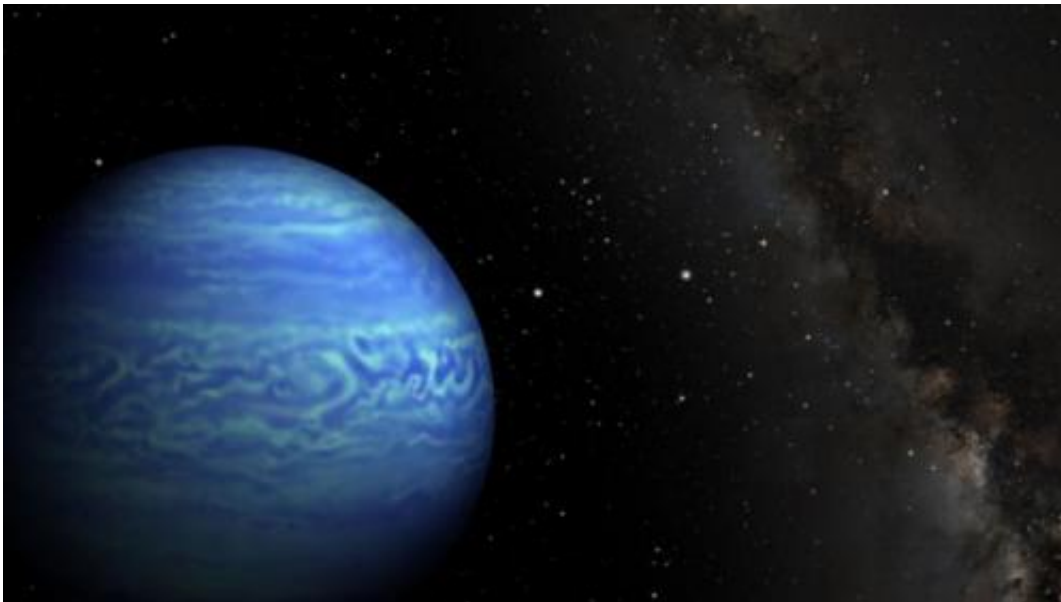


Star is discovered to be a close neighbor of the Sun and the coldest of its kind

April 25 2014, by Whitney Clavin



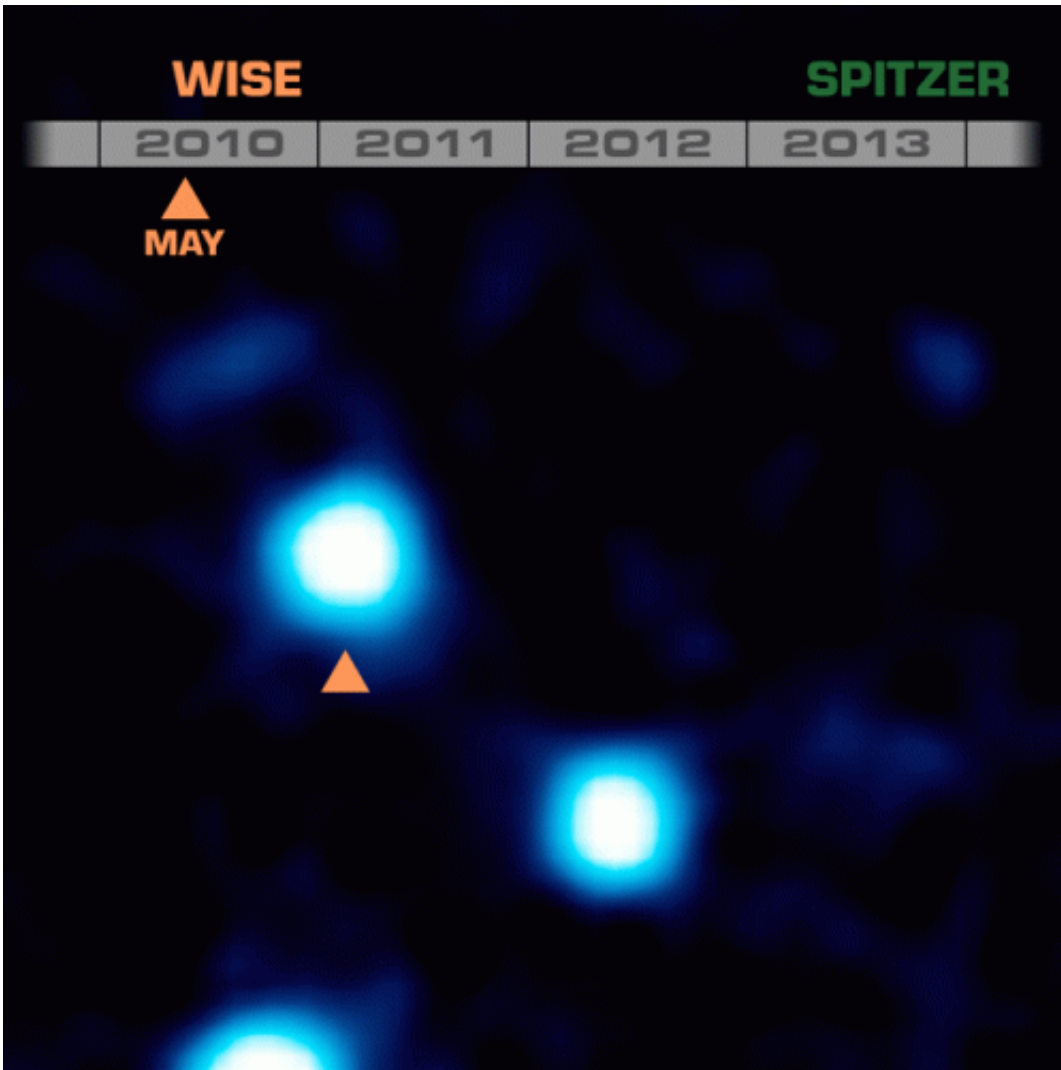
This image is an artist's conception of the brown dwarf WISE J085510.83-071442.5. The Sun is the bright star directly to the right of the brown dwarf. Credit: Robert Hurt/JPL, Janella Williams/Penn State University

