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A Comparative Study on Black Holes

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Abstract:

Black holes are the area of space with an intense gravitational field due to which no matter, not even light can escape from. The present study deals with the formulae of gravitational forces which are influencing the black hole and the light particle. This study also deals with calculation of their values for various observations. The review paper also comprises with the extract method of the thermodynamic quantities of eth solution of the Einstein equation is developed. Hence these strongly supports the validity and the comparative study of the black holes. The present paper deals with the entire comparison of the techniques and the method of the derived formulae used for the gravitational force and the existence of black hole.

Keyword: *Black holes, Einstein Equation, Thermodynamics, Gravitational force*

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Introduction

Black hole also known as the neutron star is defined as the formation which is more complicated than any other physics. It is presumed that while the nucleus of the star i.e. a giant star get collapsed from the original radius which is a few thousand km, this star forms a compressed object having a radius of few kilometers. The particles of the star that starts moving inside initially slowly and later more rapidly with expected the time which is less than a tenth of a second. Later the notable part of this mass and the core contracts considerably in order to increase the intensity of the gravitational fields pulling the inner core together.

The core mass and its kinetic energy which is produced during the collapse may or may not be sufficient to bring the system out of the nuclear intensities. Hence this entire collapse is known as a Black hole.

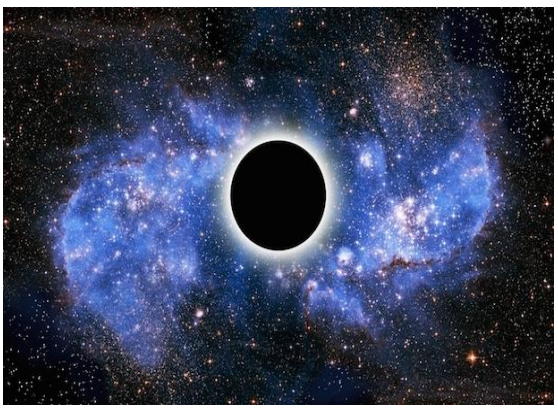

Figure 1 – Black Hole

History of Black holes

The black hole word termed by Wheeler in 1967 but possibly the existence of black hole was mentioned long before. In late 18th century, two scientist Michell and Laplace conducted their work independently and ended with a conclusion that the size of the star affects the entry and exit of the light ray. If the star has a huge surface area its gravitational field tend to pull the light ray towards itself thereby, preventing its escape. The above concept has been taken from both Newton's and Einstein theories

Formation of the Black hole

The three process suggested the formation of the black hole:

- The energy driven collision of the star and the core.
- The collapse of a star and a core with a hot neutron star followed by cooling, eventually collapsing to form a black hole.
- Above is followed by the formation of a neutron star which is highly stable and has a mass which is more than the value of collapse.

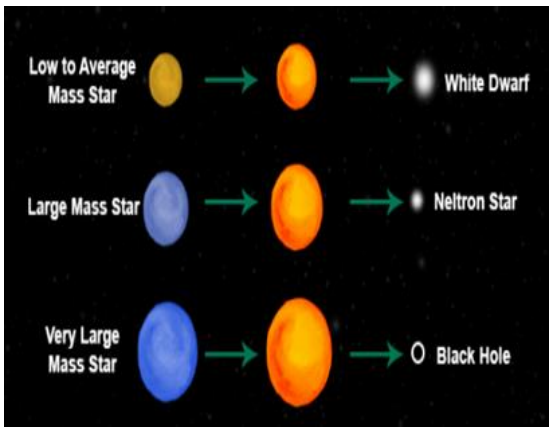

Figure 2. Formation of black hole

Literature Review

Singh (1999) stated about the elementary review of the gravitational collapse and the very importantly cosmic censorship hypothesis. They also summarized the known models of the collapse conclusive give the formation of black holes and the naked singularities. The nature of the quantum process that take place around the naked singularity and the possible implication for the observation.

Gallo and Marolf (2009) stated in their resource letter so as to guide the researchers and educators with the help of literature on the black holes. In the present recourse work both the physics and astrophysics were discussed. The resources include the ranging from the technical and non-technical discussion. It consist of production of gravity waves, black hole thermodynamics, stability of black holes, quantum treatment of black holes etc. Astronomically, they also cover the gas accretion physics onto black holes, merging history of supermassive black hole etc.

Mahto et al. (2013) stated about the formulae used for the gravitational forces present black holes and the other light particles. This also consists of the

calculation of the values of the different observations, black holes which can be observed only in X-ray binaries. The study focus on the gravitational forces which later shows that gravitational forces and light are inversely proportional to the wavelength of the radiations. It is also conclusively stated that the particle of the shorter wavelength shows more attraction as compared t that of the longer wavelength.

Nadeem (2013) discussed about the use of the formulae of gravitational forces which is performing between the light particle and black hole crossing by, near the radius of the event horizon of black holes. This is used to formulate and estimate the values by applying various test of the existing black holes present in Active galactic Nuclei (AGN) accompanied by the comparison of them with that of the black holes present in XRBs.

Abbott et al. (2016) conferred about the Laser Interferometer Gravitational Wave Observatory two detectors were observed at the same time on the basis of transient gravitational wave signal. In their research work, the LIGO detectors is helpful of the observation. The observation later describe the presence of two stellar-mass black hole system. This research work is important because of the direct detection of gravitational waves plus the observation of the binary black hole merger.

Valtonen (2016) discussed about the OJ 287 as a quaisi-periodic quasar with around 12 year optical cycles. It shows the prominent outbursts that are predictable in the binary black hole model.

Kurihara (2018) detailed about the method of extract thermodynamics quantities with the use of solutions of Einstein Solution. In this paper, Wald's method is used including the geometrical language like differential forms defined as local space time manifold. The use of new method i.e. Schwarzschild, Kerr and Kerr-Newman Black holes and De Sitter space. The conclusion discussed by purely dependence on the thermodynamics without any statistical ensembles. This paper had a great support towards the validity of the area of theorem of black holes.

Conclusion

In the present study one can deal with the various aspects of gravitational forces present between the black hole and light. The paper characterized on the basis of spinning and non-spinning of black holes. The paper conclusively represent the role of gravitational force which decreases between the black holes which increases with the radius of horizon, with the use of various techniques and instrumental method. The present paper reviews the comparative study of the different aspect of black holes and its consequences effecting in the space.

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