Black hole

The term black hole describes an astronomical phenomenon where a dense area of mass in the world brings everything towards it including the light particles. According to research, nothing can get away from the gravitational pull of a black hole. In May 2011, observation of the black holes was incomplete but scientists argued that the existence of the black holes was based on their impacts on the surrounding mass (Bethel, 1).

Formation of a black hole occurs when the gravity of a star causes it to collapse into itself. Burning hydrogen and other fuels produces pressure, which balances the star’s gravity. However, when the star’s fuels finishes, the gravity surmounts the star and it collapses. A neutron star happens to be the star with one and a half more mass than the sun. If this star is massive enough, it then subsides and becomes a black hole (Think Quest, 1). The final life stages of massive stars are the black holes, which are 10 – 15 times bigger than the sun. Researchers reveal that people dwelling on earth cannot see the black holes but their impacts on their surroundings deem that they exist in the space (Hayden, 1).

Formation and characteristics of Black Holes

Creation of miniature holes occurs when the large star uses up all the fuel and they no longer have the capability to support their heavy weight. The star’s immense layer exalts pressure of hydrogen, which begins to press down, forcing the stars to loose their weight and they finally get smaller and smaller. After some time, the star will subside to a small pinpoint due to gravity. Eventually, the star will shrivel to a smaller size than the size of an atom. When the huge stars can no longer produce energy in their cores, formation of stellar-mass holes occurs (Buttar, 3).

The gravity at the center of a star is huge, which continually pulls the burning gases towards the center. These burning gases counterbalances this gravitational pull but when the star's nuclear fuel runs out, it explodes. Scientists refer to this process as supernova. Much of the star segments scatter in the space and the remaining can no longer oppose the gravity at the center. The gravity at the center happens to be so strong that not even light can escape and scientists refer to this as a black hole (Hayden, 2).

When the star's life ends, the components that makes up the star and some materials surrounding the star collapses in slowly. This allows creation of dense mass that continually pulls the surrounding materials that later creates gravitational pull. This gravitational pull draws in more and more materials from the surrounding. Creation of a black hole occurs only when the star is huge enough. The sun happens not to be big enough to become a black hole. A star that is two and a hundred times bigger than the sun is huge enough to become a black hole (Bethel, 2).

Due to their large masses, black holes have gravitational pull from which even light cannot escape. The light rays passing near a black hole bends and if they come closer, the orbit around the black hole traps and sucks them in. The trapped light rays describe the events horizon of the black hole. The light turns red due to loss of energy trying to escape from the black hole. As this happens, a gravitational red shift takes place. Inside the event horizon, several processes occur (Think Quet, 2).

Primordial black holes (PBHs) are forecasted products of the Big Bang. Creation of countless black holes occurs due to the massive energy produced at the beginning of the universe. However, scientists deem that the small black holes will not live for long. The black holes radiate energy rendering them to lose mass, which causes the small black hole to sparkle out of existence very fast (O'Neill, 2).

A black hole consists of two major parts, which are invisible. When gravitation attracts matter and light, singularity of the black hole occurs. The other part of the black hole is the event horizon. It is an imperceptible border surrounding the singularity. The only way to locate the event horizon is to see light or matters vanish as it gets in touch with with it (Hayden, 3).

Black holes appear in different sizes and shapes and they can transform depending on the processes occurring in them. A non-rotating black hole is spherical in shape and its size depends on its mass. On the other hand, a rotating black hole bulges out near its equator and the amount depends on how faster it rotates. Its size also depends on its mass like the non-rotating black hole (Think Quest, 4).

Black holes are so called since they have large gravitational pull and are so huge and the light particles cannot escape from their gravitational pull. Since the light coming from the black holes is invisible, the black holes are also invisible. To determine the nature and location of a black hole, scientists must observe the disruption of the surrounding materials (Bethel, 3).

