Black Holes from First principles

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Abstract:

Einstein's General Theory of Relativity proposes the distortion of the fabric of space by objects, creating Potential Energy Wells. This theory leads to a number of conjectures on the nature and characteristics of Potential Energy Wells, including those which appear to emit no light (photons) - Black Holes. In this paper, the basic nature of Black Holes is analysed from first principles, using complementary analysis of Energy Fields and Potential Energy Wells. Alternative explanations are derived for the formation and characteristics of Black Holes, and for the phenomenon of Black Hole axial jets.

1. Introduction:

In this paper we examine, from first principles, the characteristics of Black Holes, with reference to the prior analysis of Energy Fields **[1] [2] [3]** and the interaction of Potential Energy Wells **[4] [5]**.

Einstein's General Theory of Relativity suggests that the fabric of space is distorted by "matter", creating Potential Energy Wells.

We can observe how the frequencies of photon emissions are affected as photons leave or approach Potential Energy Wells - see Figure 1a:

We can also observe how light bends around these Potential Energy Wells, with the phenomenon of "lensing" – see Figure 1b:

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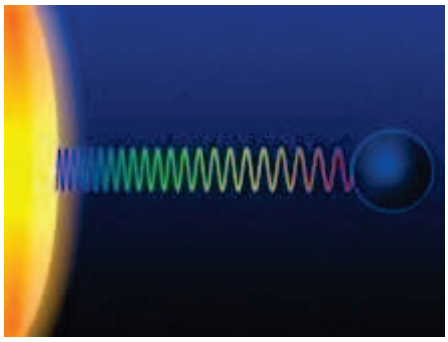

Figure 1a. Change in photon frequency when leaving/approaching a PE Well.

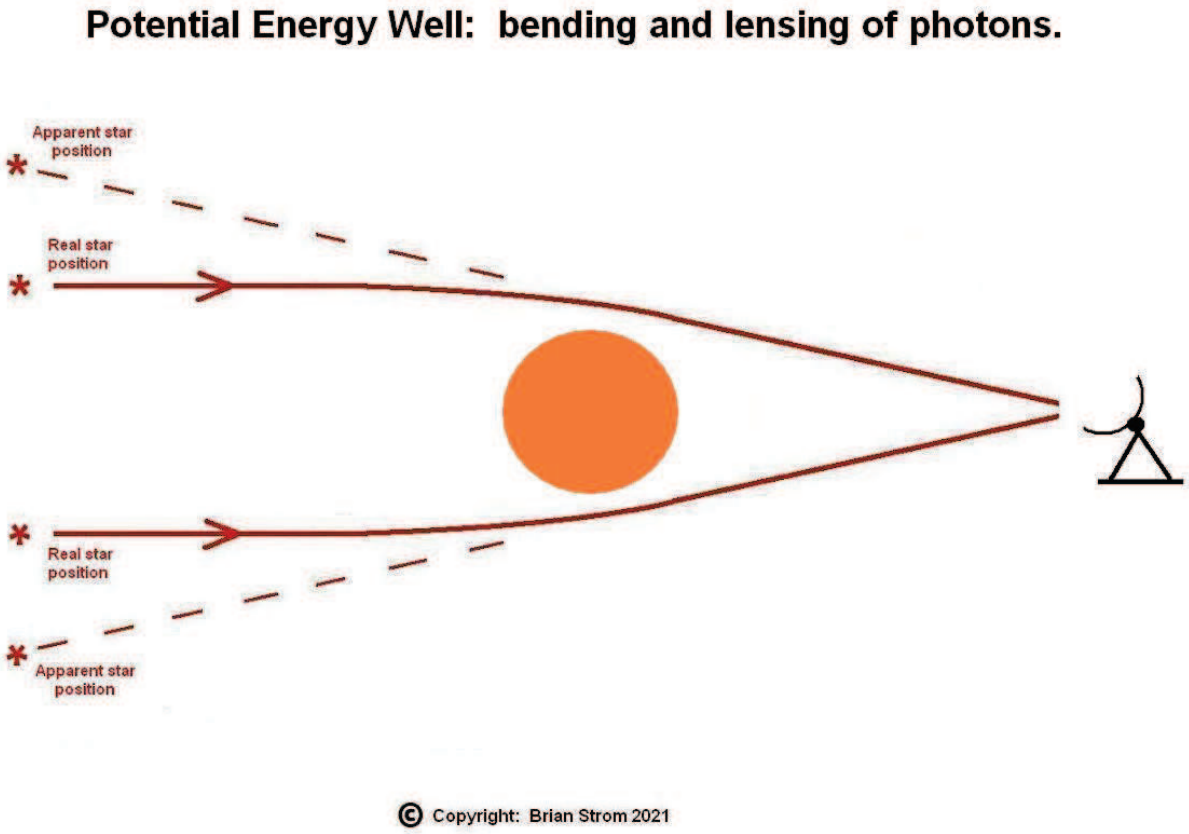

Figure 1b. Lensing and bending of photons around the Potential Energy Well of a star.

