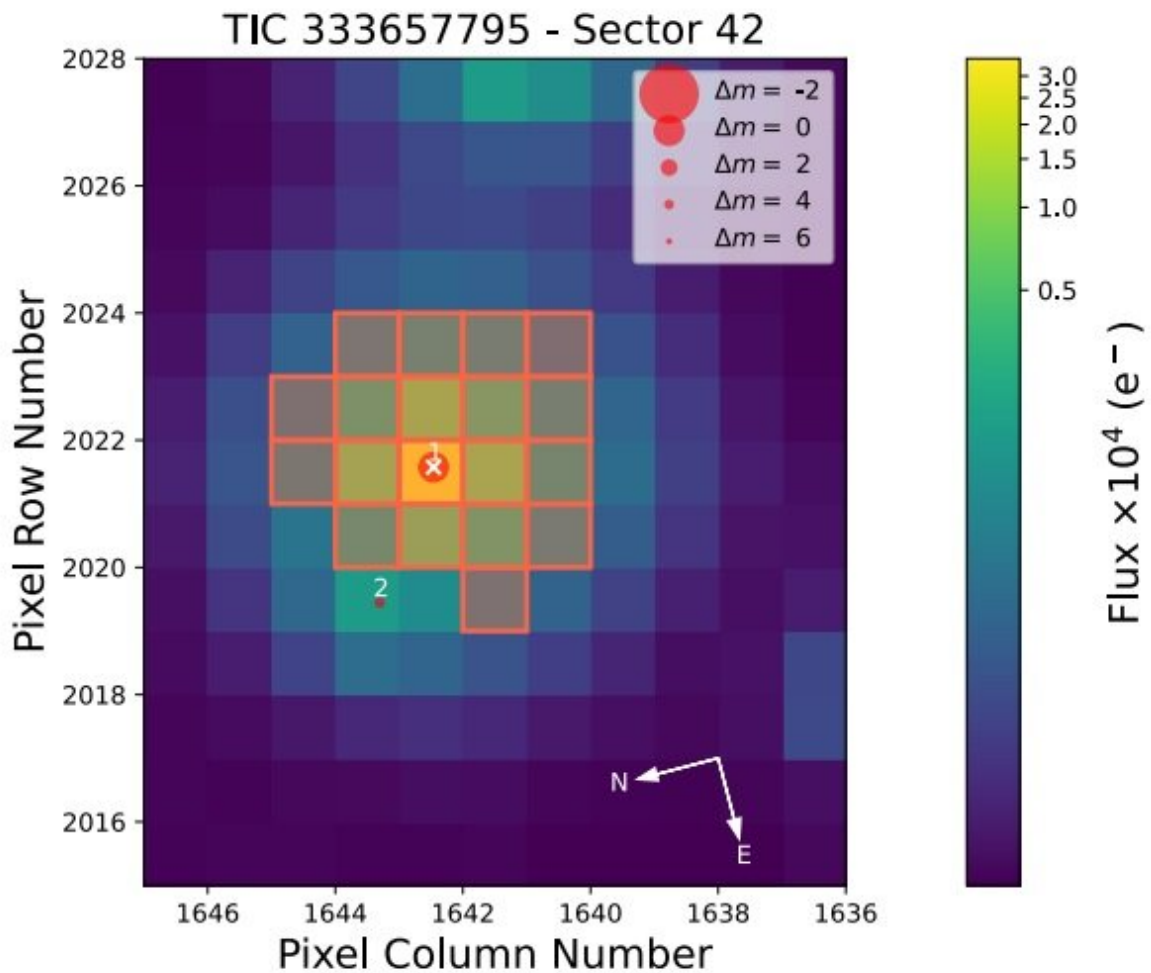


An ultra-short-period exoplanet discovered with TESS

November 24 2022, by Tomasz Nowakowski



TESS target pixel file image of HD 20329 observed in sector 42. Credit: Murgas et al, 2022

Using NASA's Transiting Exoplanet Survey Satellite (TESS), an international team of astronomers has detected a new ultra-short-period exoplanet. The newfound alien world, designated HD 20329 b, orbits its host star in slightly less than one day. The finding was presented November 4 on arXiv.org.

TESS is conducting a survey of about 200,000 of the brightest stars near the sun with the aim of searching for transiting exoplanets. So far, it has identified nearly 6,000 candidate exoplanets (TESS Objects of Interest, or TOI), of which 268 have been confirmed so far.

Now, a group of astronomers led by Felipe Murgas of the University of La Laguna, Spain, has recently confirmed another TOI monitored by TESS. In a recently published research paper, they report that a transit signal has been identified in the light curve of the solar-type star HD 20329 (or TOI-4524). The planetary nature of this signal was confirmed by follow-up radial velocity measurements taken with the HARPS-N spectrograph.

"Here we report the discovery of HD 20329 b, a USP [ultra-short-period] planet around a bright ($V = 8.74$ mag, $J = 7.5$ mag) G-type star, which was discovered using TESS data," the researchers wrote in the study.

HD 20329 b has a radius of 1.72 Earth radii and is about 7.42 times more massive than our planet, which gives a mean bulk density of approximately 8.06 g/cm^3 . It takes this [exoplanet](#) about 22.2 hours to fully orbit its host. The results show that HD 20329 b is located just 0.018 AU from the star and its equilibrium temperature is estimated to be at a level of 2,000 K.

Therefore, HD 20329 b is the latest addition to the list of about 120 known ultra-short-period exoplanets, joining about 30 USPs with radius

and Doppler mass measurements. The authors of the paper do not exclude the possibility that there are more objects in the HD 20329 system, but further observations are required in order to confirm this.

"We note that after subtracting the planetary signal of the USP planet from the RV [radial velocity] measurements, the RV residuals present a slope that might indicate the presence of an additional low-mass object orbiting HD 20329," the researchers wrote.

They added that the emission spectroscopy metric for HD 20329 b indicates that this planet presents favorable conditions for secondary transit follow-up with NASA's James Webb Space Telescope (JWST).

When it comes to the parameters of the [host star](#) HD 20329, the study revealed that it has a radius of about 1.13 solar radii and is some 10 percent less massive than the sun. The star is 11 billion years old, has a metallicity at a level of -0.07, and its [effective temperature](#) was measured to be 5,596 K. The distance to the system is estimated to be approximately 207.6 [light years](#).

More information: F. Murgas et al, HD 20329b: An ultra-short-period planet around a solar-type star found by TESS, *arXiv* (2022). [DOI: 10.48550/arxiv.2211.02547](https://doi.org/10.48550/arxiv.2211.02547)

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