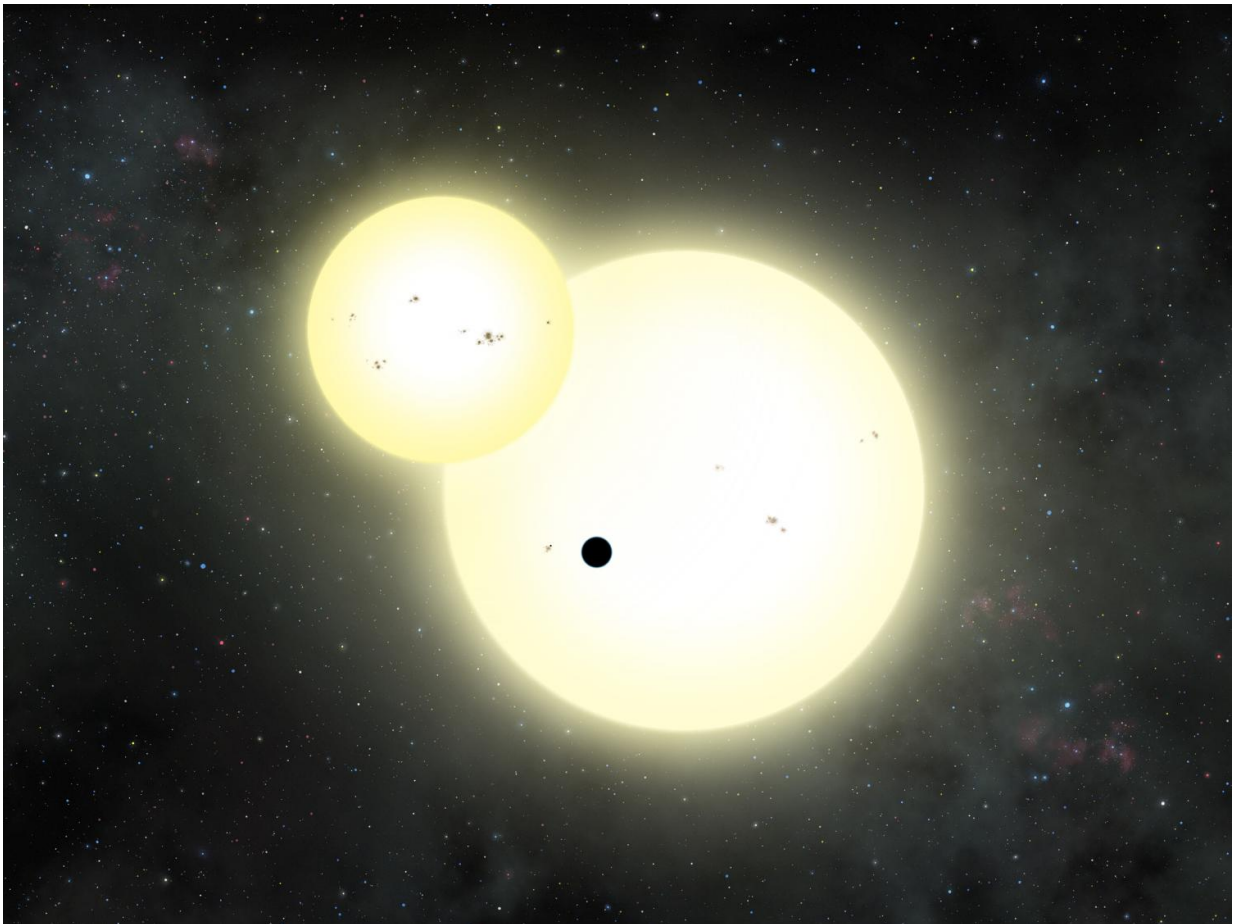


Kepler-1647b: New planet is largest discovered that orbits two suns

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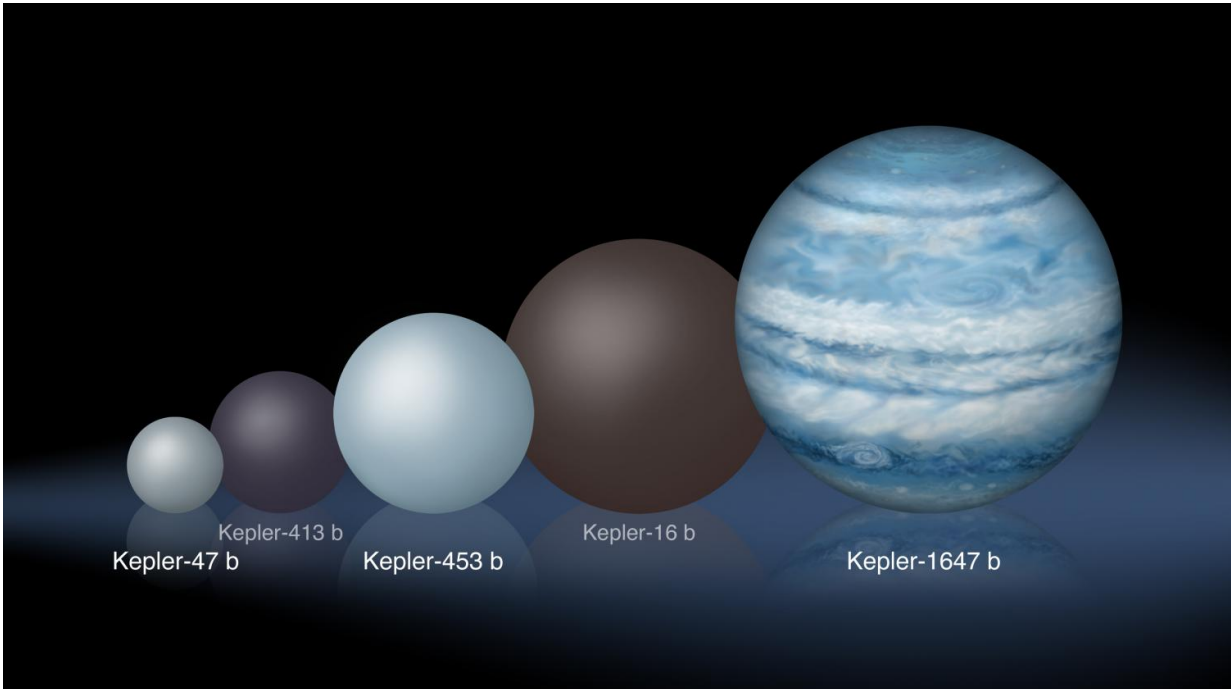
Artist's impression of the simultaneous stellar eclipse and planetary transit events on Kepler-1647 b. Such a double eclipse event is known as a syzygy. Credit: Figure credit: Lynette Cook

If you cast your eyes toward the constellation Cygnus, you'll be looking in the direction of the largest planet yet discovered around a double-star system. It's too faint to see with the naked eye, but a team led by astronomers from NASA's Goddard Space Flight Center and San Diego State University used the Kepler Space Telescope to identify the new planet, Kepler-1647b. The discovery was announced today in San Diego, at a meeting of the American Astronomical Society.

Planets that orbit two stars are called circumbinary planets, or sometimes "Tatooine" planets, after Luke Skywalker's homeland in "Star Wars." Using NASA's Kepler telescope, astronomers look for slight dips in brightness that hint a planet might be transiting in front of a star, blocking some of the star's light.

"But finding circumbinary planets is much harder than finding planets around single stars," said SDSU astronomer William Welsh, one of the paper's coauthors. "The transits are not regularly spaced in time and they can vary in duration and even depth."

Once a candidate planet is found, researchers employ advanced computer programs to determine if it really is a planet. It can be a grueling process. Laurance Doyle, a coauthor on the paper and astronomer at the SETI Institute, noticed a transit back in 2011. But more data and several years of analysis were needed to confirm the transit was indeed caused by a circumbinary planet. A network of amateur astronomers in the KELT Follow-Up Network provided additional observations that helped the researchers estimate the planet's mass. The research has been accepted for publication in the *Astrophysical Journal* with Veselin Kostov, a NASA Goddard postdoctoral fellow, as lead author.