2. The formation of a Black Hole:

There are a number of theories on the formation of Black Holes including one where large stars collapse and become Black Holes.

Another scenario is the gradual concentration of matter in an increasingly large Potential Energy Well.

If Potential Energy is converted into Heat energy (averaged Kinetic Energy) within the structure, then nuclear fusion can be triggered if the necessary conditions of pressure and temperature are achieved.

But if most Potential Energy is converted into Rotational Kinetic Energy (orbital) within the structure, then nuclear fusion may not be triggered because pressure and temperature are too low.

With reference to the prior analysis of the Interaction of Potential Energy Wells [5], this possible scenario for the formation of a Black Hole is shown in Figure 2:

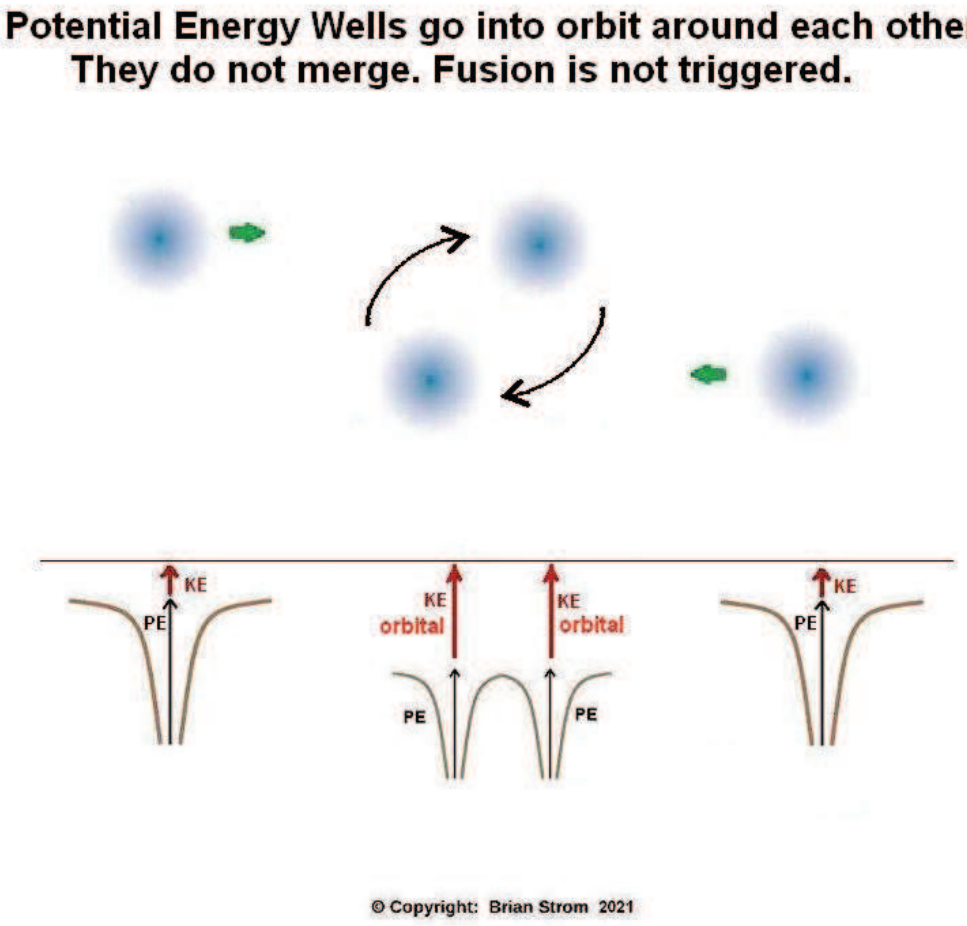

Figure 2. Possible formation of a Black Hole.

