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SOME EQUIVALENT MODELS OF BLACK HOLES AND THEIR VALIDATION

Physics

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ABSTRACT

The historical back ground of black hole region is presented here. The properties and characteristics of black holes are studied. The equivalent models of the black holes are proposed. Some models are found to act in similar ways as that of the black holes. The features of the models validate the existence of black holes identified within the galaxies. These models would be very useful in predicting different behaviors of the black holes found in the galaxies.

KEYWORDS

The Black Holes, Singularity, Event Horizon, Galaxies.

HISTORICAL BACKGROUND

The scientists of present era working in the field of astronomical science have discovered some most powerful and delightful events like the birth of latest solar systems to the cataclysmic death of massive stars occurring within the nature. The black holes lead a crucial role in the formation and in the demise of the universe. Still most of the properties of the black holes and their physics are subject of intensive study. Since there are numerous sorts of black holes discovered with various different characteristics. Some black holes are found to be of very big size, some are of small size, some are with electric charge, some are without electric charge, some black holes have rapid rotations, and a few are more sedentary. Therefore the scientists haven't found any general and perfect theory which could explain the foremost of the characteristics found within the black holes. Once we attempt to study the black holes from an outsized distance it's surprisingly just a huge object. If we suppose a region having mass like the mass of the sun, it'll exert pulling force on us almost like that of the sun. All that's missing is that the heat and light wave and radiations that the sun applies. The region itself is singularity .It is some extent where density of fabric becomes infinitely large. We cannot see the singularity itself. it's shrouded by event horizon which is usually considered because the surface of the region. However the event horizon isn't a true physical boundary. it's not a membrane or a surface. it's simply defined as a specific distance from the singularity point. If something happens to fall below this threshold distance, it cannot get out from this region. it's the space from the singularity where the gravitational pull is so extreme that nothing can go out the region clutches. it's been found that even light cannot shake the black holes. Black holes are alleged to be made from extremely massive substances with immense gravity that doesn't allow anything to flee. Even light cannot escape the black holes. Several theories are predicted for the formation of black holes. The classical theory of black hole region is given as the end state of a huge star. Most of the scientists realize it as a dead state of stars or the remains of dead stars. When the activity of emission of warmth, light and radiation from a huge star ceases due to lack of active materials, the residual state of it's referred to as the black region. We will say that the body state of a huge star forms the region. The second prediction of formation of the black hole region is by collision process. When two very massive stars like neutrons stars collide and merge together they form the black holes. Black holes that form through these mechanisms are reported to have masses usually three to 10 times greater than the mass of the Sun and that they are called stellar-mass black holes. But there have also been found super massive black holes which are greater than million to a billion times the mass of our Sun. They have been found at the centre of just about all massive galaxies. What's the mechanism of their formation remains not fully explained. However, it's documented that some states of stars are responsible to create the black hole region. The lifetime of a star are often understood as endless struggle between gravity and pressure radiation. The gravity force acting within the substance tends to compress the star within it , but the radiation produced due to nuclear fusion continuously taking place within it pushes its matter outwards. A kind of virtual equilibrium is established between these two counter effects. But when the active fuel within the star is exhausted, the star stops burning. The balance condition of the gravity force and the out ward force due to -radiation pressure is disturbed. In due course of time nothing can counteract gravity and therefore the whole mass is squeezed into some extent of zero volume and infinite density. This is called the singularity point. Now it is understood that the singularity point is surrounded by a boundary. This boundary is understood as an event horizon. The entire system is named as the black hole. The interior phenomena depend on the masses of the black holes. The Indian–American astrophysicist Subrahmanyan Chandrasekhar first Speculated in 1930 that the fate of massive stars might not be just to chill down, as smaller stars do, but they will also collapse into something denser objects like white dwarfs and neutron stars. In 1939, the American physicists Oppenheimer and Hartland Snyder predicted that black holes might be formed in nature from the collapse of massive stars. In 1974, British theoretical physicist hawking applied the scientific theory. He discovered that quantum black holes aren't as black as classical black holes. They emit thermal radiation. The term “black hole” was coined in 1967 by the American physicist John Arichbald Wheeler. Theoretically the black holes are very simple to explain. There are three parameters sufficient to characterize them fully: mass, momentum, which describes the rotation happening within the black holes. The third component of the black holes is taken as the electric charge. Considering the stars, from which the black holes are formed, these are only a few characteristics, leading physicists to mention that “black holes haven't any hair”. Astrophysical black holes are very simple because they're alleged to haven't any charges. If they might have charge, then they might be quickly neutralized by the encompassing plasma. Schwarzschild's solution to Einstein's equations reveals that a region isn't rotating, but Kerr's solution shows that black whole are going to be rotating . it's reasonable to think that black holes rotate: if they have been formed from a rotating collapsing star or from the merger of two neutron stars they need to have conserved their rotational energy. Moreover they will spin up successive interactions. It had been once thought that black holes don't emit anything. However, Hawking discovered that if quantum effects are taken under consideration, it can be shown that black holes can radiate gravitational energy, thermal energy and particles also. Since, Hawking radiation carries energy far away from the region so this reduces its mass consistent with the formula ($E = mc^2$). Therefore a region shrinks and eventually it's evaporated. This effect is vital for very tiny black holes, but astrophysical black holes are very massive and that they would need a time much longer than the age of the Universe to evaporate. consistent with Hawkins, the planet of black holes is filled with surprises: there could also be black holes smaller than a flea and lighter than a feather and tiny black holes could within the future at some point be produced in the laboratory. Primordial black holes may have existed during the first stages of the Universe, a couple of moments after the large Bang took place. At that point the temperature and pressure were so high that they might have squeezed the matter right down to a singularity point. However only primordial black holes of a few billion tons could have survived until this day; the lighter ones would all have evaporated. The lightest black holes are referred to as elementary black holes. With the startup of the massive Hadron Collider (LHC) these microscopic black holes received much attention as they could be produced during particle collisions at the LHC. However, they might be disintegrated immediately again. They might not have enough time to grow into matter and cause any macroscopic effects. it's the quantum physics which will explain how black holes die. In quantum physics, subatomic positive particles and negative antiparticles explode into existence all the time. Since the positive particles have positive mass and therefore the negative antiparticles have an opposite negative mass, they will cancel one another effects, and this happens in significant way. But if these particles and antiparticles came into existence next to a region there ,it may happen that they are doing an equivalent cancellation. Famed English physicist Hawking theoretically showed that something happens differently around a region. The thought is that particles and antiparticles might not be ready to automatically cancel one another, due to the black hole's gravity. It pulls the negative antiparticle into black hole-oblivion, and leaves the positive particle alone and "uncancelled," making it "real." These positive particles then are emitted from the region. This phenomenon is named Hawking Radiation. But that's not the top of the method. After an extended time, the region would start losing mass thanks to the gradual addition of antiparticles. According to Hawking the black holes would evaporate in suitable conditions. During evaporation, the region emits energy within the sort of the positive particles that escape. The quantity of energy release will depend upon the quantity of mass of the region. The more energy would be released from massive region . The region would eventually lose such a lot mass that it might become small and unstable. The region would then lose the remainder of its mass during a short interval of time. This may happen as abrupt explosions. These explosions could also be detected as gamma radiation bursts. So we will say that black holes perish in this manner. They are doing so when the theories of the acutely large close with the theories of the extreme small. They are doing so slowly, then all directly.

