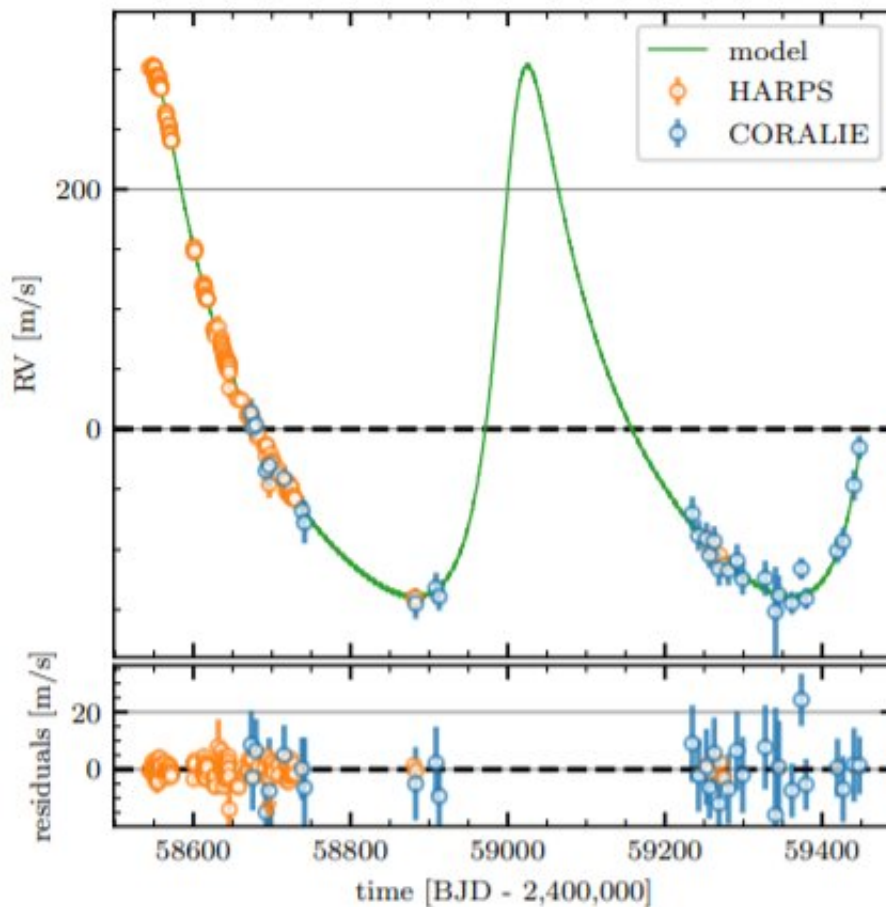


Two exoplanets orbiting a sun-like star discovered

November 26 2021, by Tomasz Nowakowski



HARPS (orange) and CORALIE (blue) radial velocities. In this figure, we present our RV time series. As is clearly seen, the data show a long-term and high-amplitude trend (semiamplitude of $\sim 200 \text{ m s}^{-1}$), typical of the signature of a long period giant planet. Credit: arXiv:2111.08764v1 [astro-ph.EP]

An international team of astronomers reports the detection of two new exoplanets orbiting an evolved sun-like star known as HD 137496. The newly found extrasolar worlds, identified using NASA's Kepler spacecraft, were classified as hot super-Mercury and cold Jupiter. The discovery is detailed in a paper published November 16 on arXiv.org.

Kepler is the most prolific planet-hunting telescope as it has discovered more than 2,600 exoplanets to date. After the failure of its two reaction wheels in 2013, the mission was repurposed as K2 to perform high-precision photometry of selected fields in the ecliptic. The revived Kepler spacecraft, which operated till November 2018, has detected hundreds of new extrasolar worlds.

Now, a group of astronomers led by Tomas Silva of the University of Porto, Portugal, reports the detection of another two [planets](#) identified by K2. The discovery was made when the telescope observed HD 137496 (also known as K2-364), a mid-G star near the main sequence turn-off, as part of the Campaign 15 of the K2 mission from August 23, 2017 to November 19, 2017. The observations revealed transit signals in the light curve of HD 137496, and planetary nature of these signals was confirmed by radial velocity (RV) observations from the HARPS and CORALIE spectrographs.

"We report the discovery of a planetary system orbiting HD 137496 (K2-364). With photometry from K2 and precise RVs from both HARPS and CORALIE spanning over two years, we are able to accurately characterize the stellar host, study its chemical composition, and put strong constraints on the planetary companions," the researchers wrote in the paper.

The exoplanet closer to the star, designated HD 137496 b is about 30 percent larger than the Earth and around four times more massive than our planet, what gives density at a level of 10.49 g/cm^3 . This planet is

composed mainly of iron, with the core representing over 70 percent of the object's mass. HD 137496 b orbits its host every 1.62 days, at a distance of about 0.027 AU from it, hence its equilibrium temperature is estimated to be some 2,130 K. Therefore, the extrasolar world was classified as a hot super-Mercury—an Earth-sized planet with the density of the solar system's smallest planet.

The second newly discovered exoplanet received designation HD 137496 c. It was classified as a cold Jupiter, given that its minimum mass was calculated to be about 7.66 Jupiter masses and its equilibrium temperature is approximately 370 K. The planet orbits HD 137496 on a highly [eccentric orbit](#) (with an eccentricity of 0.477) every 480 days, separated by 1.21 AU from the star.

With an age of about 8.3 billion years, mass of 1.03 solar masses and radius of approximately 1.59 solar radii, HD 137496 is characterized as a slightly evolved sun-like star. Its effective temperature is 5,799 K, while its metallicity was found to be at a level of -0.03.

In concluding remarks, the astronomers underlined the peculiarity of the newly detected planetary system. They noted that HD 137496 b is one of only a few well-characterized dense planets, what makes it an interesting target for testing planet formation theories, density enhancing mechanisms, and also the presence of an extended comet-like mineral rich exosphere. Moreover, given that HD 137496 c is a high-eccentricity planet, this system in general could be an interesting target for planetary evolution studies.

More information: T. A. Silva et al, The HD 137496 system: A dense, hot super-Mercury and a cold Jupiter. arXiv:2111.08764v1 [astro-ph.EP], arxiv.org/abs/2111.08764

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