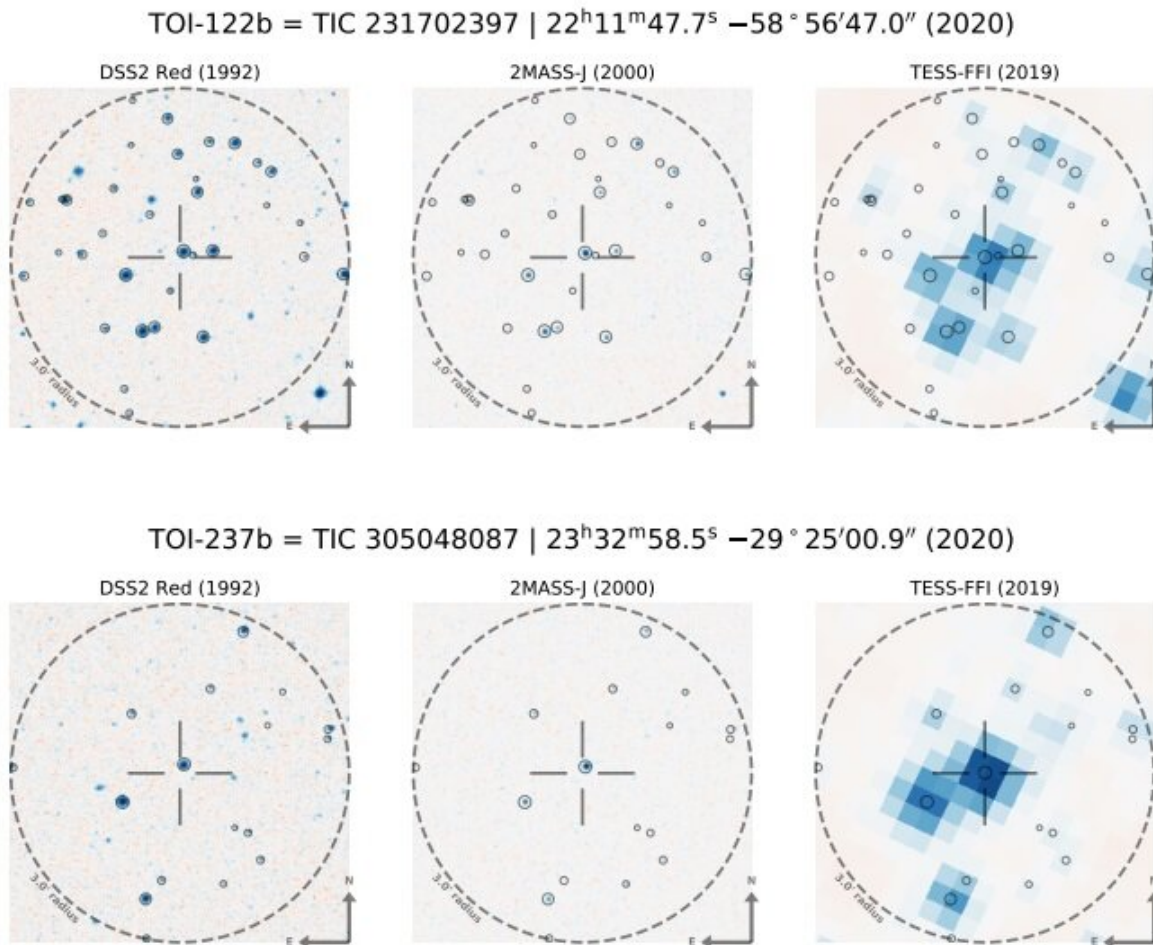


Exoplanet survey spacecraft discovers two new warm exoplanets

November 9 2020, by Tomasz Nowakowski



Finder charts for TOI 122 (top) and TOI 237 (bottom), including scanned red-sensitive photograph plates from the Digitized Sky Survey (left), 2MASS (middle), and the TESS full-frame images (right). Circles indicate stars from Gaia DR2, with areas logarithmically expressing apparent brightness. Crosshairs indicate targets' position in the year 2019, near the time of the TESS imaging.

Credit: Waalkes et al., 2020.

Using NASA's Transiting Exoplanet Survey Satellite (TESS), astronomers have detected two new warm alien worlds orbiting inactive M dwarfs. The newfound exoplanets, designated TOI 122b and TOI 237b, are about 2.7 and 1.4 times larger than the Earth, respectively, and warmer than our home planet. The finding is reported in a paper published October 29 on the arXiv pre-print server.

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 2,200 candidate exoplanets, of which 67 have been confirmed so far.

Now, a team of astronomers led by William C. Waalkes of the University of Colorado Boulder reports the finding of another two confirmed planets. Between July and September 2018, TESS observed two stars, namely TOI 122b and TOI 237, and detected transit signals in the light curves of these objects. The planetary nature of these signals was confirmed by follow-up photometric and spectroscopic observations using ground-based facilities.

"We report the discovery and validation of TOI 122b and TOI 237b, two warm planets transiting inactive M dwarfs observed by TESS," the astronomers wrote in the paper.

TOI 122b is a sub-Neptune-sized alien world with a radius of about 2.72 Earth radii and is some 8.8 times more massive than Earth. It orbits its host every 5.08 days at a distance of approximately 0.04 AU. The planet has an equilibrium temperature at a level of about 431 K, while the star has an [effective temperature](#) of some 3,400 K. The system is located

some 206 [light years](#) away.

At a distance of around 124 light years away from the sun, TOI 237b is a super-Earth-sized planet. It is about 44 percent larger and approximately three times more massive than the Earth. The exoworld has an equilibrium temperature of about 355 K and orbits its parent star every 5.44 days. The planet is separated by about 0.03 AU from its host with an effective temperature at a level of 3.212 K.

Given that TOI 122b and TOI 237b have radii not seen in our solar system, the authors of the paper perceived them as interesting laboratories to study planet formation, dynamics and composition. In general, they are very interesting targets for further observations as they occupy a space of relatively cool, though still uninhabitably warm planets.

"These two planets span an interesting range of radii and insulations, making them exciting cases that may help us learn more about the diversity of atmospheres possessed by small planets orbiting M dwarfs. (...) They may give us insight to an as-yet poorly understood type of planetary atmosphere," the astronomers explained.

They added that the relative proximity of TOI 122b and TOI 237b [planets](#) make them potentially feasible targets for future radial velocity follow-up and atmospheric characterization studies.

More information: TOI 122b and TOI 237b, two small warm planets orbiting inactive M dwarfs, found by TESS, arXiv:2010.15905 [astro-ph.EP] arxiv.org/abs/2010.15905

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