

# What is a protostar?

## **Summary:**

A protostar is a glowing cloud of gas and dust that forms when a dense cloud in space begins to collapse under its own gravity. As the cloud contracts, it heats up and undergoes nuclear reactions, emitting light and heat. Over time, the protostar will continue to shrink and eventually become a fully-fledged star.

## **Explaining Protostars:**

Imagine a cosmic nursery where stars are born. In this nursery, there are vast clouds of dust and gases, mostly hydrogen, floating in space. These clouds are like giant cosmic incubators, nurturing the birth of new stars. When a dense cloud begins to collapse under its own gravity, it marks the beginning of a star's journey—and the birth of a protostar.

## **Formation Process:**

The formation of a protostar begins when a dense cloud of gas and dust starts to collapse inward due to gravity. As the cloud contracts, it begins to spin, causing the gas atoms to collide with each other at high speeds. This generates a great deal of heat and pressure at the center of the cloud, where temperatures can soar to millions of degrees Celsius.

## **Nuclear Reactions:**

As the protostar continues to collapse and heat up, nuclear reactions begin to take place at its core. These reactions, primarily the fusion of hydrogen atoms into helium, release enormous amounts of energy in the form of light and heat. This is what causes the protostar to glow brightly, illuminating the surrounding space.

## **Growth and Evolution:**

Over time, the protostar will continue to contract and accumulate more mass from the surrounding gas and dust cloud. As it grows larger and more massive, the pressure and temperature at its core will increase, eventually reaching a point where nuclear fusion reactions become stable. At this stage, the protostar will have transformed into a fully-fledged star, beginning its long journey through space.

## **Observing Protostars:**

Astronomers study protostars using telescopes and other instruments to observe the infrared radiation they emit. Because protostars are surrounded by thick clouds of gas and dust, they are often difficult to see in visible light. However, their infrared emissions can penetrate through the dust and reveal the protostar's structure and properties.

Protostars are the cosmic cradles where stars are born. Formed from collapsing clouds of gas and dust, protostars glow brightly as they undergo nuclear reactions at their cores. Over time, these protostars will continue to grow and evolve into fully-fledged stars, lighting up the darkness of space and shaping the universe we live in.