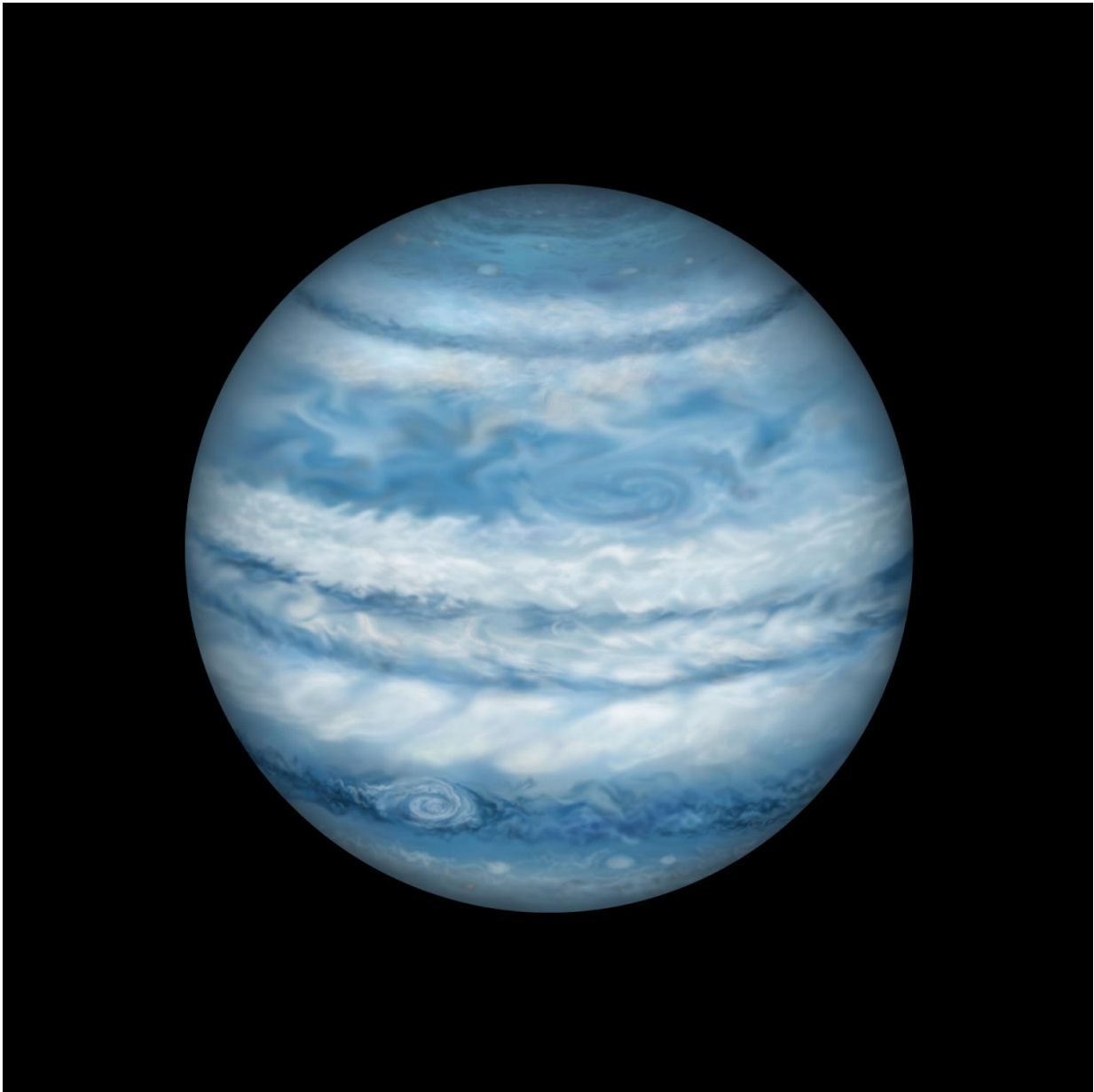
Comparison of the relative sizes of several Kepler circumbinary planets, from the smallest, Kepler-47 b, to the largest, Kepler-1647 b. Kepler-1647 b is substantially larger than any of the previously known circumbinary planets.
Credit: Lynette Cook

Kepler-1647 b is 3,700 light-years away and approximately 4.4 billion years old, roughly the same age as the Earth. The stars are similar to the Sun, with one slightly larger than our home star and the other slightly smaller. The planet has a mass and radius nearly identical to that of Jupiter, making it the largest transiting circumbinary planet ever found.

"It's a bit curious that this biggest planet took so long to confirm, since it is easier to find big planets than small ones," said SDSU astronomer Jerome Orosz, another coauthor on the study. "It took so long to confirm because its orbital period is so long."

The planet takes 1,107 days (just over 3 years) to orbit its host stars, the longest period of any confirmed transiting exoplanet found so far. The planet is also much further away from its [stars](#) than any other circumbinary planet, breaking with the tendency for circumbinary planets to have close-in orbits. Interestingly, its orbit puts the planet within the so-called habitable zone. Like Jupiter, however, Kepler-1647 b is a gas giant, making the planet unlikely to host life. Yet if the planet has large moons, they could potentially be suitable for life.

"Habitability aside, Kepler-1647 b is important because it is the tip of the iceberg of a theoretically predicted population of large, long-period circumbinary [planets](#)," Welsh said.



A standalone version of the artistic impression of the planet Kepler-1647 b. Given that the planet is nearly identical to Jupiter in both size and mass, the planet is expected to be roughly similar in appearance. But it is much warmer -- Kepler-1647 b is in the habitable zone. Credit: Lynette Cook

More information: Kepler-1647b: the largest and longest-period Kepler transiting circumbinary planet, arXiv:1512.00189 [astro-ph.EP] arxiv.org/abs/1512.00189v2

Provided by San Diego State University

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