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BAND-LIKE CLOUDS SEEN OVER SUN'S NEIGHBOUR

Relevant for: Geography | Topic: The Earth and the Solar System

A depiction of Luhman 16A. | Photo Credit: NASA

A group of international astrophysicists have identified cloud bands on the surface of Luhman 16A, one of a pair of binary brown dwarfs in the Vela constellation. They have used an idea put forth nearly two decades ago by Indian astrophysicist Sujan Sengupta, who is at the Indian Institute of Astrophysics, Bengaluru, that the light emitted by a cloudy brown dwarf, or reflected off an extrasolar planet, will be polarised. He suggested that a polarimetric technique could serve as a potential tool to probe the environment of these objects.

Subsequently, many astronomers detected polarisation of brown dwarfs. But what is special in the newest study of Luhman 16 is that the researchers have found the actual structure of the clouds — that they form bands over one of the pair (Luhman 16A) of brown dwarfs.

Understanding the cloud system over a brown dwarf can shed light on the pressure, temperature and climate on the surface of the celestial body.

Luhman 16 is a binary star system, the third closest system to the Sun after Alpha Centauri and Barnard's star. At a distance of about 6.5 light years from the Sun, this pair of brown dwarfs referred to as Luhman 16A and Luhman 16B orbit each other, casting a dim light. Brown dwarfs are also called failed stars, because their masses are intermediate to the largest planets and the smallest main sequence stars. Their masses being too small, they are unable to sustain fusion of their hydrogen to produce energy. It is believed that some of the more massive brown dwarfs fuse deuterium or lithium and glow faintly.

The faintness of the glow proved to be providential in finding the cloud bands. Unlike a star whose brightness would be too high, or an extrasolar planet orbiting a star, where the extra light from its star would have to be cut off to make the measurement, the light of the brown dwarfs was just right.

The group, by using the Very Large Telescope at European Southern Observatory, Chile, found that Luhman 16A had band-like clouds in its atmosphere, whereas the same was not true of Luhman 16B. "While, the polarisation of Luhman 16B can be interpreted to have its origin in the asymmetry caused by rotation-induced oblateness of the object, the polarisation of Luhman 16A needs inhomogeneous band-like cloud distribution," said Professor Sengupta. The work has been published in *The Astrophysical Journal*.

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