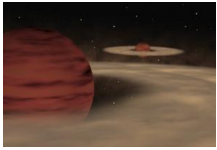


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## **Baby Planemos Can Be Born As Twins**

### *A binary system of planemos*

A team led by a University of Toronto astronomy professor is challenging an existing theoretical model and thrilling the astronomy community with its discovery of a seven-Jupiter-mass companion next to a planemo, or planetary mass object, only twice as heavy. Both objects have masses similar to those of extra-solar giant planets, usually found in orbit around a star. Unexpectedly, these bodies appear to circle each other. "This is a truly remarkable pair of twins -- each weighing some hundred times less than our sun," says Ray Jayawardhana, an associate professor of astronomy and astrophysics at the University of Toronto. "Their mere existence is a surprise, and their origin and fate a bit of a mystery." Jayawardhana and Valentin D. Ivanov of the European Southern Observatory (Chile) report the discovery in the August 3 issue of *Science Express*, the rapid online publication service of the journal *Science*. The researchers discovered the companion candidate in an optical image taken with the European Southern Observatory's 3.5-meter New Technology Telescope on La Silla, Chile, and investigated it further with optical spectra and infrared images obtained with ESO's 8.2-meter Very Large Telescope on Paranal, Chile. These follow-up observations confirmed that both objects are young, at the same distance, and much too cool to be stars. By comparing the companion to widely used theoretical models, Jayawardhana and Ivanov estimate that it weighs about seven times as much as Jupiter, while the primary planemo is an estimated 14 times Jupiter's mass. The newborn pair, barely a million years old, is separated by about six times the distance between the sun and Pluto, and is located in the Ophiuchus star-forming region approximately 400 light years away. "Roughly half of all sun-like stars, and about a sixth of brown dwarfs, come in pairs," says Jayawardhana. Brown dwarfs are 'failed stars' that weigh less than 75 Jupiter masses and are unable to sustain nuclear fusion. "Oph 162225-240515, or Oph1622 for short, is the first planemo to be resolved into a double." The existence of this wide pair poses a challenge to a popular theory which suggests that brown dwarfs and planemos are embryos ejected from multiple proto-star systems. Since the two objects in Oph1622 are so far apart and only weakly bound to each other by gravity, they would not have survived such a chaotic birth. Planets are thought to form out of disks of gas and dust that surround stars, brown dwarfs and even some planemos. The researchers think that these planemo twins formed together out of a contracting gas cloud that fragmented, like a miniature stellar binary. "We are resisting the temptation to call it a 'double planet' because this pair probably didn't form the way that planets in our solar system did," says Ivanov. "Now we're curious to find out whether such pairs are common or rare. The answer could shed light on how free-floating planetary-mass objects form." Image: Artist's impression of what a twin planemo system might look like. The two objects are still very young and are probably surrounded by a disc of material. For clarity, the image is not to scale to Oph 1622, the system just discovered as the size of the discs and the separation between the two objects would make them very tiny. *Image courtesy of European Southern Observatory*