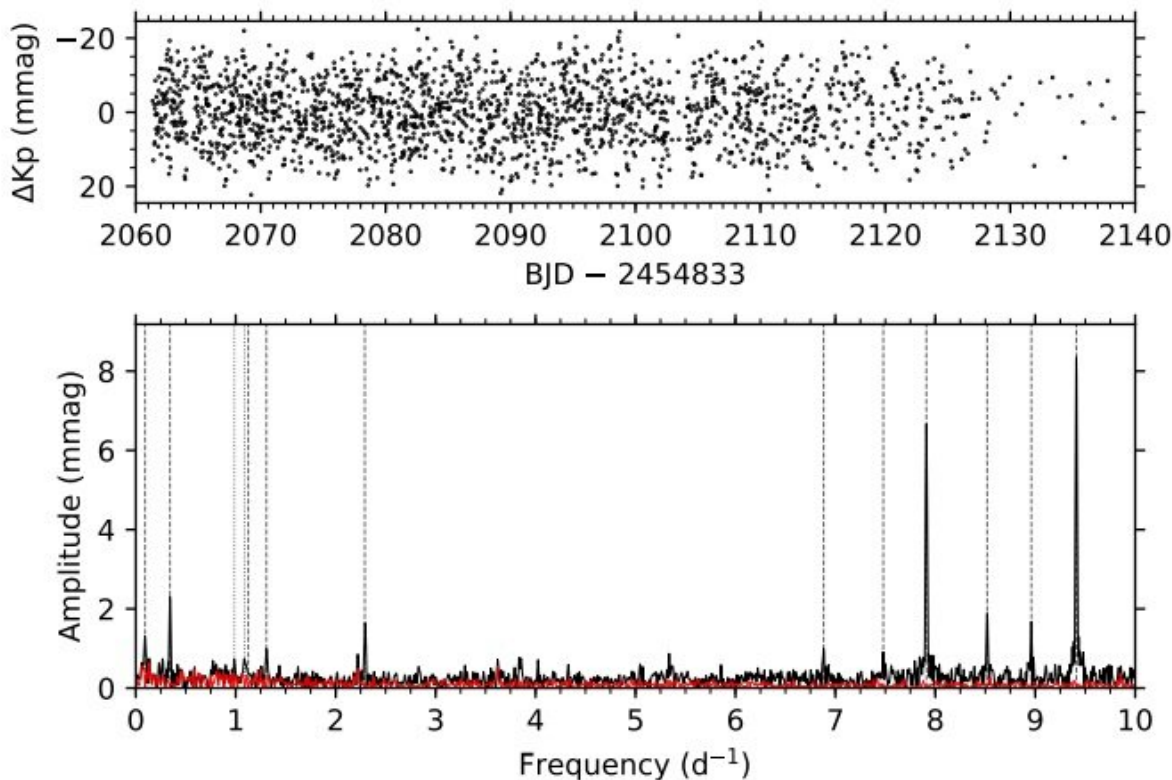


# Three new Beta Cephei stars detected

August 15 2019, by Tomasz Nowakowski



Top: K2 light curve of CD-28 12286 with the brightness variations in mmag.  
 Bottom: LS-periodograms and frequencies identified by pre-whitening. Image credit: Burssens et al., 2019.

Using NASA's prolonged Kepler mission, known as K2, astronomers have identified three new Beta Cephei stars. The newly found trio is an important addition to the still short list of known stars of this type. The

finding is detailed in a paper published August 7 on the arXiv pre-print server.

Beta Cephei ( $\beta$  Cep) stars are massive, non-supergiant [variable stars](#) with spectral type O or B, exhibiting variations in photometric, radial velocity and line profile due to low-order pressure and gravity mode pulsations. Observations revealed that most stars of this class are of early B-type with masses ranging from 8.0 to 17 solar masses, characterized by their relatively high-frequency pulsations (typically between two to seven hours).

Studies of Beta Cepheids could help astronomers better understand the interiors of massive stars. One of the best methods to investigate this class of objects is asteroseismology. This technique provides a powerful way to study both the global and local physics of such objects. However, given that the list of known Beta Cepheids is still relatively short, any new detection of a star of this type is of high importance for researchers.

Now, a team of astronomers led by Siemen Burssens of Catholic University of Leuven (KU Leuven), reports the finding of three new Beta Cepheids. The discovery was made by analyzing the data from K2 exoplanet-hunting mission. While the spacecraft's main purpose is to find new alien worlds, it is also suitable for asteroseismology studies of OB-type stars.

"Here, we focus on the detection of new heat-driven OB-type variable stars, which are stars whose oscillations are driven by the  $\kappa$ -mechanism, discovered in the K2 space mission data," the researchers wrote in the paper.

The newly detected Beta Cepheids received designations CD-28 12286 (EPIC 202691120), CD-27 10876 (EPIC 202929357) and LS 3978 (EPIC 235094159). All the three stars show pulsations with frequencies

as high as about 17/day.

According to the paper, CD-27 10876 turned out to be the richest Beta Cepheid in terms of the number of high amplitude resolved p-mode frequencies. The star is of spectral type OB- and is located some 9,100 light years away from the Earth.

CD-28 12286, like CD-27 10876, is also of spectral type OB- and its distance was estimated to be around 6,070 light years. When it comes to LS 3978, it has a spectral type B2III and is located most likely about 19,500 light years away.

The astronomers added that further monitoring of the three new Beta Cepheids should be carried out in the near future. For instance, observations of these targets using NASA's Transiting Exoplanet Survey Satellite (TESS) could determine their fundamental parameters, including effective temperature. The satellite would allow researchers to conduct more detailed asteroseismology studies of Beta Cepheids and massive [stars](#) in general.

"With TESS, massive star asteroseismology will certainly be getting a boost," the authors of the paper noted.

**More information:** S. Burssens, et al. New  $\beta$  Cep pulsators discovered with K2 space photometry. arXiv:1908.02836v1 [astro-ph.SR]: [arxiv.org/abs/1908.02836](https://arxiv.org/abs/1908.02836)

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