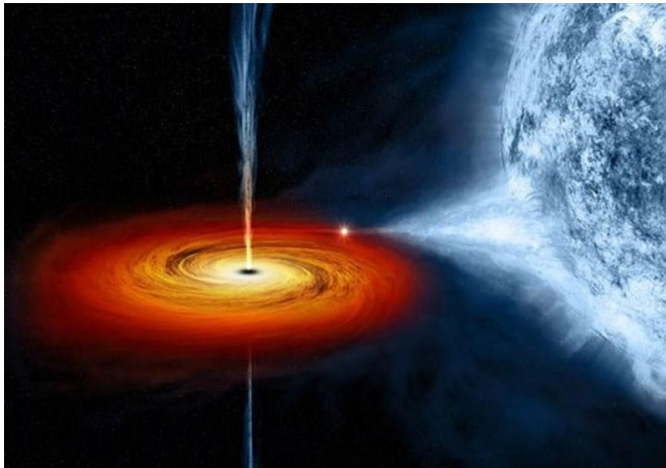


## Black Holes: The Alpha and Omega of Galaxies

Black holes have long dominated the realms of science fiction and science knowledge as leviathans who devour planets, stars, and even light. There is no question that the intense gravitational pull of a black hole is lethal to anything and anyone in our universe. Despite their destructive powers, however, black holes are shrouded in mystery and may even have unforeseen benefits to the creation of galaxies and life itself.



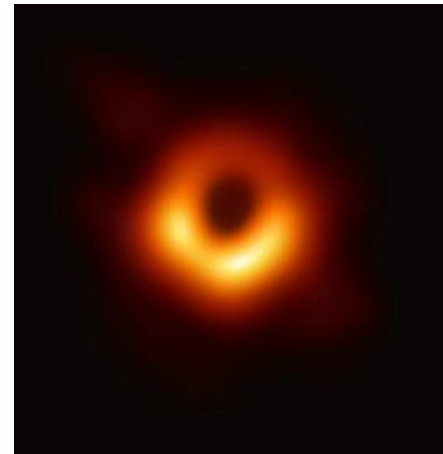
Artist representation of the black hole, Cygnus X-1 devouring a star

In short, black holes are regions in space where the gravity is so dense that nothing can escape. Due to this intense gravity, it is currently impossible to know what happens in the center of a black hole. Furthermore, due to the inability of light to escape, black holes are essentially invisible to the naked eye- unless of course, they are feeding on interstellar objects as can be seen in the image on the left. Once matter or light passes the event horizon (essentially the point of no return) of a black hole it is impossible to escape.

Black holes are created when a star dies and the massive amount of stellar gravity becomes unstable and collapses in upon itself. This process is violent, and the outer layer of the star is blown away.

There are three main classifications of black holes; primordial black holes (the smallest of the black hole classifications), a stellar-mass black hole (the most common of the black hole types and the intermediate size classification) and supermassive black holes (the largest of the black hole classifications). The image on the right is the first photograph taken of a black hole; it is a supermassive black hole in the center of a galaxy.

Due to the fact that we currently do not have the technology to explore the depths of a black hole or see one up close, scientists have a lot of questions regarding their nature. One of the most prevalent questions is what happens with information (matter that a black hole has devoured) after that specific black hole has expired due to Hawking Radiation. According to Law of Conservation of Mass, matter



The supermassive black hole in the center of the Messier 87 galaxy

cannot be created nor destroyed and yet the information that a black hole had devoured seems to disappear once the black hole evaporates.

There are numerous theories regarding what happens with information; some of these theories are explored in the video below:



Despite the destructive power and mystery surrounding black holes, there is a significant benefit to their existence. Supermassive black holes are what helps galaxy formation- without the strong gravitational pull of these behemoths, stars and planets would not be able to come together to form galaxies, let alone solar systems. It is because of the presence of supermassive black holes in the center of galaxies that helps to form solar systems like our own. Furthermore, the gravitational pull of two supermassive black holes in the center of galaxies can cause them to collide, and thus giving birth to a new galaxy filled with new possibilities for life.



The collision of the NGC 2207 galaxy and the IC 2163 galaxy