3. A Black Hole contradiction:

For a photon travelling from Earth to an Earth-orbiting satellite, we can observe how the frequency of the photon changes, as in the Pound-Rebka experiments **[6]**. Yet, from all such experiments, there is no evidence that the photon's speed (the speed of light) changes.

Yet, surprisingly, many physicists believe that light cannot escape from a Black Hole. They claim it slows down on its journey, as though a light photon was a particle.

The logical conclusion is that a Black Hole is NOT black. Its emission spectrum is simply red-shifted to very long wavelengths - which are then attenuated and absorbed on their journey through space to our observatories.

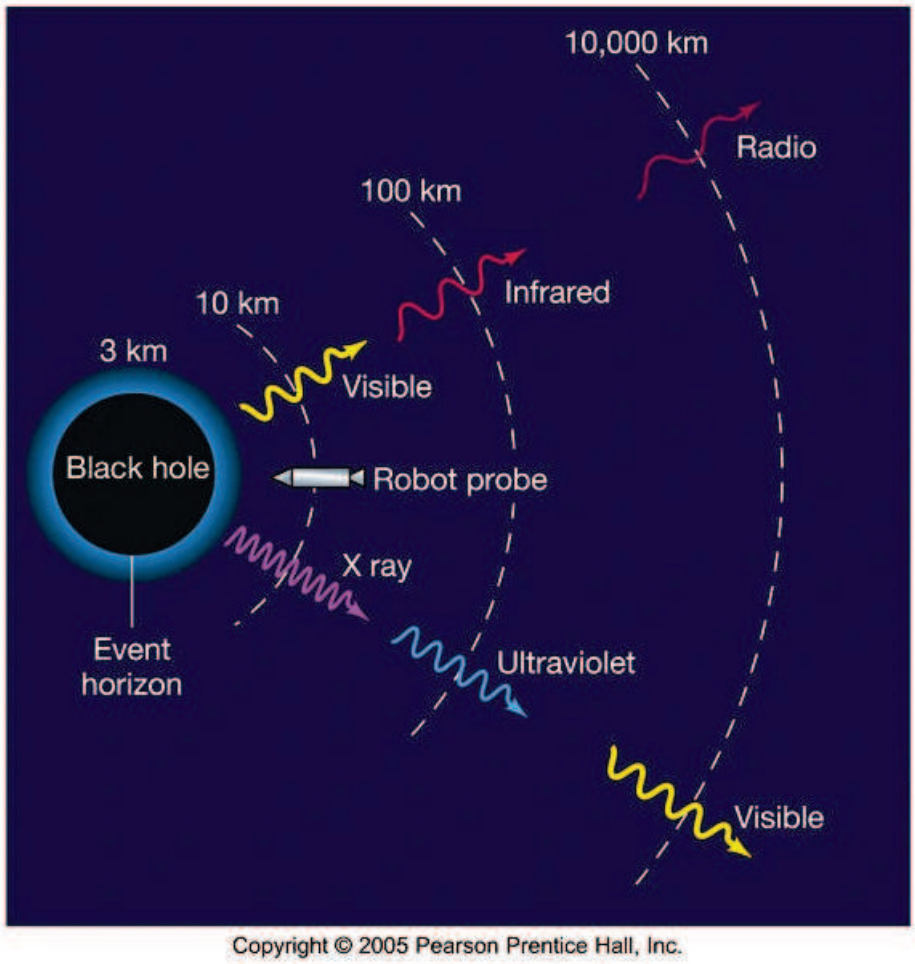

Figure 3. How photons change frequency near a Black Hole.

4. Photo-sphere around a Black Hole:

Another consequence of Einstein's General Theory of Relativity is that the distortions in the fabric of space caused by Potential Energy Wells affect the way that photons (light) move around the universe. It is possible to observe how light bends around stars and other Potential Energy Wells, and see the phenomenon which is called "lensing".

For a Potential Energy Well of adequate depth, there will be an orbital radius where the orbital velocity is equal to the velocity of light. At this radius, any passing photon will be drawn into an inescapable orbit. It will be trapped by the Black Hole.

A photon sphere is an area or region of space where the Potential Energy Well is so deep that the orbital speed at a certain radius is equal to the speed of light. Hence approaching photons which pass within this critical radius will be trapped in orbit. Viewed from a distance, this will appear to be a black disc or "black hole". According to Kerr and others, the radius of the photon sphere is 1.5 times the Schwarzschild radius [7].

