Scientific Research Publishing

Journal of High Energy Physics, Gravitation and Cosmology, 2022, 8, 97-99
https://www.scirp.org/journal/jhepgc
ISSN Online: 2380-4335
ISSN Print: 2380-4327

# Stellar Rotating Black Holes

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**How to cite this paper:** Irani, A. (2022) Stellar Rotating Black Holes. *Journal of High Energy Physics, Gravitation and Cosmology*, **8**, 97-99.
https://doi.org/10.4236/jhepgc.2022.81007

**Received:** August 29, 2021
**Accepted:** December 27, 2021
**Published:** December 30, 2021



## Abstract

Both mass and charge are needed to create a rotating Black Hole as has been investigated in great mathematical detail by the Reissner-Nordstrom metric and the Kerr-Newman metric. It is their application to astronomical phenomena that they have stated difficulty with because astronomical objects have no net electric charge and that is what we are exploring. While the energy in the gravitational field of the mass of a Neutron Star alone cannot create a stationary Black Hole, together with the energy in the strong magnetic field created by a rotating Neutron Star a rotating Black Hole is formed. Black Holes are the portal to the next higher spatial dimension.

## Keywords

Mass, Charge, Rotating Black Hole, Astronomical Objects, Neutron Star

## 1. Introduction

The Reissner-Nordstrom metric is a static solution to the Einstein-Maxwell field equations, which corresponds to the gravitational field of a charged, non-rotating, spherically symmetric body of mass M. The analogous solution of a charged, rotating body is given by the Kerr-Newman metric. This solution has NOT been especially useful for describing astrophysical phenomena because observed astronomical objects do not possess an appreciable net electric charge… Their solution is of theoretical and mathematical interest as it provides a simple cornerstone for further exploration as has been stated on the Internet in Wikipedia, The Free Encyclopedia. The astronomical phenomena that they were unable to explain have been explained here because a neutron has spin and a magnetic moment. The magnetic field of a rotating Neutron Star can provide the electric charge needed for the Kerr-Newman metric since moving electric charges create magnetic fields.

## 2. Text

It is the energy content in mass and the energy content in charge that is curving space-time according to the equations [1]

$$\text{Energy} = mc^2$$

and

$$\begin{aligned}\sqrt{\text{Energy}} &= \sqrt{mc^2} \\ &= \pm q\sqrt{\frac{1}{24\pi\varepsilon_0 r}}\times\left\{\left(\sin^2\theta\cos^2\phi+\gamma^2\sin^2\theta\sin^2\phi+\gamma^2\cos^2\theta\right)\right. \\ &\quad \left.+\left(\gamma^2-1\right)\times\left(\cos^2\theta+\sin^2\theta\sin^2\phi\right)\right\}^{1/2}\end{aligned}$$

Or,

$$\begin{aligned}\text{Energy} = q^2\times&\left\{\left(\sin^2\theta\cos^2\phi+\gamma^2\sin^2\theta\sin^2\phi+\gamma^2\cos^2\theta\right)\right. \\ &\left.+\left(\gamma^2-1\right)\times\left(\cos^2\theta+\sin^2\theta\sin^2\phi\right)\right\}\Big/\left(24\pi\varepsilon_0 r\right)\end{aligned}$$

Hence the Energy in mass and charge or equivalently in the gravitational field, electric field and magnetic field all have the capacity to curve space-time.

The core collapse of a Supernova explosion leads to the formation of a neutron star [2]. In all neutron stars, the crust of the star is locked together with the magnetic field so that any change in one affects the other, and hence as the crust rotates faster the magnetic field of the neutron star increases until it generates enough energy to create a Stellar rotating Black Hole.

**PSR J1748-2446ad** is the fastest-spinning pulsar known, at 716 Hz. This pulsar (rapidly rotating neutron star) was discovered in 2004 and confirmed in 2005. The rotation rate of a neutron star would have to be greater than the maximum observed value of 716 cycles per sec. to create a rotating Black Hole because the faster it spins the stronger the magnetic field it creates which further curves space-time around it.

Neutron stars can be born with a spin that is large enough to create a rotating Black Hole or they can gain speed by absorbing enough matter from companion stars to increase their spin rate. Neutron stars have magnetic fields that are between $10^8$ and $10^{15}$ (100 million to 1 quadrillion) times stronger than the Earth's magnetic field. Neutron star rotational speeds can increase, a process known as spin up. As neutron stars absorb orbiting matter from companion stars, the momentum of the absorbed matter increases the rotation rate until a rotating Black Hole is created. Once the neutron star enters the Black Hole it will exist out the White Hole at the other end into the fourth spatial dimension recombining to become a spinning fourth dimensional object [3]. The neutron star would have to keep spinning near its exit point to provide the energy necessary to keep the Black Hole rotating. Should it slow down its spin rate (because of the higher dimension it is now located in) and eventually stop spinning then it will lose the rotational energy it has been providing and the Black Hole will also stop rotating. Hence there can exist both rotating Black Holes and stationary Black

Holes.

Since Galaxies rotate about their center there is an abundance of stars near the center compared to distances further out because of the centrifugal force. This would explain an abundance of neutron stars being formed near the center of most Galaxies which would explain Supermassive Black Holes at Galactic centers.

## 3. Conclusion

The Energy to create the rotating Black Hole comes from the Energy released by the Supernova. Hence while the remnants from the corona of the Supernova explosion are blown out all over the third spatial dimension, its core goes into the fourth spatial dimension as a rotating Neutron Star which creates the Black Hole and becomes the Dark Matter of our third dimension (3) as also does all other matter that is sucked into the Black Hole. Hence a Black Hole (both stationary and rotating) is a one-way portal to a higher dimension.

## Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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