Article

Negative Energy Density: Pulsars and Kerr Rotating Black Holes

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Negative Energy Density; Pulsars and Kerr Rotating Black Holes

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Abstract: This paper will explain how negative energy density, the same kind of negative energy density that is used in theoretical frameworks that explain wormholes, interact with rotating black holes in spacetime. Wormholes are particularly significant since they can be a route for time travel. As sci-fi as it seems, it is indeed a possibility, thanks to Kerr rotating black holes. Penrose process is key in understanding how negative energy density comes into play, and ergospheres in rotating black holes are also crucial. NASA data and Chandra telescope data were extracted to look at particle anomalies, which strongly suggest energy leakage and exotic matter. EHT (Event Horizon Telescope) data was also extracted, which solidifies the negative energy density argument. I will explain how this occurs using past theoretical models and real-world scientific observations. Jets, cone particles formed by hardons and other quark particles, leave the rotational black hole, from which it is produced, to create a forward force in space. Particles split, and the weaker one goes into the rotational black hole becoming negative, and the other one extracts energy from the black hole, making it exotic. These factors contribute to negative density since negative density fills the void left by the jets once they are carried away.

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1. Introduction

I will begin by introducing neutron stars as part of this observation of rotating black holes and pulsars. Neutron stars are special since they are the densest objects in the universe, aside from black holes. They are formed when the core of a star collapses after a supernova explosion. They are made up of neutrons and other elementary particles. Negative energy does not exist in Gravitational Waves, but in rotating pulsars (neutron stars) and rotating black holes. Infalling particles in the ergosphere of a black hole, which is outside the outer layer of a black hole, have negative energy ultimately extracting rotational energy from the black hole or rotating neutron star, allowing it to escape with more energy than before. Jets also play a big part in this (cone shaped hardon particles formed by other elementary subatomic particles like quarks), by leading negative energy to be the emerging jets substitution. This balances the flow of energy, since the jets are leaving, and the negative energy is flowing in, which makes the particles that are in the ergosphere negative as well.

2. Methods and Results

The methods that were used were computational analysis and research from prior theoretical models and explanations like the Penrose process. Accessible data like NICER recorded unusual low frequency x-ray fluctuations near rotating black holes. AGN IES 1927+654, a supermassive black hole released twin plasma jets, which grew over months. Swift and Nu-star also played a crucial role in this observation. This further fuels speculations and claimed about anomalies in that area in space. Additionally, some LIGO and Virgo data were used that captured key neutron star and black hole collision data by gravitational waves. Although negative energy density does not lie in Gravitational Waves, LIGO can observe discrepancies because of an influence in negative energy density, likely the

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cause of the 0.002 phase shift in gravitational waves which I have previously discovered. This would provide a plausible explanation, to why this is positive, which is because of exotic particles that extract black hole rotational energy, before the other half particle falls in and becomes negative, after the split.

Furthermore, the Blandford-Znajek mechanism, which is the electromagnetism of spin energy suggest that month-long X-rays built up magnetic fields until a jet was triggered. This aligns with many theoretical models where the black hole's rotation energy is triggered to power the outflow of energy. This event demonstrates energy extraction in action, where the jet carries away energy and angular momentum, the black hole should lose some rotational energy. This is an indirect sign that negative energy particles fell into the hole predicted by Penrose process. This is like I mentioned earlier, allows for the energy carried away by the jet produced by the black hole. The Event Horizon Telescope, which was used as a primary method for learning such data and experiments existed, provided not only images but also polarimetric (polarization is when the oscillations are perpendicular to the wave's direction of travel, observed in electromagnetic radiation, where polarimetric is the study of polarization and how it interacts with other objects), that help confirm how jets extract energy from black hole's rotation.

The M87 black hole's ring of emission was partially polarized, meaning magnetic fields flow near the black hole or its ergosphere. They also show how magnetic forces can hold some infalling matter and put it into an outflow. Energetic jets thousands of light-years long need the extraction of the black hole's rotational energy, and the EHT data supports that this is happening in M87. As plasma infalls, some particles get dragged by rotating space-time and eventually end up with negative energy, seen by a distant observer, before crossing the black hole's horizon. Negative energy density is very hard to observe, but in the black hole's singularity, it suggests it is in small scales.

3. Discussion

Now that models and evidence from previous scientific observations were shown and explained how it tied into negative energy density, I can effectively explain how all of this ties in together. As the jet carries away energy/angular momentum, the black hole or rotating neutron star should lose some rotational energy, which explains anti-glitches, which are sudden spin-down events in rotational energy, opposite to glitches, sudden spin-up events. This is another indirect sign that negative energy particles fall into a black hole, like Penrose process predicted by making up for the energy being carried away by the jet. Magnetic forces can hold infalling matter through an outflow. This creates an electromagnetic energy flow that becomes the jet, which allows charged plasma to be flung out of the black hole's ergosphere and forward. Experimentation and thorough analysis prove that an external force, the outflow of the exotic energy particle that gets its energy from the black hole's rotation, is causing the 0.002 phase shift in GWs.

The excess in gamma rays further suggests energy leakage from higher-dimensional space. Specifically in pulsars, the anti-glitch similar to a black hole still occurs, but x-ray spectral lines in pulsars, which consist of unexplained redshifted or blueshifted lines, could be an observational sign of quantum vacuum fluctuations leading to negative energy density. Large particle accelerators can localize a wormhole using the negative energy density that gets filled in the rotating black hole's rotational energy filling the void for the created jet, by recreating extreme high-energy plasma flows of particle collisions with configuration of magnetic and gravitational fields. This can produce a wormhole.

4. Conclusion

In conclusion, this paper has explored the intricate relationship between negative energy density and rotating black holes, emphasizing the implications for our understanding of spacetime and exotic phenomena such as wormholes. By analyzing the Penrose process and the role of ergospheres, we can see how infalling particles can yield negative energy while facilitating the extraction of rotational energy from these extraordinary cosmic entities. Evidence gathered from various observational

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platforms, including NASA's Chandra Telescope, the Event Horizon Telescope, and LIGO, supports the notion that negative energy density plays a critical role in the dynamics of black holes and neutron stars.

The findings suggest that negative energy density may not only explain the energy leakage observed but also provide insights into the electromagnetic mechanisms at play, such as the Blandford-Znajek process. The interplay between energy extraction through jets and the underlying negative energy interactions sheds light on phenomena like anti-glitches in pulsars, reinforcing the connection between neutron stars and black hole behavior.

Furthermore, the potential for leveraging negative energy density to explore concepts like wormholes may open intriguing avenues for future research, especially with advancements in observational technology and theoretical models. While the direct observation of negative energy remains elusive, the indirect signs we have identified point towards a deeper understanding of the universe's fabric and the fundamental forces that govern it. As we continue to investigate these extraordinary phenomena, we may not only deepen our grasp of physics but also edge closer to unraveling the mysteries surrounding time travel and the fundamental essence of the cosmos.

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