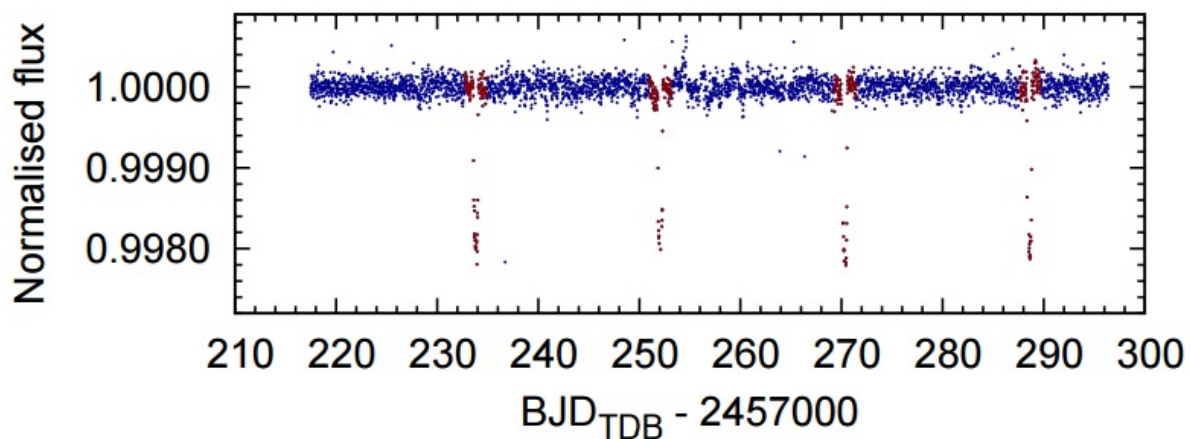


Jupiter-like planet discovered in a distant star system

September 8 2016, by Tomasz Nowakowski



K2 light curve of EPIC 212803289, processed by the K2SC code of Aigrain et al. (2016), which removes both instrumental and stellar noise. Portions of the light curve selected for modelling are shown in red. Credit: Smith et al., 2016.

(Phys.org)—A team of astronomers led by Alexis Smith of the German Aerospace Center's (DLR) Institute of Planetary Research in Berlin reports the detection of a Jupiter-like planet orbiting a distant subgiant star known as EPIC 212803289. The researchers also present compelling evidence for the existence of a third body in the system, most likely a brown dwarf. The results were published Sept. 1 in a paper on *arXiv.org*.

EPIC 212803289 is a bright, metal-rich subgiant star located some 1,970 light years away in the constellation Virgo. Although the star has a temperature similar to the sun, it is about three times larger and is approximately 1.6 [solar masses](#). It was identified by NASA's prolonged Kepler mission, called K2, as a good candidate to host an alien world. However, the existence of a potential exoplanet must be confirmed by follow-up observations.

"Following the identification of the system as a candidate, it was necessary to make radial velocity measurements to confirm the planet and measure its mass. These observations were performed with four different ground-based telescopes (on La Palma, Spain, in Chile, and in Texas, U.S.)," Smith told Phys.org.

The newly found exoworld, designated EPIC 212803289 b, is similar in size to Jupiter, with a radius of 1.29 Jupiter radii and is only 3 percent less massive than our solar system's biggest planet. The object orbits its parent star every 18.25 days.

The scientists estimated that the exoplanet's temperature is about 1,000 degrees Celsius and classified it as a so-called 'warm Jupiter' However, it is possible that the planet is even hotter, as it could be tidally locked, meaning that one of its sides permanently faces the star, while the other side experiences permanent night.

"In this case, the day side could be even hotter (up to 1,350 degrees Celsius), depending on how good the planet's atmosphere is at redistributing heat from the day side to the night side," Smith said. He added that the host star will soon expand to become a red giant, enlarging so much that it will engulf the planet. This will happen relatively soon in astronomical terms—in about 150 million years.

Furthermore, besides detecting EPIC 212803289 b, Smith's team

suspects the existence of another companion of the star. Based on measured systemic radial acceleration, they assume that there is a third body in the system with an orbital period of more than 236 days and a mass of more than 22 Jupiter masses. They noted that it could be a brown dwarf orbiting within 2.7 AU, a solar mass object at about 10 AU, or an object orbiting on a highly-eccentric orbit.

According to Smith, further radial velocity observations of this system over the next year or two would probably reveal the nature of this body.

The new research is significant for our understanding of extrasolar systems, as EPIC 212803289 b is the newest addition to a currently small number of [planets](#) known to transit subgiant stars. So far, only 31 transiting planets of stars more massive than 1.5 solar masses have been detected. Moreover, only four planets are known to transit giant stars, and a further three transiting planets are known around subgiants.

"Understanding [gas giant planets](#) requires large numbers of detections, so that statistics can be performed. Especially, detections are needed that expand the parameter space of known systems—e.g. planets around different types of star (such as subgiants in this case), and at longer periods than hot Jupiters. It is also important that such systems are discovered around relatively bright [stars](#), to allow further characterization observations. Progress is incremental, but this new system is an important addition to the catalogue of known gas giants," Smith concluded.

More information: EPIC 212803289: a subgiant hosting a transiting warm Jupiter in an eccentric orbit and a long-period companion, arXiv:1609.00239 [astro-ph.EP], arxiv.org/abs/1609.00239

Abstract

We report the discovery from K2 of a transiting planet in an 18.25-d,

eccentric (0.19 ± 0.04) orbit around EPIC 212803289, an 11th magnitude subgiant in Virgo. We confirm the planetary nature of the companion with radial velocities, and determine that the star is a metal-rich ($[\text{Fe}/\text{H}] = 0.20 \pm 0.05$) subgiant, with mass $1.60 + 0.14 - 0.10 M_{\odot}$ and radius $3.1 \pm 0.1 R_{\odot}$. The planet has a mass of $0.97 \pm 0.09 M_{\text{Jup}}$ and a radius $1.29 \pm 0.05 R_{\text{Jup}}$. A measured systemic radial acceleration of $-2.12 \pm 0.04 \text{ ms}^{-1} \text{d}^{-1}$ offers compelling evidence for the existence of a third body in the system, perhaps a brown dwarf orbiting with a period of several hundred days.

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