# Rare Quadruple Star System in Milky Way: Brown Dwarfs Orbiting Red Dwarfs Discovered

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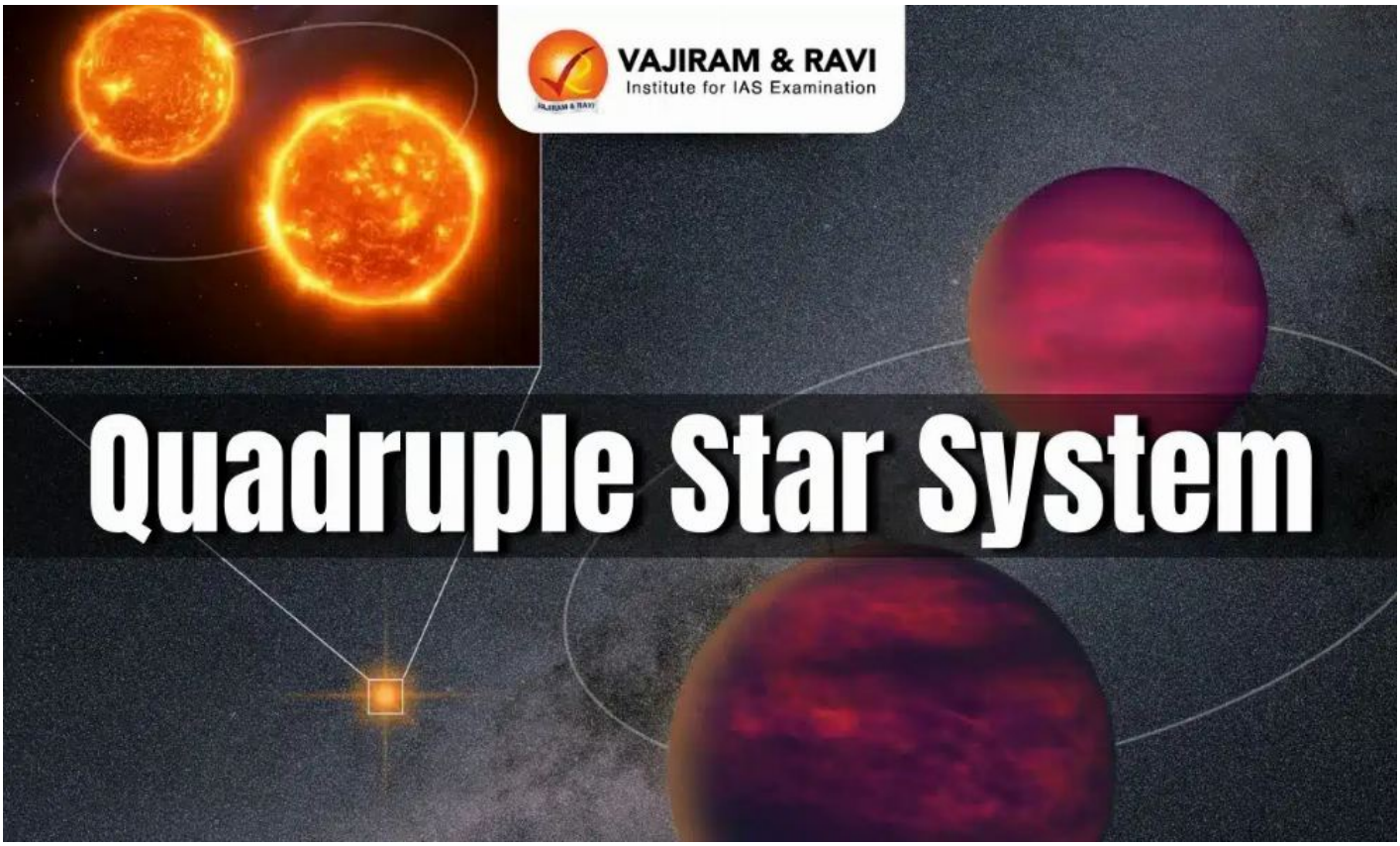


## Quadruple Star System Latest News

- A team of international scientists has identified an extremely rare quadruple star system in the Milky Way, named **UPM J1040−3551 AabBab**. The system features a pair of **cold brown dwarfs** orbiting two **young red dwarf stars** — a configuration never observed before.
- The study was published in the *Monthly Notices of the Royal Astronomical Society* (September issue).
- Scientists say this discovery is significant as it provides fresh insights into **brown dwarfs**, celestial objects that are notoriously hard to detect and study, helping improve understanding of their properties and role in stellar evolution.

## Young Red Dwarf Stars

- Young red dwarf stars are small, relatively cool stars in the early stages of their long lifetimes. They are the most common type of stars in the Milky Way.

- **High radiation**: They are characterized by strong magnetic activity, leading to intense ultraviolet (UV) radiation and violent superflares, which can pose significant challenges to planetary atmospheres and life.
- **Size & Temperature**: They are smaller and cooler than our Sun, with surface temperatures ranging from about 2,500°C to 4,000°C.
- **Longevity**: Red dwarfs burn hydrogen fuel very slowly, allowing them to live for tens to hundreds of billions of years, far longer than stars like the Sun.
- **Youth factor**: When they are young, red dwarfs are more active, often emitting intense stellar flares and strong radiation.
- **Importance in astronomy**: Studying young red dwarfs helps scientists understand stellar evolution, the habitability of surrounding exoplanets, and how such stars influence planetary atmospheres.
- **Proximity to Earth:** The nearest star to our Sun, Proxima Centauri, is a red dwarf, highlighting the abundance and significance of these stars in our galactic neighbourhood.

## Brown Dwarfs: The “Failed Stars”

- Brown dwarfs are unique celestial objects that form like stars from collapsing gas and dust but lack the mass to sustain hydrogen fusion, which powers normal stars.
- This limitation makes them faint and cooler, earning them the nickname **“failed stars.”**
- Despite this, they share characteristics with gas giants such as Jupiter and Saturn, having similar atmospheres filled with molecules like water vapor.
- Brown dwarfs can be massive—reaching up to **70 times the mass of Jupiter**—yet remain distinct from true stars, occupying the gap between planets and stars in the cosmic family.

## Why Brown Dwarfs Are Hard to Detect

- Brown dwarfs are **extremely cold and faint**, making them difficult to observe directly.
- To study them, astronomers often track brown dwarfs that orbit brighter companion stars, since both objects are usually born together from the same material.
- By analysing the brighter stars, scientists can estimate the age, temperature, and composition of the dimmer brown dwarfs.
- The recent discovery of the quadruple star system UPM J1040−3551 AabBab is remarkable because it contains **two T-type brown dwarfs, each about the size of Jupiter, orbiting two young red dwarf stars**.
- Such a configuration is exceptionally rare — the probability of a low-mass brown dwarf having a companion is less than 5%, making this finding a valuable opportunity to deepen our understanding of these elusive “failed stars.”

## Importance of Studying Brown Dwarfs

- Brown dwarfs help astronomers understand the **processes behind star and planet formation**, since they occupy the middle ground between the two.
- Mapping their abundance and distribution also provides crucial insights into how **mass is spread across the universe**.

- This is particularly significant because much of the universe’s mass remains unseen, existing as **dark matter**, and studying brown dwarfs offers valuable clues to this cosmic mystery.

**Source:** IE | ES

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