

# Scientists Find Solar System Like Ours

By DENNIS OVERBYE, February 14, 2008

Astronomers say they have 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.

The discovery, they said, means that our solar system might be more typical of planetary systems across the universe than had been thought.

“It looks like a scale model of our solar system,” said Scott Gaudi of Ohio State University. He led an international team of 69 professional and amateur astronomers, who announced the discovery in a news conference with reporters on Wednesday. Their results are being published Friday in the journal *Science*.

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 about half the mass of the Sun, at about half the distances that Jupiter and Saturn circle our own Sun.

Neither of the two giant planets is a likely abode for life as we know it, but, as Dr. Gaudi pointed out, 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, “Right now in exoplanets we are on an inexorable path to finding other Earths.” She praised the new discovery as “a big step in finding out if our planetary system is alone.”

Since 1995, around 250 so-called 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 inside the orbit 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 stars should become perfectly aligned with the Earth, the gravity of the nearer star can bend and magnify the light from the more distant one, causing it to suddenly get much brighter for a few days.

If the alignment is especially perfect, any big planets attending the nearer star will get into the

act, adding their own little bumps 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. It 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-109L. The next 10 days, as Andrew Gould of 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. Ms. McCormick, who described herself as “an ordinary New Zealand mother,” said she had done her observing with a 10-inch Meade telescope from a shed in her back yard.

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 Bennett 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,” in the words of Dr. Seager. The new system, she said, is just the tip of the iceberg and the odds are that a lot of the ones that will be discovered could be like ours.

Only six planets, including the new ones, have been discovered by microlensing so far and the Scorpius event was the first in which the alignment of the stars was perfect 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 Washinton, 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.”