Black Holes

Summary

http://quantumspotacademy.org/videos/black-holes/

The first substantial theory of gravity was developed by Isaac Newton, who realized that gravity is an attraction acting on all objects — everything from apples to planets. Newton wrote an equation describing the gravitational attraction between any two objects.

The gravitational force between two objects is directly proportional to the masses of the objects and inversely proportional to the square of the distance between their gravitational centers.

The speed it takes to escape an object's gravitational field is called the escape velocity.

According to Albert Einstein's theory of Special Relativity, the speed of light is the fastest speed that any massive object can have. Thus, it is impossible to escape an object with an escape velocity greater than the speed of light. Such an object is called a black hole because not even light can escape it and thus it would look like a black hole in the sky.

The radius of the sphere that an object must be crushed into in order to become a black hole is called the Schwarzschild radius.

Throughout a star's life, the inward gravitational force is in equilibrium with the star's outward pressure, but when the star runs out of fuel in its core, the outward pressure is unable to counteract gravity, so the star will collapse. If the star is massive enough, it will become a black hole.

Black holes can grow after their formation by consuming other objects in their vicinities. The largest black holes are called supermassive black holes. Some supermassive black holes may reach tens of billions of solar masses.

The point at which an object cannot return from a black hole is called the event horizon.

Although black holes do not emit or reflect light, they can still be located by observing stars affected by their gravitational fields, observing radiation from the accretion discs formed by matter falling into a black hole, or detecting ripples in the gravitational field caused by a black hole.