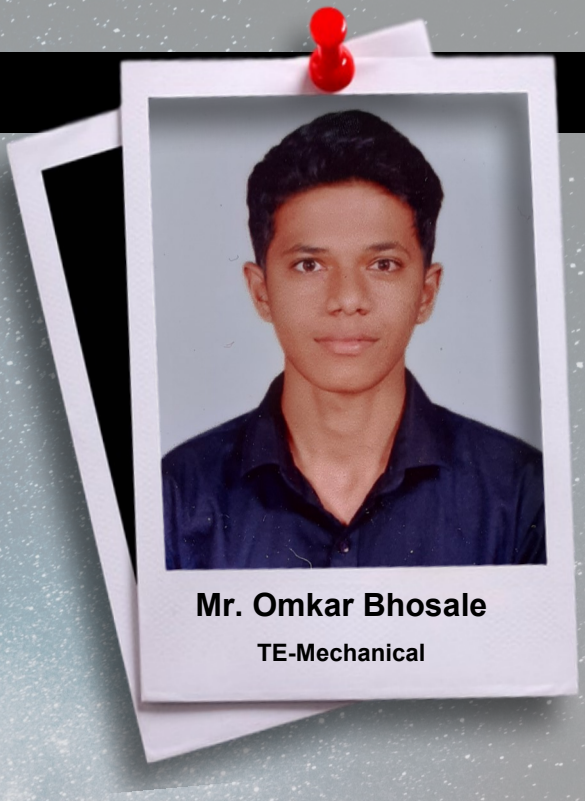
"BLACK HOLE"



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The universe was very different in its first few hundred million years. Gravity was just kicking into clump together clouds of gas and dark matter. And the first generation of stars only rich in hydrogen and helium were beginning to form.

But surprisingly, by now, some giant black holes having a mass of up a billion ++ solar masses had somehow formed. If we consider the birth of the black hole and it's growth, the early universe and it's expansion, less than a billion years old. The early universe surely wouldn't allow the black holes to gain billion times mass than the sun in the usual way.

If our current black hole models are accurate, such massive black holes, or quasars, in particular, should not have formed in that era of the universe. But in reality, they did exist in the early universe. So the question is how this massive galactic component formed in early universe? How did they gain such enormous mass in just a few million To begin with, let me first give you a brief introduction to a quasar. Quasar is an abbreviation for quasi-stellar radio source.

It is an active galactic nucleus, a rapidly spinning and bursting jet packed super massive black hole that lives on the gas. It is located at the centre of the galaxy. Quasars are among the brightest sources and the most powerful objects in the universe. Some quasars can have luminosities even thousands of times greater than the Milky Way galaxy.

But the intriguing question is that what makes these objects so powerful? The answer is their environment. Quasars usually reside in galaxies that are home to enormous gas supplies. In such a plentiful environment, as thegas around the black hole while falling into it, it gets heated.

Hence, it emits radiation throughout the entire electro magnetic spectra. The supermassive black holes in nearby galaxies do not contain such huge quantities of gas. Quasars are generally found in faraway galaxies.

They are so far from our solar system that the nearest quasar, Markarian 231, lies about 600 million light years away. So how do such magnificent spinning structure form? Currently, two of the many theories explain the formation of black holes generally.

As per the first and the widely known theory, when a massive star dies, maybe it can leave a black hole that can nearly around 100 to million times the mass of the Sun. Over time, this black hole can consume the surrounding material.

This helps the black hole grow bigger and bigger until it becomes a supermassive black hole, which is millions to billions of times the mass of the Sun. But scientists believe that no black hole can consume or feed enough material in just 500 million years to achieve the mass of a billion sun. That's because as matter starts to gather near around a black hole, it settles into an accretion disk.

The material in this disk travels around the black hole at speeds comparable to the speed of light. Due to the motion, the disk gets heated up and blasts out jets of radiation across a broad spectrum of wavelengths.

The intense pressure exerted by this radiation pushes away the nearby matter, restricting how fast the black hole can devour or feed the additional required mass.

This maximum accretion rate of a black hole theoretically is known as the Eddington mass limit. Even if the matter is pulled by the black hole faster than the specific limit, the enhanced accretion is expected to produce powerful winds.

These winds will further drive the surrounding material away, thus, halting the growth. All these factors limit how fast a black hole can grow. So if this scenario is accurate, it contradicts the theory that quasars formed in the early universe in the usual way.