

Astronomers are watching a gas giant grow, right in front of their eyes

May 3 2021, by Andy Tomaswick

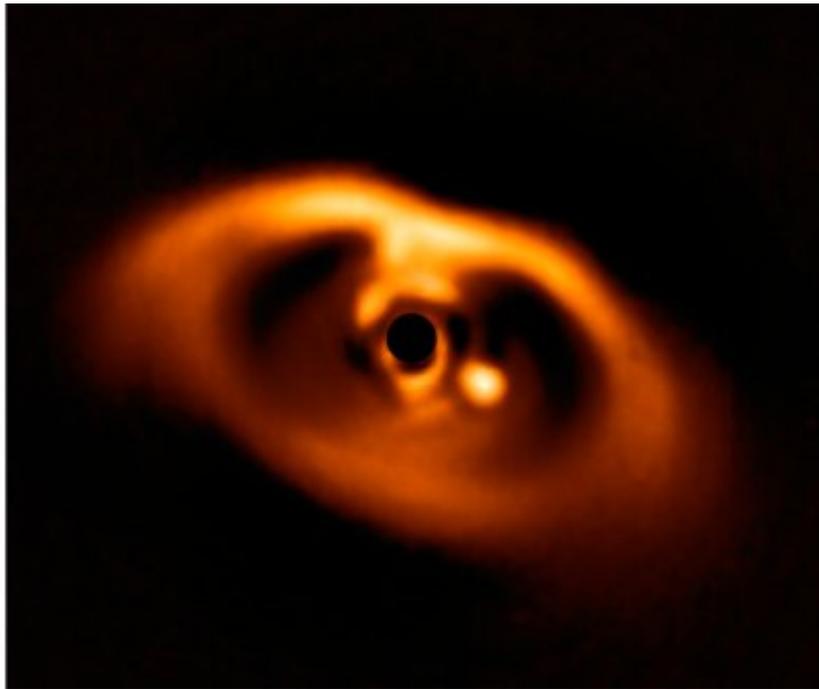


Image of the protoplanetary disc surrounding PDS 70. Credit: ESO, VLT, André B. Müller (ESO)

In the vastness of space, astronomers are likely to find instances of almost every astronomical phenomenon if they look hard enough. Many planetary phenomena are starting to come into sharper focus as the astronomy community continues to focus on finding exoplanets. Now a team led by Yifan Zhou at UT Austin has directly imaged a gas giant still

in formation.

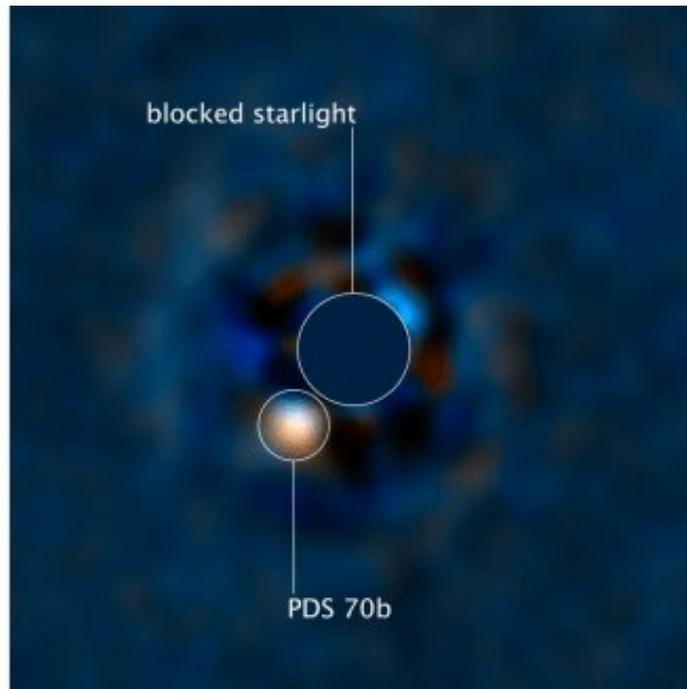
To do this, the team used that workhorse of astronomers for the last 30 years—Hubble. They pointed it at the orange dwarf system PDS 70, which is known to have two [planets](#) in the formation stage. The system is located in the constellation Centaurus, about 370 [light years](#) away from our solar system. One of its planets, PDS 70b, is a gas giant that circles its star at about the same distance as Uranus from our sun.

PDS 70b is still relatively young, at about 5 million years old, but it has already grown to the size of approximately five Jupiters. It also appears to be at the tail end of its growth phase, collecting only about 1/100 of a mass of Jupiter over the next million years if it maintains its current rate of growth.

That growth is fueled by a circumplanetary disk that collects material from a larger circumstellar disk and funnels it onto the planet. Those funnels follow [magnetic field lines](#) into the planet's atmosphere, and can be viewed as extra hot specks in ultraviolet wavelengths.

Dr. Zhou and his team managed to directly image the planet, making it one of only about 15 that have been directly imaged so far, and the youngest of those imaged by Hubble. They used the space telescope's ultraviolet sensors to capture an image of both the PDS 70 star and its growing gas giant. The problem was filtering out the star's [light](#), which was 3000 times brighter than the ultraviolet light from the planet.

Using a novel post-processing technique, Dr. Zhou was able to block out the light from the star and leave only the light emitted from the planet to be analyzed. In doing so, he also decreased the maximum exoplanet's maximum orbit around a star that can be viewed by Hubble by a factor of five.



Processed image of the PDS 70b gas giant with blocked starlight. Credit: NASA, ESA, McDonald Observatory – University of Texas, Yifan Zhou (UT), Joseph DePasquale (STScI)

The team points out that this observation is only a snapshot in time, so there is no data on any changes to the speed with which PDS 70b is continuing to grow or how close it is to completing its growth. However, string enough snapshots together over time and they begin to form a moving picture that provides more information than a single one ever could. With luck, Hubble will continue to collect more data on the PDS 70 system using Dr. Zhou's techniques to track the progress of its planet's fascinating creation process.

Provided by Universe Today

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