The longest period transiting planet candidate from K2

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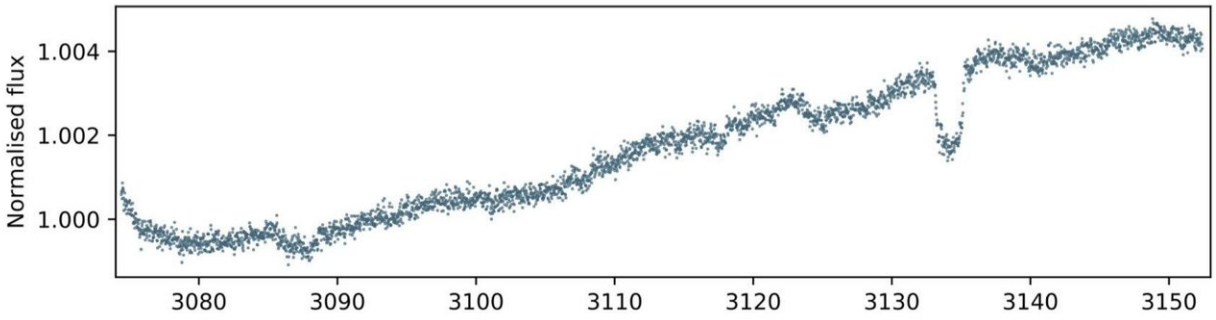

Data from the light curve of the EPIC248847494 star. The transit is clearly visible, on the upper right part of the image. Credit: UNIGE

To discover and confirm the presence of a planet around stars other than the sun, astronomers wait until it has completed three orbits. However, this very effective technique has its drawbacks since it cannot confirm the presence of planets at relatively long periods (it is ideally suited for periods of a few days to a few months). To overcome this obstacle, a team of astronomers under the direction of the University of Geneva (UNIGE) have developed a method that makes it possible to ensure the presence of a planet in a few months, even if it takes 10 years to circle its star: This new method is described for the first time in the journal *Astronomy & Astrophysics*.

The method of transits, consisting of detecting a dip in the luminosity of the host star at the time the planet passes, is very effective for finding exoplanets. It makes it possible to estimate the radius of the planet, the inclination of the orbit and can be applied to a large number of stars at the same time. However, it has a significant limitation: Since it is necessary to wait at least three passes in front of the star to confirm the existence of a planet, it is currently only suitable to detect planets with short orbital periods (typically from a few days to a few months). Astronomers would have to wait more than 30 years to detect a planet similar to Jupiter that needs 11 years to make the full tour).

To overcome this obstacle, a team of astronomers led by researcher Helen Giles, from the Astronomy Department at the Faculty of Science of UNIGE and a member of the NCCR PlanetS, has developed an original method. By analysing data from the space telescope K2, one star showed a significant long-duration temporary decrease of luminosity, the signature of a possible transit, in other words, the passage of a planet in front of its star. "We had to analyse hundreds of light curves" explains the astronomer, to find one where such a transit was unequivocal.

Helen Giles consulted recent data from the Gaïa mission to determine the diameter of the star referenced as EPIC248847494 and its distance, 1500 light-years away from the planet Earth. With that knowledge and the fact that the transit lasted 53 hours, she found that the planet is located at 4.5 times the distance from the sun to the Earth, and that consequently it takes about 10 years to orbit once. The key question left to answer was whether it was a planet and not a star. The Euler telescope of the UNIGE in Chile would provide the answer. By measuring the radial velocity of the star, which makes it possible to deduce the mass of the planet, she was able to show that the mass of the object is less than 13 times that of Jupiter—well below the minimum mass of a star (at least 80 times the mass of Jupiter).

"This technique could be used to hunt habitable, Earth-like planets around stars like the sun," says Helen Giles, "we have already found Earths around red dwarf stars whose stellar radiation may have consequences on life which are not exactly known." With her method it will no longer be necessary to wait many years to know whether the detected single transit is due to the presence of a planet. "In the future, we could even see if the planet has one or more moons, like our Jupiter," she concludes.

More information: The longest period transiting planet candidate from K2. arxiv.org/abs/1806.08757

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