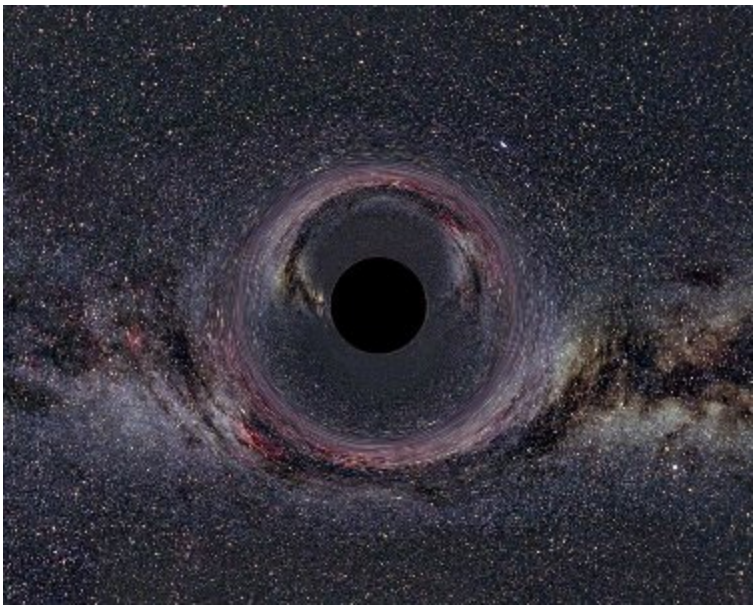
BLACK HOLES



Ever heard of a body into nothing which enters can escape, not even light!
Sounds like a monster, isn't it?
Well, black holes are the one..
Celestial body with such an intense pull that nothing, not light, not electromagnetic radiation-nothing can escape its pull;hence the name black hole. It possesses an infinite density and is a one-way pathway because things can go in but cannot escape out. Its core is termed as *singularity* and the outer boundary is the *event horizon*, the end point beyond which anything and everything it sucked into the cosmic whirlpool of infinite density.
Around a black hole there is a mathematically defined surface called the event horizon that marks the point of no return. it is called 'black' because it absorbs all the light that hits the horizon, reflecting nothing, just like a **perfect black body** in **thermodynamics**!

So, how are black holes formed?!

There are many theories to that question.

Most common theory is where a *colossal star* with a mass of more than 3 times the sun's reaches the end of its life, gets crushed under its own gravity, leaving behind a compact black hole.

When a gigantic star reaches its final stage of life and is about to go **supernova**(which normally takes billions of years).it spends all the nuclear fuel by then. So it stops burning and heating up and cannot create the nuclear energy required to feed the star and let it make a pivotal balance to support its own gravitational draw against the pressures brewing inside.

Therefore its stability cracks under its own gravity.

The radius of star shrinks to a critical size called the **Schwarzschild radius** and it starts to devour anything and everything that comes a bit too close, including light. Gravity does its job and the core of the star caves in and implodes.

The outer shells of the star explode into space. The may even fall into the already dense black hole making it even heavier and denser. And that's how how you get a stellar mass black hole.

Let's explore the various reactions going on inside the star that result in a stellar mass black hole.

Basically what happens is that nuclear fusion reactions take place in the core of the star which causes an acute outward pressure but that pressure is optimally balanced by the intense inward pull of gravity by the star's mass. But when a star is in its death throes, the fusion reactions combining hydrogen into helium (like in the Sun) stop and a new kind of nuclear reaction take place that convert helium into carbon.

This is followed by carbon turning into oxygen and oxygen to silicon and then to iron.
That's the point where nuclear fusion stops and the outer layers of all the elements produced (hydrogen, helium, carbon & silicon) keep burning around the central core of **iron**.

The mammoth iron core builds up and finally explodes which is called a **supernova explosion.**

Well after that there can be a few outcomes of the fate of the now-blown-up star –

1. A star with a mass 1.4 times more than that of our sun will after a supernova explosion simply compresses further into a mass of dense neutrons (they are so dense that 100 million tons of them would be equal to just one teaspoon!) and become a massive neutron star held up by neutron degeneracy.

2. But if the neutrons degenerating are not able to prevent the star's collapse due to the gravitational forces lurking inside, its shrinks and compresses into an infinite void of blackness or in other words – a stellar mass black hole.

Existence of black holes

Scientists have discovered at least 20 objects in 20 different galaxies that are potential black holes and may contain event horizons. A black hole may even be at the center of the Milky Way Galaxy.

How do astronomers detect black holes if they are unable to see them? Well, to be precise, astronomers do not detect black holes. But they do detect the phenomena that can only be explained by the existence nearby of objects that match the description of black holes!
The strong gravitational attraction of a black hole affects the motion of nearby objects. When astronomers see a star circling around something, but they cannot see what that something is, they may suspect it is a black hole..

Scientists precisely locate black hole using the material it ejects.