

EXOPLANETS

Three red suns in the sky

Astron. J. (in the press); preprint available at <https://arxiv.org/abs/1906.10147>

Late in 2018 one of the pixels in one of the cameras on the Transiting Exoplanet Survey Satellite (TESS) recorded a slight and momentary dimming. That pixel was watching three cool M-dwarf stars orbit each other in a hierarchical triple system known as LTT 1445ABC (TOI 455), only ~ 7 pc away. After removing the contributions of starspots, flares and other stellar variability to the TESS lightcurve, four transit signals stood out, indicating a super-Earth-sized planet with a 5.4-day period in the system — but which of the three stars was it orbiting? Jennifer Winters and collaborators set out to identify the planet host in that expansive TESS pixel.

Three months later the MEarth-South array in Chile detected a similar dimming in the same system, confirming the presence of LTT 1445Ab in orbit around the most massive star of the trio. The planet is $1.4 \pm 0.4 R_{\oplus}$ in size, less than 8.4 Earths in mass (probably more like $2.2 M_{\oplus}$), and orbits at ~ 0.04 AU, too close to the star to be habitable, but likely to be in a stable orbit despite the nearby stellar neighbours. The planet's equilibrium temperature is a warm ~ 433 K, but it will receive more than five times the Sun's irradiance.

M dwarfs are likely to host multiple close-in planets, giving encouragement that there are other planets in the LTT 1445 system. The orbital alignment of the BC pair and the transiting planet Ab suggests that this unusual find is co-planar. Given the proximity to Earth and the large transit depth of the planet (0.2%), LTT 1445Ab looks set to be a prime target for ground-based follow-up observations and for atmospheric characterization in particular.

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