

# TESS Finds Its First Earth-Sized Planet

The planet, HD 21749c, is about 89% Earth's diameter. It orbits HD 21749, a K-type star with about 70% of the Sun's mass located 53 light-years away in the southern constellation Reticulum.

*The star also hosts a second planet — HD 21749b — a warm “sub-Neptune” with a 36-day orbit.*

The new world is likely rocky and circles very close to its star, completing one orbit in just under eight days. The planet is likely very hot, with surface temperatures as high as 800 degrees F (427 degrees C). This is the 10th confirmed planet discovered by TESS, and hundreds of additional candidates are now being studied.

The discovery of this Earth-sized world is nevertheless exciting, as it demonstrates TESS' ability to pick out small planets around nearby stars. In the near future, the TESS team expects the probe should reveal even colder planets, with conditions more suitable for hosting life.

“For stars that are very close by and very bright, we expected to find up to a couple dozen Earth-sized planets,” says lead author and TESS member Diana Dragomir, a postdoc in MIT's Kavli Institute for Astrophysics and Space Research. “And here we are — this would be our first one, and it's a milestone for TESS. It sets the path for finding smaller planets around even smaller stars, and those planets may potentially be habitable.”

TESS has been hunting for planets beyond our solar system since it launched on April 18, 2018. The satellite is a NASA Astrophysics Explorer mission that is led and operated by MIT, and is designed to observe nearly the entire sky, in overlapping, month-long patches, or “sectors,” as it orbits the Earth. As it circles our own planet, TESS focuses its four cameras outward to monitor the nearest, brightest stars in the sky, looking for any periodic dips in starlight that could indicate the presence of an exoplanet as it passes in front of its host star.

Over its two-year mission, TESS aims to identify for the astronomy community at least 50 small, rocky planets, along with estimates of their masses. To date, the mission has discovered 10 planets smaller than Neptune, four of their masses which have been estimated, including  **$\pi$  Men b**, a planet twice the size of Earth, with a six-day orbit around its star;

**LHS 3844b**, a hot, rocky world that's slightly bigger than Earth and circles its star in a blistering 11 hours; and **TOI 125b and c** — two “sub-Neptunes” that orbit the same star, both within about a week. All four of these planets were identified from data obtained during TESS' first two observing sectors — a good indication, the team writes in its paper, that “many more are to be found.”