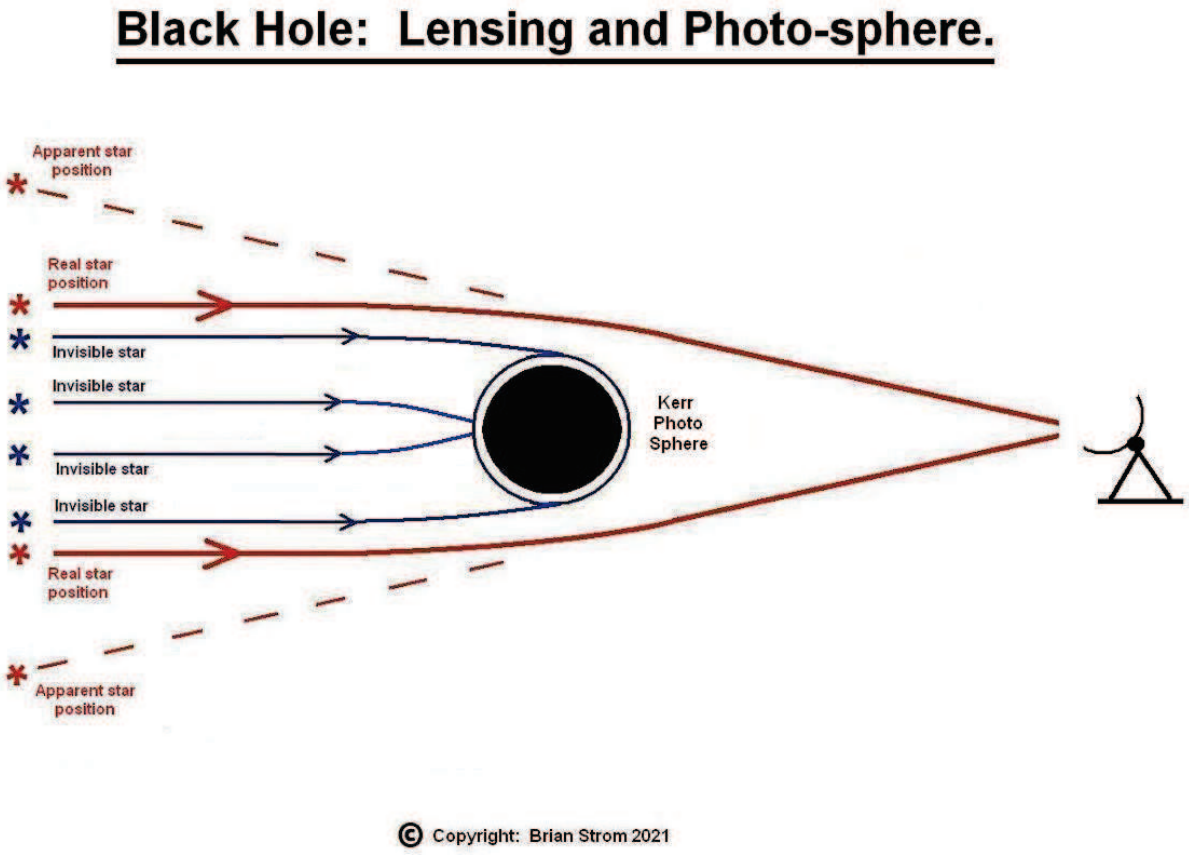

Figure 4. Black Hole lensing and Kerr photo-sphere.

5. Axial jets from a Black Hole:

There are many reports of observations of axial jets of fast-moving particles from the locations of black holes.

Using Energy Field Theory [3], we can see how a particle with a Rotational Energy Field may be attracted towards the Rotational Energy Field of the Black Hole. Near the center of the Black Hole, the energy fields will act to propel the particle out along the axis of the Black Hole – see Figure 5:

