ON HAWKINGS ERROR

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ABSTRACT

Hawking radiation is currently considered by the academic community as being a proven fact however nothing could be farther from the truth. It is nothing more than a theory based upon several other as yet unproven theories. Hawking radiation is a theory that can be disproven so simply that any high school physics student can accomplish this with just one equation and little basic logic. There are also blatantly obvious logical errors in the theory itself which will be explained. It does however require thought and the motivation to do so which is the purpose of this paper suggesting why the Hawking radiation theory should be abandoned.

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1. Introduction

The foundations of Hawking radiation are drawn directly from Einstein's theory of General Relativity. It is worthy of note at this point to emphasize that there are actually no gravitational forces in General Relativity, everything in the universe moves and is governed by the bending of space and time. Hawking begins his quest with a Black Hole whereby at a certain distance from this hypothetical entity there exists a radius whereupon any object coming close is subsequently accelerated to the speed of light. At this point the object will be unable to escape as it would require that it obtained a velocity in excess of the speed of light, it therefore falls into the black hole and is lost forever. The problem then arises that if this object is lost in the black hole the balance of the universe is in jeopardy as the conservation of energy has been violated being that energy can neither be destroyed nor created. To counter this problem Stephen Hawking, jiggled around a few mathematical equations and eventually came up with the idea that when a particle arrived at the event horizon an anti-particle would spontaneously be created from the vacuum one would fall into the black hole and its partner would escape. This meant that information could theoretically escape the black hole and this information or energy is now commonly known as Hawking radiation.

2. Basic Theory

To address the issues with Hawking radiation the properties of the black hole itself must be analyzed, in particular its escape and its orbital velocity. The escape velocity determines the physical properties of the black hole itself and the orbital velocity the hypothetical event horizon surrounding it.

There is one well known and generally agreed upon equation which governs the relationship between escape velocity and orbital velocity being;

$$\frac{v_e}{v_o} = \sqrt{2} \tag{1}$$

As said, this equation is generally acknowledged to be correct and can be derived using Newtonian physics. Basically from this it can be seen that escape and orbital velocity are not the same value but rather proportional to each other. The first property of a black hole that can be calculated is the orbital velocity by rearranging the equation;

$$v_o = \frac{\sqrt{2}\, v_e}{2} \tag{1}$$

The escape velocity is assumed to be the speed of light which is $2.99 * 10^8$ and the square root of two is simply the value 1.414 so these values can be inserted into the equation;

$$v_o = \frac{1.414 * 2.99 * 10^8}{2} \tag{1}$$

This results in the following;

$$v_o = 2.11 * 10^8 \tag{1}$$

Clearly this value is less than the speed of light which means that if the escape velocity is the speed of light the orbital velocity will always be less than that number and as a consequence not only light can escape but any object. This being the case it is inevitable that a so called "event horizon" just cannot exist. There is of course a second possibility what would be the escape velocity if the orbital velocity was the speed of light by rearranging the equation once more;

$$v_e = \sqrt{2}\, v_o \qquad (1)$$

Substituting the known values results in;

$$v_e = 4.24 * 10^8 \qquad (1)$$

The escape velocity would be in excess of the speed of light which again according to the basic laws of physics is not allowed.

3. Summary and Conclusions

It can be seen from the above basic calculations that there are only two options;

1) The orbital velocity is the speed of light and light may not escape but remains in orbit. In this situation however there would be no black hole as the escape velocity would have to be less than the speed of light and therefore light can actually escape from the black hole but paradoxically not from the event horizon.
2) The escape velocity is the speed of light but the orbital velocity must always be less than c. This indicates that light could escape as there would be no event horizon.

It is expected that there will be objections inasmuch as Einstein's General Theory will be brought in an attempt to rescue the theory. Suggestions will undoubtedly be made that time will slow down and it can be calculated to show that both escape velocity and orbital velocity can be the speed of light simultaneously depending upon the observers' frame of reference. In the opinion of the author this will only be one more desperate attempt to save a failed theory and will not be considered a serious rebuttal.

The explanation above does not bode well for Hawking radiation as the alternatives are no black hole or no event horizon. A black hole and an event horizon cannot exist at the same time as both velocities cannot simultaneously be the speed of light. In either situation Hawking needs both for his theory of radiation to be correct.

There is however a second and much simpler reason why Hawking radiation cannot exist which requires a return to the original concept itself.

When approaching the event horizon an anti-particle is created from empty space producing a pair. One of these particles falls into the black hole and the other continues on its way or is ejected. If however the particle that escapes the black hole is an anti-particle it would immediately be annihilated, complete with its opposite a particle, upon contact. This of course means that one particle had disappeared down the black hole and yet another particle was annihilated by the ejected anti-particle. In this particular situation the universe has actually lost two particles and not just one.

It does not require statistics to show that there is a fifty percent chance that an anti-particle escapes the black hole. As a consequence this would produce a loss on average of one particle for every particle entering the black hole, which is not what is suggested by Hawking as the information loss paradox still exists. Even when an attempt was made by Hawking to correct the information loss with his theory of radiation, instead of solving the paradox Hawking has actually highlighted the error in his own theory.