

The Second Event Horizon

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ABSTRACT. The relevant dynamics of electromagnetic waves traveling through gravitational fields are explored. Relevant characteristics of black holes are also presented. The presence of second event horizons, with different yet similar characteristics as traditional event horizons, is established by reasoning involving the above dynamics.

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As an electromagnetic wave (light) travels through a gravitational field in the opposite direction of the gravitational field's pull, it loses some of its energy. The energy of an electromagnetic wave is proportional to its frequency. This effect has been named the red shift because the color red has a low frequency compared to other colors. The human eye sees different colors due to the frequency of the electromagnetic wave.

All black holes have an event horizon, which is a sphere around the core of the black hole and a distance from the black hole's core that is proportional to the mass of the core. If something passes into the event horizon, it will never get out, not even an electromagnetic wave that travels at c (299,792,458 meters per second). This is the currently accepted idea of a black hole.

However, there is a second event horizon that behaves similarly to the traditional one. This second event horizon is the one we actually notice. The traditional event horizon is inside this second event horizon. Allow me to explain: Since electromagnetic waves lose frequency as they travel away from a gravitational force, there would be this second event horizon, where in between the two event horizons, the electromagnetic waves lose all of their energy/frequency *but can still escape the black hole*. Only inside the traditional event horizon can electromagnetic waves not escape and instead spiral towards, and eventually become part of, the black hole's core.

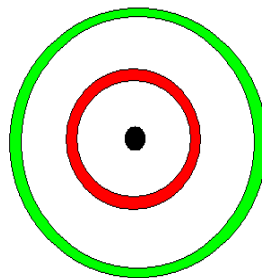


Figure 1. The black dot is the core of a black hole. The red circle represents the sphere of the traditional event horizon. The green circle represents the sphere of the second event horizon.

The wavelength of an electromagnetic wave is inversely proportional to its frequency. Therefore, an electromagnetic wave with zero frequency has an infinitely long wavelength. Also, with zero frequency, the electromagnetic wave can not oscillate. Since the wavelength is infinitely long, no matter how long the electromagnetic wave propagates through space, it will never exhibit an amplitude. The zero points of the amplitude are infinitely separated because the wavelength is infinite. This is why no electromagnetic wave is ever detected once it has traveled through the second event horizon.

There would however be frequency gained from gravitating bodies the electromagnetic wave passes on its way to earth, but it would be lost again as it goes away from those bodies. Really the only factor that would give the electromagnetic wave frequency again is the gravitational field of the earth. However, that would be a tiny increase from zero. Therefore, I think most electromagnetic waves that pass through the second event horizon would be virtually undetectable, even on earth.

You may say that the electromagnetic wave will gain energy/frequency as it approaches the black hole, and that balances with the amount lost by going away from it. However, the frequency can not become infinite because that would have all the peaks and valleys of an electromagnetic wave on top of each other. So there must be an upper limit on frequency. There is no lower limit to frequency though, so the second event horizon exists.