Whenever the orbit sucks in more matter, the mass and the size of the black hole increases. A black hole also holds up the entropy, or disorder, and the size of the event horizon increases whenever the amount of entropy increases. However, for the black hole to hold entropy, it must have a temperature, an aspect that most scientists could not conquer with for a long time. To have such a temperature, something has to give out particles, and nothing can escape from a black hole. If the black hole loses enough particles, its mass become too small to keep up its huge gravity and it explodes. After the explosion takes place, scientists speculate that a tiny particle is left, which they refer to as a boltzmon (Think Quest, 5).

Impacts of Black Holes

The gravitational pull of a black hole does not go beyond its event horizon, therefore, light and matter has to move toward the black hole. One major effect of the black hole is the consumption of matter that drifts near its event horizon. This matter consumed is added in the singularity’s density. A black hole formed near another star may use up the star over time and it eventually grows as it continues to pull in the matter (Hayden, 4).

Another impact of the black hole is the damage it causes on earth. The black hole enters into the atmosphere, suck up many gases, and finally form a radioactive accretion disk. As the black hole gets closer to the earth surface, individuals living in the earth and the objects around it would be sucked up into it. Once the black hole affects the surface, it would start swallowing up the Earth, and perhaps eat its way all the way through. In this situation, the Earth would end up being no more than a wispy disk of debris around the remaining black hole (Wethington, 10).

The presence of a micro-black hole coming from the beginning of the Universe would be very small but have devastating effects (O'Neill, 6). Scientists speculate that PBHs can zip straight through matter but it will often leave a mark. As the tiny entity soars through the Earth at a supersonic speed, it will eventually force out radiation in the form of electrons and positrons, which is another impact off the black hole on earth (O'Neill, 7).

Astronomers can detect the presence of black holes by measuring the effects on objects near then even though black holes are impossible to view from Earth. These impacts include, gravitational lens results, mass estimations from objects scoping a black hole or spiraling into the core, and released radiation. Most black holes have objects surrounding them and they greatly affect these objects (Buttar, 4).

Scientists can barely notice the black hole’s gravity from a few yards and this type of black hole would have no effect on the gravity of the Solar system. The black hole would suck up the air as it passes through the atmosphere of the Earth and it starts forming a small accretion disk. The Earth seems too close to a vacuum and it would therefore pass right via it, leaving a wake of radiation in its path and nothing else (Wethington, 9).

Another impact of the black hole is the emission of X-rays. The substances that fall into the hole from another star heats up to million of degrees. The highly heated material goes on emitting X-rays, whereby an X-ray telescope detects them (Buttar, 5). Some scientists attribute observations of the planets and stars to small black holes trapped inside the gravitational well of the mass. This aids in explaining the unusual temperatures observed in

Saturn and Jupiter, which are hotter than the normal temperatures. Scientists deem that interactions with the PBH hiding inside generate the extra heat (O'Neill, 4).

According to the Einstein's General Theory of Relativity, gravity had the capability to twist space. Many years later, scientists confirmed this during a solar eclipse whereby the shifting of the star’s position occurred when sun’s gravity twisted its light. Therefore, it is true to speculate that an object with massive gravity between the Earth and another object have the possibility to bend the light from the distant object into a focal point, similar to the way a camera lens does (Buttar, 5).

For many years, most people deemed that black holes remained in existence, but in the year 1974, physicist Stephen Hawking proved them wrong. Basing views on the laws of quantum mechanics, he discovered that creation of tiny particles of light and matter on a sub-atomic level occurs within the black hole. These particles can at times escape, leading to a small glow in the event horizon. The hole then slowly disappears, returning its engrossed energy to the universe (Hayden, 5).

It is evident that the black holes are the most captivating objects in the space. Even though the human beings cannot observe them directly, there is indubitable indirect evidence that they exist. The most evident aspect of black holes is their effect on the earth and objects that surround them. Black holes causes increase in temperatures through emission of X-rays, which increases radiation. Moreover, black holes consume objects nearing their events horizon.