Propositions of Black Holes:-

1: Explosion Theory:- If we assume that the black holes were produced at the time of massive bang ,It was the giant black hole itself liable for this phenomenon. It burst itself to optimize its energy and to urge stability for the nonce. On applied mathematics it has been shown that the dimensions of component black holes ranges from micro miniatures to larger than million size of the sun. Further the method of fission reaction happened and really massive black holes continuously went on breaking in suitable circumstances. Thus energy evolved to the galaxy. The black holes of micro size went on evaporating through hawking evaporation process, which further gives off energy within the sort of radiations and warmth the galaxy. This process is sustained till date.

2:- Transducer Theory:- If we assume that region is found in nature as a tool which has ability to rework matter in to energy and energy in to matter. It's a bit like a engine. It takes matter from surrounding converts some a part of it into energy and therefore the remains is shipped to the singularity point. during this process the equilibrium will be achieved almost like Carnot's cycle.

3:- Dual Nature Theory: If we assume that the region is a tool which could take all the masses and energy radiations near its event horizon and sends it to the singularity point .The whole thing is situated at the centre of the galaxy , then we'll need to assume another twin galaxy. If the primary nature device is named a black hole , then its twin counter a part of twin galaxy are going to be called the white galaxy. The white hole galaxy will serve in other way. Thus a pair of holes will lead the pair of galaxies.

4:- The Region is a Pool for Transportation of Mass and Energy Between Two Galaxies : If we assume that there are existed always twin galaxies in nature ,then the pair of regions one called black hole while other called white hole function a pool between the two galaxies. The mass and radiation of the first galaxy is transported to a different galaxy in this process. The thought and views given in the proposition are based on intensive study of article related to the black hole.

CONCLUSION

In this work, black holes have been examined through both classical foundations and equivalent theoretical models in order to provide a unified understanding of their formation, evolution, and physical significance. Beginning with stellar collapse and singularity formation, the study extends to quantum aspects such as Hawking radiation, evaporation, and primordial black holes, thereby linking general relativity with quantum physics. The proposed equivalent models—treating black holes as energy transducers, explosive systems, or dual entities connected to large-scale cosmic transport—offer conceptual frameworks that complement established solutions such as the Schwarzschild and Kerr metrics. Recent observational confirmations from gravitational-wave detections and direct imaging of event horizons further validate the physical reality of black holes while motivating refined theoretical interpretations. Together, these perspectives demonstrate that black holes are not merely gravitational endpoints but dynamic, energy-evolving systems that play a fundamental role in galactic structure, cosmology, and modern theoretical physics.

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