

MEDIA RELEASE

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Discovery Expands Search for Earth-like Planets

Newly spotted frozen world orbits in a binary star system.

New Zealand astronomers have played an important role in the discovery of an Earth-like planet in a binary star system located 3,000 light-years from Earth. This expands astronomers' notions of where Earth-like—and even potentially habitable—planets can form and how to find them.

At just twice the mass of Earth, the planet (now named OGLE-2013-BLG-0341Lb) orbits one of the stars in the binary system at almost exactly the same distance from which Earth orbits the sun. However, because the planet's host star is much dimmer than the Sun, the planet is much colder than Earth—a little colder, in fact, than Saturn's icy moon Titan.

Four international research teams, led by Professor Andrew Gould of The Ohio State University, published their discovery in the July 4 issue of the prestigious international journal *Science*. New Zealand astronomers, both professional and amateur, who were members of these research teams made significant contributions to the discovery using a powerful technique called "gravitational microlensing".

The study provides the first evidence that terrestrial planets can form in orbits similar to Earth's, even in a binary star system where the stars are not very far apart. Although this planet itself is too cold to be habitable, the same planet orbiting a sun-like star in such a binary system would be in the so-called "habitable zone"—the region where conditions might be right for life.

"Small dim stars are the most common in our galaxy and the majority of these are found in binary systems. They have much longer lives than our Sun and could potentially provide a stable habitable environment over very large time spans", said Stardome astronomer, Dr Grant Christie.

"Now we have shown that planets like Earth can form and survive in these systems, it opens up exciting new opportunities to explore. Planets such as this are likely to be volcanically active so potential habitats for life could exist beneath the surface."

Detailed analysis showed that the planet is twice the mass of Earth, and orbits its star from an Earth-like distance, around 135 million kilometres. But its star is 400 times dimmer than our Sun, so the planet is very cold—around -210° Celsius. The second star in the star system is only as far from the first star as Saturn is from our Sun. But this binary companion is also very dim and contributes almost no heat to the planet.

While four other terrestrial planets have been discovered in binary systems that have similar separations using different techniques, this is the first discovery within a binary system of a planet that is both Earth-like in size and follows an Earth-like orbit.

Four amateur observatories in New Zealand contributed observations covering four nights (23-27 April, 2012) while working as part of the international MicroFUN collaboration (Microlensing Follow-up Network). In particular, Ian Porritt of Palmerston North worked through gaps in clouds to obtain the first few critical measurements that revealed the planet was in a binary star system.

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The New Zealand members of MicroFUN who contributed to the discovery of this planetary system:

- Dr Grant Christie, Stardome Observatory (Auckland)
- Jennie McCormick, Farm Cove Observatory (Auckland)
- John Drummond, Possum Observatory (Gisborne)
- Ian Porritt, Turitea Observatory (Palmerston North)

The 1.8m MOA telescope at Mt John Observatory near Tekapo was also able to cover the event. This telescope is one of only two large telescopes dedicated to exploring the galaxy using gravitational microlensing.

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About Stardome

Stardome and its team have been sharing a love of space from its premises in Auckland's One Tree Hill Domain since 1967.

A place of exploration, research and sharing of knowledge the Stardome 360-degree planetarium Night Sky shows take viewers into outer space to get a closer view of stars, planets and nebulae. Stardome night planetarium shows also include telescope viewings (weather permitting). School children across Auckland enjoy daytime visits for curriculum-based school trips.

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