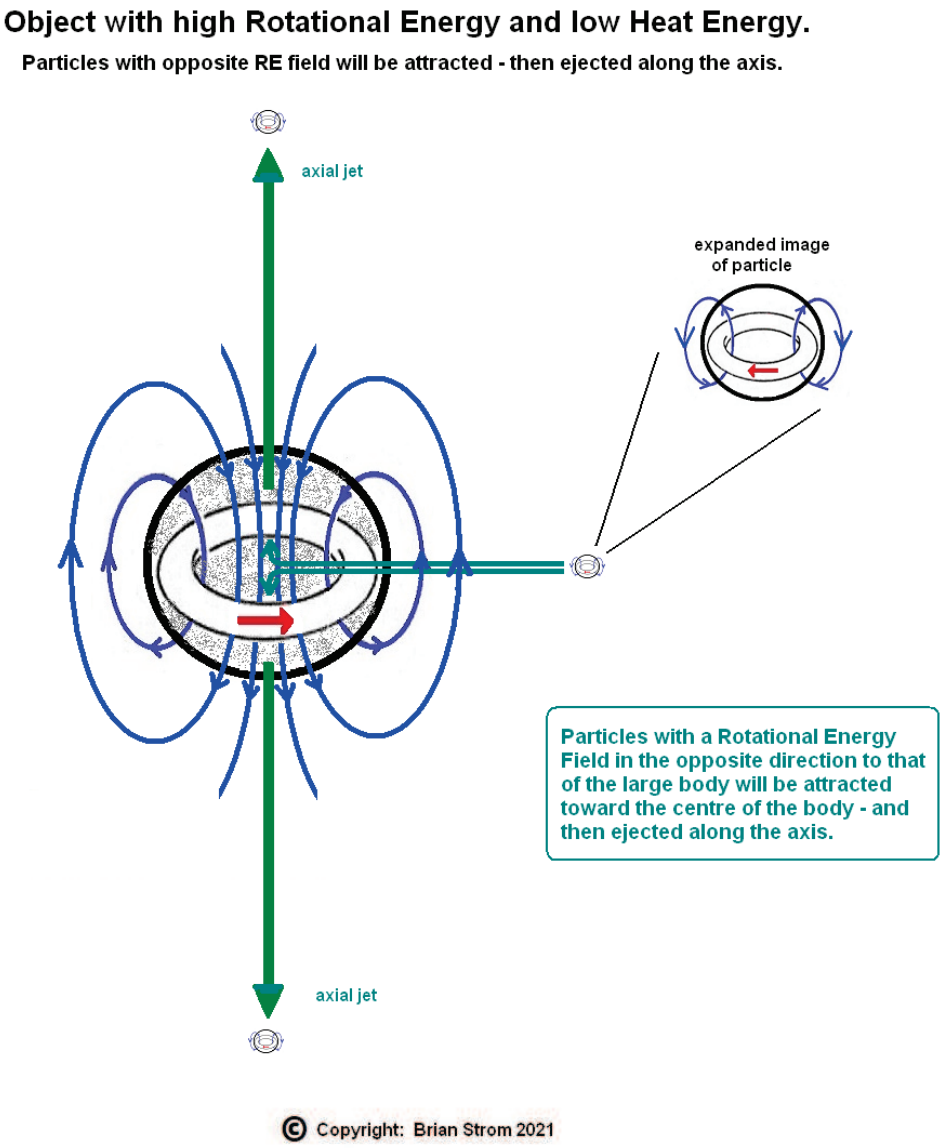

Figure 5. The formation of Black Hole axial jets.

6. Summary and Conclusions:

This paper gives a simple analysis, from first principles, of some aspects of Black Holes, based upon the prior analysis of Energy Fields and the Interactions of Potential Energy Wells. It proposes alternative explanations for some of the basic characteristics of Black Holes.

7. References:

[1] "AI Physics - Energy Fields (Part 1)" Brian STROM. viXra: 1902.0421. February 2019. This paper includes a summary of the simple interactions between energy fields.

[2] "AI Physics - Energy Fields (Part 2)" Brian STROM. viXra: 1903.0495. March 2019. This paper includes a summary of the interactions between Potential energy fields, Orbital energy fields and Rotational energy fields.

[3] "AI Physics - Energy Fields (Part 3)" Brian STROM. viXra: 1906.0492. June 2019. This paper includes advanced proposals for interactions between energy fields.

[4] "The Mystery of Potential Energy Wells" Brian STROM. viXra: 2109.0046. September 2021. This paper questions some of the basic aspects of Potential Energy Wells.

[5] "The Interactions of Potential Energy Wells" Brian STROM. ViXra: 2110.0170. October 2021. This paper gives an analysis of the various possible interactions between Potential Energy Wells.

[6] "Apparent Weight of Photons." R. V. Pound and G. A. Rebka, Jr. Phys. Rev. Lett. 4, 337 (1960). Published April 1, 1960.

[7] Kerr, R. P. (1963). "Gravitational field of a spinning mass as an example of algebraically special metrics". Phys. Rev. Lett. 11 (5): 237–238. Bibcode:1963.

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