
February 15, 2008

Smaller Version of the Solar System Is Discovered

By [DENNIS OVERBYE](#)

Astronomers said Wednesday that they had found a miniature version of our own solar system 5,000 light-years across the galaxy — the first planetary system that really looks like our own, with outer giant planets and room for smaller inner planets.

“It looks like a scale model of our solar system,” said Scott Gaudi, an assistant professor of astronomy at [Ohio State University](#). Dr. Gaudi led an international team of 69 professional and amateur astronomers who announced the discovery in a news conference with reporters.

Their results are being published Friday in the journal *Science*. The discovery, they said, means that our solar system may be more typical of planetary systems across the universe than had been thought.

In the newly discovered system, a planet about two-thirds of the mass of [Jupiter](#) and another about 90 percent of the mass of Saturn are orbiting a reddish star at about half the distances that Jupiter and Saturn circle our own Sun. The star is about half the mass of the Sun.

Neither of the two giant planets is a likely abode for life as we know it. But, Dr. Gaudi said, warm rocky planets — suitable for life — could exist undetected in the inner parts of the system.

“This could be a true solar system analogue,” he said.

Sara Seager, a theorist at the [Massachusetts Institute of Technology](#) who was not part of the team, said that “right now in exoplanets we are on an inexorable path to finding other Earths.” Dr. Seager praised the discovery as “a big step in finding out if our planetary system is alone.”

Since 1995, around 250 planets outside the solar system, or exoplanets, have been discovered. But few of them are in systems that even faintly resemble our own. In many cases, giant Jupiter-like planets are whizzing around in orbits smaller than that of Mercury. But are these typical of the universe?

Almost all of those planets were discovered by the so-called wobble method, in which astronomers measure the gravitational tug of planets on their parent star as they whirl around it. This technique is most sensitive to massive planets close to their stars.

The new discovery was made by a different technique that favors planets more distant from their star. It is based on a trick of Einsteinian gravity called microlensing. If, in the ceaseless shifting of the stars, two of them should become almost perfectly aligned with Earth, the gravity of the nearer star can bend and magnify the light from the more distant one, causing it to get much brighter for a few days.

If the alignment is perfect, any big planets attending the nearer star will get into the act, adding their own little boosts to the more distant starlight.

That is exactly what started happening on March 28, 2006, when a star 5,000 light-years away in the constellation Scorpius began to pass in front of one 21,000 light-years more distant, causing it to flash. That was picked up by the Optical Gravitational Lensing Experiment, or Ogle, a worldwide collaboration of observers who keep watch for such events.

Ogle in turn immediately issued a worldwide call for continuous observations of what is now officially known as OGLE-2006-BLG-109. The next 10 days, as Andrew P. Gould, a professor of mathematical and physical sciences at Ohio State said, were “extremely frenetic.”

Among those who provided crucial data and appeared as lead authors of the paper in *Science* were a pair of amateur astronomers from Auckland, New Zealand, Jennie McCormick and Grant Christie, both members of a group called the Microlensing Follow-Up Network, or MicroFUN.

Somewhat to the experimenters’ surprise, by clever manipulation they were able to dig out of the data not just the masses of the interloper star and its two planets, but also rough approximations of their orbits, confirming the similarity to our own system. David P. Bennett, an assistant professor of astrophysics at the [University of Notre Dame](#), said, “This event has taught us that we were able to learn more about these planets than we thought possible.”

As a result, microlensing is poised to become a major new tool in the planet hunter’s arsenal, “a new flavor of the month,” Dr. Seager said.

Only six planets, including the new ones, have been discovered by microlensing so far, and the Scorpius event being reported Friday is the first in which the alignment of the stars was close enough for astronomers to detect more than one planet at once. Their success at doing just that on their first try bodes well for the future, astronomers say.

Alan Boss, a theorist at the Carnegie Institution of Washington, said, “The fact that these are hard to detect by microlensing means there must be a good number of them — solar system analogues are not rare.”