(Phys.org) —A "brown dwarf" star that appears to be the coldest of its kind—as frosty as Earth's North Pole—has been discovered by a Penn State University astronomer using NASA's Wide-field Infrared Survey Explorer (WISE) and Spitzer Space Telescopes. Images from the space telescopes also pinpointed the object's distance at 7.2 light-years away, making it the fourth closest system to our Sun.

"It is very exciting to discover a new neighbor of our [solar system](#) that is so close," said Kevin Luhman, an associate professor of astronomy and astrophysics at Penn State and a researcher in the Penn State Center for Exoplanets and Habitable Worlds. "In addition, its extreme temperature should tell us a lot about the atmospheres of planets, which often have similarly cold temperatures."

Brown dwarfs start their lives like stars, as collapsing balls of gas, but they lack the mass to burn nuclear fuel and radiate starlight. The newfound coldest brown dwarf, named WISE J085510.83-071442.5, has a chilly temperature between minus 54 and 9 degrees Fahrenheit (minus 48 to minus 13 degrees Celsius). Previous record holders for coldest [brown dwarfs](#), also found by WISE and Spitzer, were about room temperature.

Although it is very close to our solar system, WISE J085510.83-071442.5 is not an appealing destination for human space travel in the distant future. "Any planets that might orbit it would be much too cold to support life as we know it" Luhman said.

