Black hole Tidal Distruption Events (TDE) observatories and the LIGO observatory will prove that photons cannot penetrate the black hole event horizon

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Abstract- This paper suggests a way to prove based on Black Hole Tidal Disruption Events (TDE) or by Gamma Ray Bursts (GRB), comparing the observatory telescopes with the Laser Interferometry Gravitational wave Observatory (LIGO) measurements that photonic light can never pass the event horizon of a black hole towards the gravitational singularity in its core. This conclusion will indicate that photonic light has no direct gravitational effect on space-time and that at the event horizon it will interact with a gravitational "fire wall" that will split the photon into a matter particle with its gravitational curving effect and an anti-matter particle with its anti - gravitational stretching effect.

1. *Introduction*

Let us assume that a photon reaches the event horizon of a black hole towards the singularity in its core. Based on the Einstein field equations the photon will undergo a gravitational time dilation and at the event horizon its internal time clock will stop and it will seem to the outside observer as if it froze on the edge of the event horizon. This contradicts the basic principle that light travels at the speed of light to all observers. Furthermore, when the photon reaches the singularity point at the center of the black hole, its wavelength (ƛ) becomes infinitesimal small and this results in an infinite energy ($E_{photon} = \frac{hc}{ƛ}$), which raises the question where this infinite energy comes from. These two paradoxes leads to the assumption that when a photon is about to pass the event horizon of a black hole, the event horizon becomes a gravitational "fire wall" and the photon splits into matter and anti-matter pair. The matter particle will enter the event horizon (it will seem to the outside observer as if it is stopped ,"freezes" forever on the event horizon surface) while the anti-matter particle ,due to its anti-gravitational characteristics will be ejected into space. This "firewall effect" on the surface of the event horizon, detailed above, will generate a gravitational wave, since the anti-matter particles will generate an anti-gravitational wave trying to flatten the curvature of space due to the black hole.

2. *Measuring the "firewall" effect with LIGO*

When a star passes too close to the event horizon of a black hole, it is ripped to shreds. That triggers a months-long tidal disruption event (TDE), which can shine as brightly as a supernova. Until a few years ago, astronomers had spotted only a handful of TDEs. But now, a new generation of wide-field surveys is catching more of them soon after they start—yielding new insights into the violent events and the hidden population of black holes that drives them. In the standard TDE picture, the gravity of the black hole shreds an approaching star into strands like spaghetti. The black hole immediately swallows half the star's matter while the rest arcs away in long streamers. These rapidly fall back and settle into an accretion disk that steadily feeds material into the black hole, growing so hot that it emits copious x-rays. [1], [2]. During the TDE the star that is ripped apart and swallowed by the black hole emits photonic radiation, which partly radiates into space (a small part of this radiation reaches our telescopes) and partly reaches the black hole event horizon. These photons interact with the event horizon gravitational firewall and split into matter and anti-matter pairs. The matter particles enter the event horizon while the antimatter particles eject into space. This interaction between the photons and the event horizon gravitational firewall will generate gravitational waves.

Conclusion

By measuring, the same TDE simultaneously by the Large Interferometer Gravitational Observer (LIGO) [3] and by the wide field telescopes designed to measure TDE's; we can test this firewall theory. Another option to test the theory is to measure with the LIGO the gravitational waves due to Gamma Ray Bursts (GRB) [4] interacting with a black hole event horizon surface (interacting with the same gravitational "firewall" effect described above for the TDE's).

[1] https://www.sciencemag.org/news/2020/01/black-holes-caught-act-swallowing-stars

[2[https://www.youtube.com/watch?v=O0xHA0unJaw

[3] https://www.sciencemag.org/news/2020/04/gravitational-waves-reveal-unprecedented-collision-heavy-and-light-black-holes

[4] https://imagine.gsfc.nasa.gov/science/objects/bursts1.html