produced such a strong RV signal that we would have discovered it, planets below this limit could have gone undetected. The employed statistical method is called bootstrap simulation (details in Kürster et al. 2003). Note that all results relate to the minimum mass of the planet, $m \sin i$ rather than the true mass, since the inclination i of the orbit with respect to the plane of the sky is not known. However, one can show that there is a 90 % chance that the true mass is no more than a factor of 2.3 larger (corresponding to the upper edge of the yellow region), and that the minimum mass is the most probable value.

Also shown in Figure 6 are astrometric mass limits (blue line) for Barnard's star from Benedict et al. (1999) based on data from the Fine Guidance Sensor of the Hubble Space Telescope. As astrometry is more sensitive for larger orbital radii, these limits are complementary to our RV-derived limits. Combining both types of limits we can exclude the presence of any Saturn-mass planet with high confidence.

In short-period (few days) orbits planets of just a few Earth masses would have been discovered. In the habitable zone planets with minimum masses greater than about 5 $M_{\oplus}$ are excluded and the true mass of any undiscovered planet should be below the mass of Uranus. Continued monitoring of Barnard's star will lower these limits over time enabling us to search for planets of increasingly lower mass.

Acknowledgements

Thanks are due to quite a number of people who helped to make this survey happen. We are specially grateful for the assistance of Andreas Kaufer, Stéphane Brillant, and all the ESO staff who supported this project by carrying out service-mode observations and by securing the high quality of the instrument and data. Artie Hatzes created the title of the programme. Sebastian Els, Frédéric Rouesnel, and William Cochran helped in the early phase of the project.

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Low-Mass Exoplanet Found Using Microlensing

Using a network of telescopes scattered across the globe, including the Danish 1.54-m telescope at ESO La Silla, astronomers have discovered a new extrasolar planet which is only about five times as massive as the Earth, and circles its parent star in about 10 years. It is the least massive exoplanet around an ordinary star detected so far and also the coolest. The planet most likely has a rocky/icy surface. Its discovery marks a ground-breaking result in the search for planets that may support life.

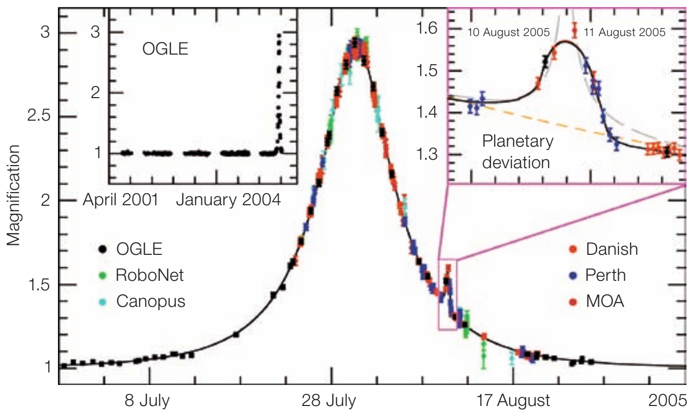
The microlensing technique is based on the temporary apparent brightening of a background star by the gravity of an intervening massive object (star or planet) passing in front. An intervening star causes a characteristic brightening that lasts about a month. Any planets orbiting this star can produce an additional signal, lasting days for giant planets down to hours for Earth-mass planets.

In order to be able to catch and characterise these planets, nearly-continuous round-the-clock high-precision monitoring of ongoing microlensing events is required, once the beginning of an event has been reported. The present case was discovered on 11 July 2005, and observed until well into August, when the planetary deviation was noticed.

The new planet orbits a red star five times less massive than the Sun, located at a distance of about 20 000 light years, not far from the centre of our Milky Way Galaxy. Its relatively cool parent star and large orbit implies that the likely surface temperature of the planet is −220° C, too cold for liquid water. It is likely to have a thin atmosphere, like the Earth, but its rocky surface is probably deeply buried beneath frozen oceans. It may therefore more closely resemble a more massive version of Pluto, rather than the rocky inner planets like Earth and Venus.

A full report has been published by Jean Philippe Beaulieu et al. in Nature 439, 437 (2006). This result is a joint effort of three independent microlensing campaigns: PLANET/RoboNet, OGLE, and MOA, involving a total of 73 collaborators affiliated with 32 institutions in 12 countries (France, United Kingdom, Poland, Denmark, Germany, Austria, Chile, Australia, New Zealand, United States of America, South Africa, and Japan).

(Based on ESO Press Release 03/06)



Light Curve of OGLE-2005-BLG-390.