\Lambda}{3}\right\}$ …… *(4.5)*

So, when we travel at a speed of $\sqrt{2}c$, the energy of the photons begins to interact with the energy of the black hole and hence it leads to the breaking of the Schwarzschild Symmetry.

$$E_T = \frac{c^6}{2G} + \frac{G^{\mu\vartheta}c^4}{3\left(\frac{2GM}{c^2}\right)^2 g^{\mu\vartheta}} - \frac{R^{\mu\vartheta}}{3g^{\mu\vartheta}} + \frac{1}{6}R$$

$$=> \frac{\Lambda}{3} = \frac{G^{\mu\vartheta}c^4}{3\left(\frac{2GM}{c^2}\right)^2 g^{\mu\vartheta}} - \frac{R^{\mu\vartheta}}{3g^{\mu\vartheta}} + \frac{1}{6}R$$

$$=> \frac{G^{\mu\vartheta}c^8}{3.4G^2M^2g^{\mu\vartheta}} - \frac{R^{\mu\vartheta}}{3g^{\mu\vartheta}} + \frac{1}{6}R = \frac{\Lambda}{3}$$

$$=> \frac{G^{\mu\vartheta}c^8}{12G^2M^2g^{\mu\vartheta}} = \frac{\Lambda}{3} + \frac{R^{\mu\vartheta}}{3g^{\mu\vartheta}} - \frac{1}{6}R$$

$$=> c^8 = \left(\frac{\Lambda}{3} + \frac{R^{\mu\vartheta}}{3g^{\mu\vartheta}} - \frac{1}{6}R\right)\left(\frac{12G^2M^2g^{\mu\vartheta}}{G^{\mu\vartheta}}\right)$$

$$=> c^2 = \sqrt[6]{\left(\frac{\Lambda}{3} + \frac{R^{\mu\vartheta}}{3g^{\mu\vartheta}} - \frac{1}{6}R\right)\left(\frac{12G^2M^2g^{\mu\vartheta}}{G^{\mu\vartheta}}\right)} \quad \ldots(4.6)$$

5. Conclusion

Destruction of a black hole:

We know that even light cannot escape from a black hole which is due to the strong gravitational force due to which light bends and is lost forever. And we know that to escape from a black hole, we must travel at a speed which is greater than the velocity of light and is lesser than $\sqrt{2}c$.

$$c < \vartheta < \sqrt{2}c$$

Now, while travelling at ϑ , the Schwarzschild Symmetry gets disintegrated on a minute scale which is almost insignificant. But when we travel at a velocity of $\sqrt{2}c$, the Schwarzschild symmetry gets completely broken as the energy of light exceeds the visible and dark (total) energy of a black hole due to which the excess energy gets converted into mass and due to the distortion of space-time, the gravitational field ruptures and hence ultimately, the black hole gets destroyed.

Appendix A

Bending of light:

$d\varphi \approx \frac{2r_s}{b} = \frac{4GM}{c^2 b}$ *A (2.1)*

$G = \frac{G^{\mu\vartheta}}{8\pi\left(\frac{2GM}{c^2}\right)^2 T^{\mu\vartheta}}$ *A (2.3)*

Appendix B

Comparing a black hole to the universe:

$R = \sqrt{\frac{3R^2KcA + 12SK\hbar G}{8G_p cKA + 4\Lambda S\hbar G}}$ Radius of our universe. *B (3.1)*

$\delta\varphi = \frac{2P}{b}\frac{1}{c^2}$ divergence of light related to the speed of light *B (3.6)*

$\delta\varphi = \frac{2P}{b}\frac{1}{2GE}$ divergence of light related to the visible energy of a black hole. *B (3.7)*

$\partial\varphi = \frac{2P}{b}\frac{1}{\sqrt[6]{\left(\frac{\Lambda}{3} + \frac{R^{\mu\vartheta}}{g^{\mu\vartheta}} - \frac{1}{6}R\right)\left(\frac{12G^2M^2g^{\mu\vartheta}}{G^{\mu\vartheta}}\right)}}$ divergence of light related to the dark energy of a black hole. *B (3.8)*

$\partial\varphi = \frac{2P}{b}\sqrt{\frac{G^{\wedge}\mu\vartheta}{8\pi G T^{\mu\vartheta}}}$ divergence of light inside the tensor fields of a black hole. *B (3.10)*

Appendix C

Energy inside a black hole:

$\frac{\Lambda}{3} = \frac{G^{\mu\vartheta}c^4}{3\left(\frac{2GM}{c^2}\right)^2 g^{\mu\vartheta}} - \frac{R^{\mu\vartheta}}{3g^{\mu\vartheta}} + \frac{1}{6}R$, is the dark energy inside a black hole *C (4.3)*

$E_T = E_V + E_D = \left\{E + \frac{\Lambda}{3}\right\}$ *C (4.5)*

$c^2 = \sqrt[6]{\left(\frac{\Lambda}{3} + \frac{R^{\mu\vartheta}}{3g^{\mu\vartheta}} - \frac{1}{6}R\right)\left(\frac{12G^2M^2g^{\mu\vartheta}}{G^{\mu\vartheta}}\right)}$ *C (4.6)*

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