

Type I and II Cepheids in the K2 Campaigns 2 & 3

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Type I Cepheids are young supergiant stars that show large-amplitude pulsations. They are also important cosmic distance indicators. However, their observations usually have either sparse temporal coverage or not particularly high photometric accuracy. In contrast, space-based continuous measurements were essential to detect cycle-to-cycle fluctuations in the pulsation [1,2]. These subtle variations are possibly caused by large convective cells on appearing on the surface of the stars: the *K2* observations may shed more light on their origins and advance our understanding of the inner workings of Cepheids.

Type II Cepheids (BL Her and W Vir stars), in comparison, are older giants. Model calculations already revealed that various dynamical effects, like mode resonances and chaos can occur in the pulsation of these stars [3,4]. Period doubling was already detected in ground-based data [5]. However, type II Cepheids have not been observed by space photometry before the *K2* mission. We expect to detect various dynamical effects in the proposed targets and thus we will be finally able to compare the predictions of hydrodynamic models with data from real stars.

Field 2 We identified 7 Cepheid candidates in Field 2. These include a W Vir, a possible classical Cepheid and five BL Her (short-period Type II) stars. Two of the stars also show long-period variations in the ASAS survey data.

The periods of the BL Her stars range between 1.7 and 4.9 days, making the detection of various dynamical effects and light-curve fluctuations possible.

Field 3 Although Field 3 is far from the Galactic Plane, we found a single Cepheid candidate that falls on silicon. Its period is 12.9 days meaning that *Kepler* will cover almost 6 pulsation cycles. Recent results from the MOST space telescope indicate that period fluctuations can be estimated from only 6-7 cycles [6].

Targets Cepheids are intrinsically luminous stars. However, we expect that only the brightest star in the list, EPIC 202571062 will suffer from saturation with a peak brightness of $Kp = 9.36$ mag. The rest of the stars fall between 11.2 and 13 magnitudes. Targets are listed with decreasing priority. We request to observe all of them within the K2 Mission. The target lists include the estimated maximum brightness in Kp magnitudes for all stars.

References:

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