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Perspective

Black hole: A Region with Accelerating Gravity

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ABSTRACT

A black hole is a place in space where gravity pulls so hard that even light cannot escape from it. Gravity is so strong because matter has been compressed into a tiny space and does not allow the smallest particles, electromagnetic radiation or space objects such as comets or planets. This can happen when a star dies. Stellar-mass black holes are formed when a massive star can no longer produce energy at its core. Black holes can be millions or billions of stars or as small as a few stellar masses that are crushed to extreme densities in supernova explosions. They are invisible. Space telescopes with special tools can help find black holes. Special tools can see how stars that are very close to black holes behave differently than other stars. The star's outer layers can be blown out into space or fall into the black hole to make it heavier. When a black hole and a star orbit close together, high-energy light is produced.

Keywords: Stellar-mass black holes; Astrobiology; Event horizon; Galaxies; Supernova explosions

DESCRIPTION

The event horizon of a black hole is the boundary around the black hole's mouth beyond which no light can escape. Once a particle crosses the event horizon, it cannot get out. Gravity is constant across the event horizon. The inner region of a black hole, where the object's mass resides, is known as its singularity. It is the only point in space time where the black hole's mass is concentrated and the black hole's gravity can sometimes be strong enough to pull the outer gases out of the star and grow a disc around it called the accretion disk. There are four types of black holes: stellar, intermediate, supermassive, and miniature.

The most well-known way in which a black hole is formed is through stellar death. As stars reach the end of their lives, most swell up, lose mass, and then cool to form white dwarfs. But the largest of these fiery bodies, which are at least 10 to 20 times more massive than our own Sun, are destined to become super dense neutron stars or so-called stellar-mass black holes. It is estimated that a mass of gas falling rapidly into a black hole releases more than 100 times more energy than the same mass through nuclear fusion formed by the collapse of individual stars, black holes are relatively small but incredibly dense. Stellar black holes this consumes dust and gas from surrounding galaxies, causing them to grow in size.

Massive black hole

The largest confirmed black hole inhabits the core of M87, a giant elliptical galaxy in the constellation Virgo. M87 appears to be 6.6 billion solar masses with a diameter of about 25 billion miles (40 billion km), more than four times the diameter of Neptune's orbit, our solar system's most distant planet. Supermassive black holes can be the result of the merger of hundreds or thousands of small black holes. Large gas clouds could also be responsible, collapsing together and quickly accumulating mass. In billions of years, when the sun is at the end of its life, it will become a red giant star. Then, when it runs out of fuel, it will shed its outer layers and become a ring of glowing gas called the planetary nebula. Eventually, all that will remain of the Sun is a cooling white dwarf star.

CONCLUSION

Although there are many theories as to how this type of black hole forms, one of the most compelling is that it becomes so large as a result of a runaway chain reaction of colliding stars and black holes. Black holes are massive, compact objects of infinite density that can warp the curvature

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of space-time, allowing nothing, not even light, to escape them. Multiple stellar-mass black holes are thought to form when multiple stellar-mass black holes undergo a series of mergers. These mergers often occur in crowded areas of galaxies.