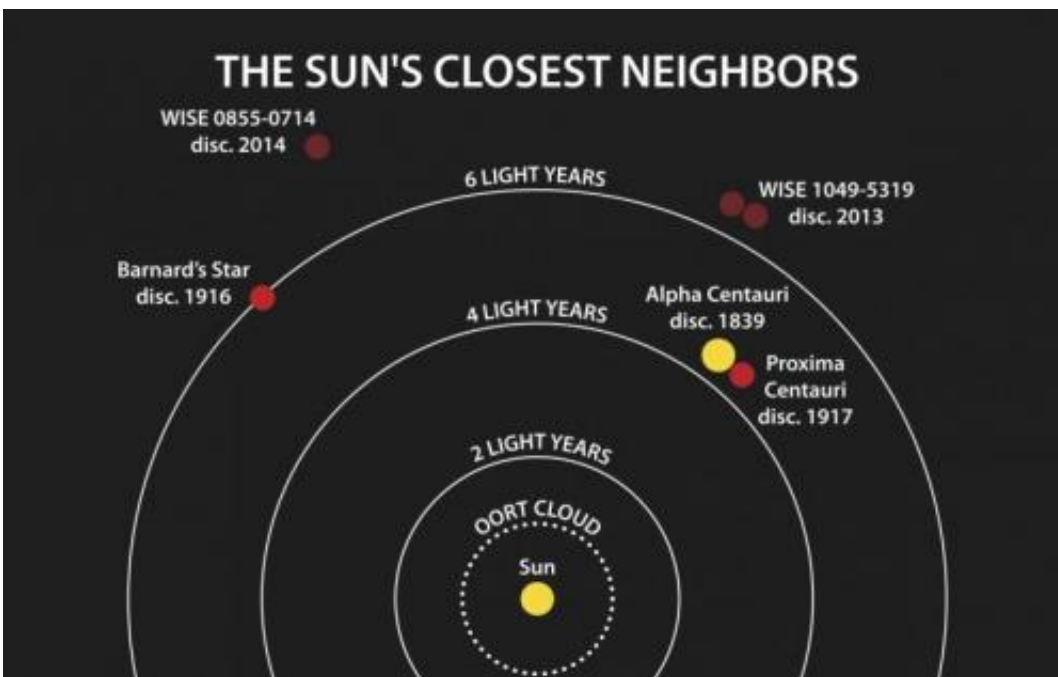


WISE J085510.83-071442.5 was discovered through its rapid motion across the sky in two infrared images the WISE satellite taken six months apart in 2010. Two additional images were taken with the Spitzer Space Telescope in 2013 and 2014 to measure its distance via the parallax effect. Credit: NASA/JPL/IPAC

"This object appeared to move really fast in the WISE data," said Luhman. "That told us it was something special." The closer a body, the more it appears to move in images taken months apart. Airplanes are a good example of this effect: a closer, low-flying plane will appear to fly overhead more rapidly than a high-flying one.

WISE was able to spot the rare object because it surveyed the entire sky twice in infrared light, observing some areas up to three times. Cool objects like brown dwarfs can be invisible when viewed by visible-light telescopes, but their thermal glow—even if feeble—stands out in [infrared light](#).

After noticing the fast motion of WISE J085510.83-071442.5 in March, 2013, Luhman spent time analyzing additional images taken with Spitzer and the Gemini South telescope on Cerro Pachon in Chile. Spitzer's infrared observations helped to determine the frosty temperature of the brown dwarf.



This diagram illustrates the locations of the star systems that are closest to the Sun. The year when each star was discovered to be a neighbor of the Sun is indicated. The brown dwarf WISE J085510.83-071442.5 is the fourth nearest system to the Sun. Credit: Janella Williams, Penn State University

WISE J085510.83-071442.5 is estimated to be 3 to 10 times the mass of Jupiter. With such a low mass, it could be a gas giant similar to Jupiter that was ejected from its star system. But scientists estimate it is probably a brown dwarf rather than a planet since brown dwarfs are known to be fairly common. If so, it is one of the least massive brown dwarfs known.

Combined detections from WISE and Spitzer, taken from different positions around the Sun, enabled the measurement of its distance through the parallax effect. This is the same principle that explains why your finger, when held out right in front of you, appears to jump from side to side when you alternate left-eye and right-eye views.

In March of 2013, Luhman's analysis of the images from WISE uncovered a pair of much warmer brown dwarfs at a distance of 6.5 light years, making that system the third closest to the Sun. His search for rapidly moving bodies also demonstrated that the outer solar system probably does not contain a large, undiscovered planet, which has been referred to as "Planet X" or "Nemesis."

"It is remarkable that even after many decades of studying the sky, we still do not have a complete inventory of the Sun's nearest neighbors," said Michael Werner, the project scientist for Spitzer at NASA's Jet Propulsion Laboratory (JPL), which manages and operates Spitzer. "This exciting new result demonstrates the power of exploring the universe using new tools, such as the infrared eyes of WISE and Spitzer."

Provided by Pennsylvania State University

Citation: Star is discovered to be a close neighbor of the Sun and the coldest of its kind (2014, April 25) retrieved 19 April 2024 from <https://phys.org/news/2014-04-star-neighbor-sun-coldest-kind.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.