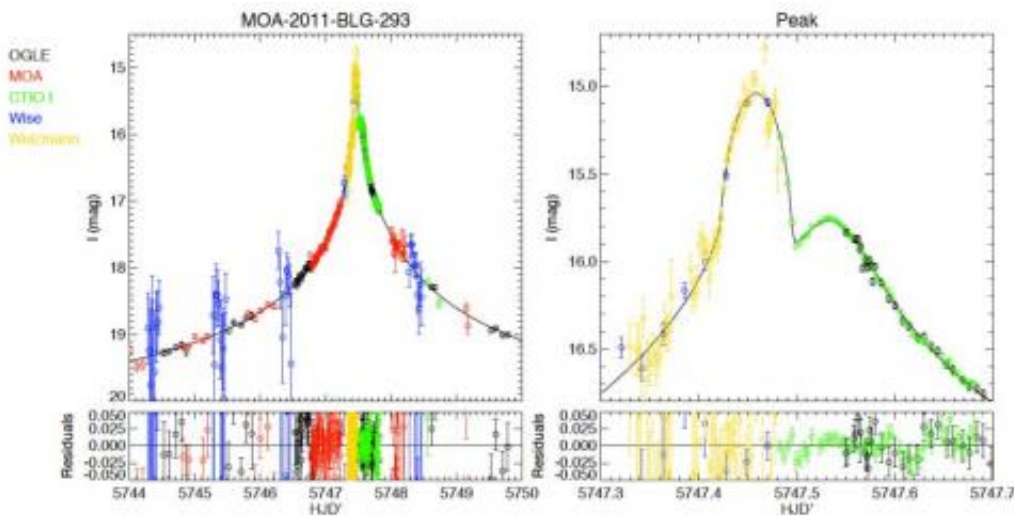


Habitable zone super Jupiter-sized exoplanet found in Milky Way bulge

October 17 2013, by Bob Yirka



Light curve of MOA-2011-BLG-293 from Yee et al. (2012). Credit: arXiv:1310.3706 [astro-ph.EP]

(Phys.org) —A multinational team of astronomers has discovered the existence of a large (four times the size of Jupiter) sized exoplanet lurking in the Milky Way bulge—the first discovery of its kind. The team has reported on their findings in a paper they've uploaded to the preprint server *arXiv*.

The researchers on the project were using technology to study microlensing events—where one star passes in front of another allowing measurements to be taken of the star that is closer, due to magnification

brought about by gravity (bending of spacetime). Measuring such light allows scientists to note transient brightening which reveals information not only about the star but about any planets that may be orbiting it. The overall objective is to find [stars](#) of the right size with planets of the right kind orbiting at just the right distance to allow for the possible existence of life—known commonly as the habitable or Goldilocks zone.

The microlensing event that led to the [discovery](#) has been named MOA-2011-BLG-293Lb—observations were made from three facilities, one of which, the Keck facility in Hawaii was able to follow the initial discovery with a closer analysis that revealed finer details of the star and its [planets](#). The newly discovered planet has not yet been named, but because it's a gas giant, there is little hope that it might harbor life on its surface. Microlensing isn't precise enough to discern whether the planet has any moons, but if it does, the researchers suggest, they could perhaps, because they too would exist in the [habitable zone](#), possibly allow for life.

The discovery marks the first time a habitable zone exoplanet has been found in the dense patch of the Milky Way known as the bulge and further highlights just how sophisticated Earth measuring devices have become—the new exoplanet is approximately 25,000 light years away. The star was found to be a G type of dwarf, a little smaller than our own sun, while the exoplanet was found to be just 1.1 AU from its star (1 AU is the distance of Earth from our sun). The researchers report that because of the small distance there is a 53 percent chance that the planet lays in the habitable zone, though it's also likely to be near its outer edges.

More information: MOA-2011-BLG-293Lb: First Microlensing Planet possibly in the Habitable Zone, arXiv:1310.3706 [astro-ph.EP] arxiv.org/abs/1310.3706

Abstract

We used Keck adaptive optics observations to identify the first planet discovered by microlensing to lie in or near the habitable zone, i.e., at projected separation $r_{\perp}=1.1\pm 0.1$ AU from its $M_L=0.86\pm 0.06M_{\odot}$ host, being the highest microlensing mass definitely identified. The planet has a mass $m_p=4.8\pm 0.3M_{\text{Jup}}$, and could in principle have habitable moons. This is also the first planet to be identified as being in the Galactic bulge with good confidence: $DL=7.7\pm 0.44$ kpc. The planet/host masses and distance were previously not known, but only estimated using Bayesian priors based on a Galactic model (Yee et al. 2012). These estimates had suggested that the planet might be a super-Jupiter orbiting an M dwarf, a very rare class of planets. We obtained high-resolution JHK images using Keck adaptive optics to detect the lens and so test this hypothesis. We clearly detect light from a G dwarf at the position of the event, and exclude all interpretations other than that this is the lens with high confidence (95%), using a new astrometric technique. The calibrated magnitude of the planet host star is $H_L=19.16\pm 0.13$. We infer the following probabilities for the three possible orbital configurations of the gas giant planet: 53% to be in the habitable zone, 35% to be near the habitable zone, and 12% to be beyond the snow line, depending on the atmospherical conditions.

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Citation: Habitable zone super Jupiter-sized exoplanet found in Milky Way bulge (2013, October 17) retrieved 24 April 2024 from <https://phys.org/news/2013-10-habitable-zone-super-jupiter-sized-exoplanet.html>

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