ets. First investigations show that Earth-like planets around bright stars could be detected, provided that the total integration time is kept sufficiently long (~ hours) to average out the stellar oscillations. A number of studies have been started to investigate the instrumental aspects. HARPS may serve in this context as a test bench for attaining extremely high radial-velocity precision. Indeed, new instrumental concepts, and new calibration techniques and algorithms are being explored and could partially be verified on HARPS on the 3.6-m telescope in the near future. Nevertheless, any measurement aiming at the cms^{-1} accuracy with HARPS would be limited to very bright objects, due to the limited telescope size. A star with $m_v \sim 4$ would require 125 sequences of 2-minute exposures each leading to a total observing time of 5 hours to obtain a single data point with 1 cms^{-1} photon limited error. An improved version of the HARPS spectrograph at the VLT as a new-generation spectrograph seems more appropriate for this kind of science. In addition, it would represent an ideal intermediate step toward CODEX. With the refinement of HARPS and the possible future with CODEX, the Doppler technique promises us many new exciting discoveries and new knowledge in the domain of extra-solar planets.

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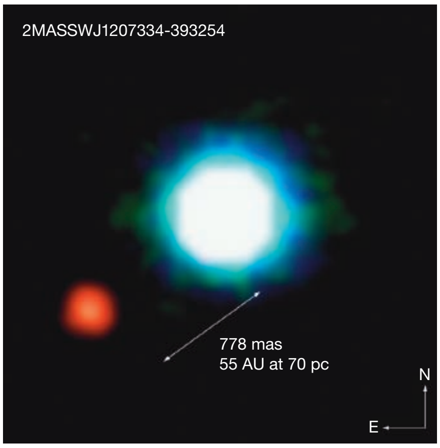
Confirmation of the First Image of an Extra-Solar Planet



2M1207 (centre) and its Planetary Companion (red). The photo is based on three near-infrared exposures (in the H, K and L′ wavebands) with NACO. *ESO PR Photo 14a/05.*

A team of astronomers[1] has confirmed the discovery of a giant planet, approximately five times the mass of Jupiter, that is gravitationally bound to a young brown dwarf, putting an end to a year-long discussion on the nature of this object.

Last year, the team reported a faint red object in the close vicinity of a young brown dwarf (see ESO PR 23/04). The red object, now called 2M1207b, is more than 100 times fainter than the brown dwarf, 2M1207A. The spectrum of 2M1207b contains a strong signature of water molecules, confirming that it must be cold. Based on the infrared colours and the spectral data, evolutionary model calculations led to the conclusion that 2M1207b is a 5-Jupiter-mass planet. Its mass can also be estimated from a different method, which focuses on the strength of its gravitational field; this technique suggests that the mass might be even less than 5 Jupiter masses.

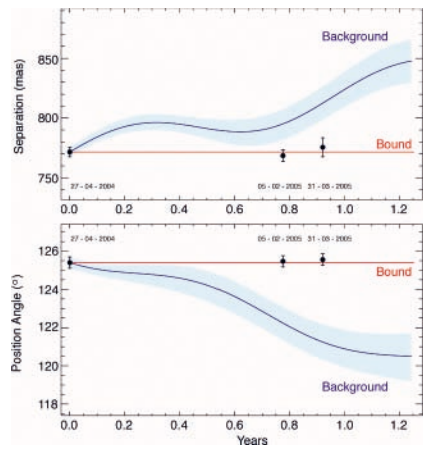
At the time of its discovery in April 2004, it was impossible to prove that the faint source is not an unrelated background object. In February and March of this year, new images were obtained of the young brown dwarf and its giant planet companion with NACO on the VLT. They show with high confidence that the two objects are moving together and hence are gravitationally bound.

The new observations therefore show that this really is a planet, the first planet that has ever been imaged outside of our solar system. The separation between the planet and the brown dwarf is 55 times the separation of the Earth and Sun.

"Given the rather unusual properties of the 2M1207 system, the giant planet most probably did not form like the planets in our solar system," says Gaël Chauvin, the leader of the team. "Instead it must have formed the same way our Sun formed, by a one-step gravitational collapse of a cloud of gas and dust."

Anne-Marie Lagrange, another member of the team from the Grenoble Observatory in France, looks towards the future: "Our discovery represents a first step towards one of the most important goals of modern astrophysics: to characterise the physical structure and chemical composition of giant and, eventually, terrestrial-like planets."

(Based on ESO Press Release 12/05)



Relative position of 2M1207b with respect to 2M1207A at three different epochs (April 2004, February and March 2005). The top panel shows the separation between the two objects in milli-arcseconds, while the lower one represents the relative angle. The blue line shows the predicted change in position if the faint red source were a background object.

[1] The team consists of Gaël Chauvin and Christophe Dumas (ESO), Anne-Marie Lagrange and Jean-Luc Beuzit (LAOG, Grenoble, France), Benjamin Zuckerman and Inseok Song (UCLA, Los Angeles, USA), David Mouillet (LAOMP, Tarbes, France) and Patrick Lowrance (IPAC, Pasadena, USA).