

A Fading Young Star Stuns Astronomers.

Astronomers have observed a young star in the Mon R2 star-forming region that mysteriously dimmed to just **one-tenth of its usual brightness**—before slowly brightening again. The dramatic event, lasting between 80 and 320 days, has left scientists searching for answers.

The star, known as **[CMD97]-1031**, is located **3,400 light-years away** (~ 1050 parsec) in the constellation **Monoceros**. It is an **X-ray-emitting** young stellar object (YSO) with an **accretion disk**, a swirling mass of gas and dust that feeds material onto the star, evidenced by the near-infrared glow it is emitting. Despite this, the star shows relatively little mid-infrared emission, suggesting it does not have much dust in its outer regions.



Figure 1. The molecular cloud and embedded star cluster Monoceros R2.

The Missing Star

Using observations from the **Zwicky Transient Facility (ZTF)**, **Asteroid Terrestrial-impact Last Alert System (ATLAS)**, and **Gaia**, researchers tracked the star's **brightness over eight years (2014–2022)**. Normally, [CMD97]-1031 shines at a magnitude of **18 in the r-band**, but during this event, its brightness plummeted **by a factor of 10**, causing the seeming disappearance in the night sky.

Adding to the mystery, the star seemed to "blink" during the dimming phase, experiencing **short-term fluctuations of up to 2 magnitudes** before stabilizing at a lower brightness. After months of darkness, it **gradually recovered** but remained slightly **fainter and redder** than before—suggesting lasting changes in its surrounding material.

Why Would This Happen?

Although brightness variation is common in YSOs, which exhibit short duration variation, this is distinct in that this deep dimming over a longer time scale is rare but has been observed in another young star ASASSN-21qj. But scientists are still at a loss for the exact cause.

One leading theory is that a **dense cloud of dust temporarily passed in front of the star**, blocking its light. This behavior is similar to **UX Orionis-type variable stars**, where young stars experience irregular dimming due to orbiting dust clouds. If correct, this event could **offer insights into how dust and gas distribute around young stars—key to understanding planet formation**.

Why Does This Matter To Us?

The fading and recovery of [CMD97]-1031 is one of the most **extreme** cases of stellar variability seen in a young star. Such events reinforce the **importance of long-term sky surveys** to uncover the hidden processes shaping stars and planetary systems.

Is this the end of the story for this young star or does it have more secrets to give up?

<http://astroa.physics.metu.edu.tr/Astronom/SC/MONR2A.HTM>