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An Otherworldly Discovery: Billions of Other Planets

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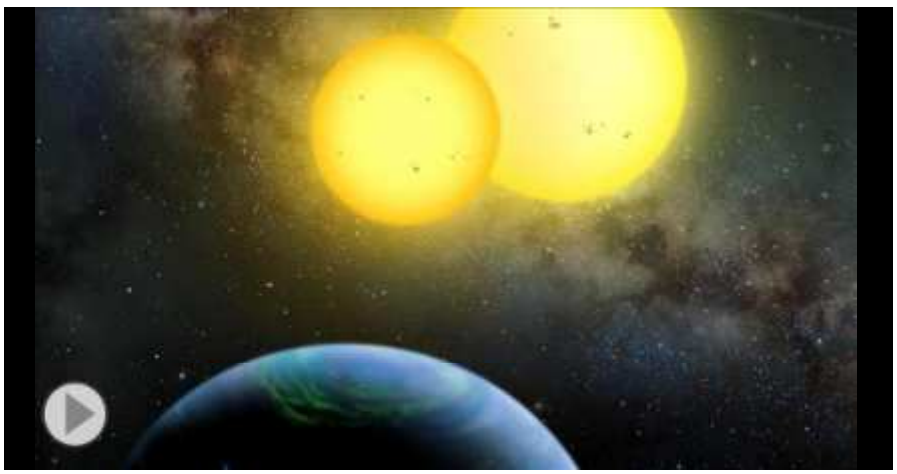
By ROBERT LEE HOTZ



Astronomers said Wednesday that each of the 100 billion stars in the Milky Way probably has at least one companion planet. Lee Hotz has details on The News Hub. Photo: AP

Astronomers said Wednesday that each of the 100 billion stars in the Milky Way probably has at least one companion planet, on average, adding credence to

the notion that planets are as common in the cosmos as grains of sand on the beach.

The finding underscores a fundamental shift in scientific understanding of planetary systems in the cosmos. Our own solar system, considered unique not so long ago, turns out to be just one among billions.

Until April 1994, there was no other known solar system, but the discoveries have slowly mounted since then: The Kepler space telescope, designed for planet-hunting, now finds them routinely.

"Planets are the rule rather than the exception," said lead astronomer Arnaud Cassan at the Institute of Astrophysics in Paris. He led an international team of 42 scientists who spent six years surveying millions of stars at the heart of the Milky Way, in the most comprehensive effort yet to gauge the prevalence of planets in the galaxy.

Enlarge Image

ESO/Z. Bardon/ProjectSoft

The Milky Way is seen above an observatory in Chile.

To estimate the number of other worlds, Dr. Cassan and his colleagues studied 100 million stars between 3,000 and 25,000 light-years from Earth with gravitational microlensing. The technique uses distant light amplified by the gravity of a massive star or planet to create an astronomical magnifying lens. Then they combined their findings with earlier surveys, which used other detection techniques, to create a statistical sample of stars and the planets that orbit them, which they say is representative of the galaxy.

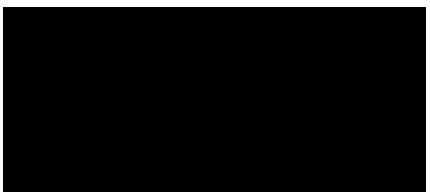
By their calculations, most of the Milky Way's stars—100 billion is the most conservative estimate—have one or more planets, the researchers reported in Nature Wednesday. None of the planets detected so far appear suitable for conventional carbon-based life as known on Earth.

Almost two-thirds of the stars likely host a planet measuring about five times Earth's mass, and half of them harbor a planet about the mass of Neptune, which is 17 times the mass of Earth. About one-fifth of them are home to a gas giant like Jupiter or a still more massive planet.

"One can point at almost any random star and say there are planets orbiting that star," said astronomer Uffe Grae Jorgensen, of the University of Copenhagen in Denmark, a member of Dr. Cassan's team.

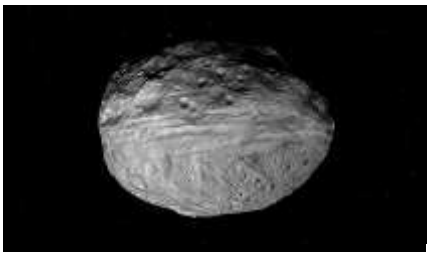
Moreover, millions of these planets may circle two stars, astronomers using NASA's Kepler space telescope announced in a separate finding published online in Nature Wednesday—an arrangement considered so unlikely that until a few months ago it was found only in science fiction.

Related Video



"We are starting to see a whole new type of planetary system, which is unlike anything in our own solar system," said William Welsh, an astronomer at San Diego State University, who presented the Kepler findings Wednesday at a meeting of

Using NASA's Kepler space telescope, astronomers discovered two Earth-size planets orbiting a distant star--the smallest of all the thousands of alien worlds detected so far, Lee Hotz reports on the News Hub. Photo: NASA.



NASA's $456 million Dawn probe of the giant asteroid Vesta has revealed one of the tallest mountains in the solar system and a landscape more rugged than Mars or the Moon. WSJ's Robert Lee Hotz reports.

the American Astronomical Society in Austin, Texas.

The discoveries are the latest from an avalanche of new data about worlds around other stars.

Since 1994, researchers have confirmed the existence of more than 700 planets around various stars, with more than 2,000 additional candidates currently under study by astronomers around the world. Earlier this month, astronomers using the Hungarian-made Automated Telescope Network announced the discovery of four more massive worlds, each one orbiting a separate star.

"We are now facing the idea that planets are all over the place," said astrophysicist John Southworth at the U.K.'s Keele University, who wasn't part of these research projects.

Astronomers using the Kepler telescope found the first known double-star planet just last September—Kepler-16b, a gassy oddball orb the size of Saturn that circles a pair of stars 200 light-years from Earth, like the planet Tatooine in the "Star Wars" films.

On Wednesday, Dr. Welsh and his colleagues announced that they have confirmed the existence of two more worlds in distinctive double-star solar systems in the constellation Cygnus. The first, called Kepler-34b, orbits its two small stars in a solar system about 4,900 light years from Earth. The second, Kepler-35b, orbits a set of twin stars about 5,400 light years away.

Both planets are "fluffy," gaseous, Saturn-size worlds, where temperatures quickly rise and fall from balmy to near boiling, as the planets periodically swing close to their stars and then spin away in an elliptical minuet, the researchers reported.

"The seasons on these planets will be quite weird," said Dr. Southworth.

Write to Robert Lee Hotz at sciencejournal@wsj.com

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