

## Long Cadence Cepheid targets – K2 Campaign 1

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Cepheids are found in all stellar populations. Since Field 1 is far from the Galactic Plane, few if any young Cepheids were expected, and our search for targets yielded no Pop. I Cepheids. However, a single short-period, Pop. II Cepheid that is a potential BL Her-type star was identified [1]. We also found three stars in the RR Lyrae sample that displayed peculiar light curves with shallow rising branches and relatively long periods; these stars possibly are anomalous Cepheids of the sort found in some globular clusters and most dwarf galaxies. In the period-luminosity diagram anomalous Cepheids lie between the classical and population II Cepheids and follow a separate P-L relation [2]. They have low metallicities and their origin is somewhat uncertain but may involve mass transfer in a binary system [3] with a possible link to blue stragglers.

**Aims** The observations of the various types of Cepheid stars in the K2 mission may provide an opportunity to investigate the following questions.

- TYC 267-687-1 can be the first BL Her star to be observed by *Kepler*. Hydrodynamic models of BL Her stars indicate that various dynamical effects such as period doubling and modulation can be expected in them. However, ground-based observations indicate that the amplitude of the effects is small, therefore high-precision space-based observations are important in detecting and understanding these phenomena [4,5].
- Three possible anomalous Cepheid stars were identified in the field. This type of variable was not studied from space before. Based on our experiences with RR Lyrae and Cepheid stars, it is reasonable to expect that these stars will display new phenomena as well, e.g. low-amplitude additional modes and/or light curve fluctuations that are very hard to detect from the ground. Observing multiple modes in anomalous Cepheids may also lead to a better understanding of their internal structure and origin.

**Targets** We propose 4 targets for long cadence observations. The brightness of the BL Her candidate is  $Kp = 10$  magnitudes. The three anomalous Cepheid candidates are between  $Kp = 15 - 17$  magnitudes and therefore do not require excessive pixel use. The target list includes the estimated maximum brightness in  $Kp$  magnitudes for all stars.

**References:** [1] Schmidt et al., 2009, ApJ, 137, 4598

[2] Nemeč, Nemeč & Lutz, 1994, AJ, 108, 222

[3] Szabados, Kiss & Derekas, 2013, A&A, 461, 613

[4] Smolec & Moskalik 2012, MNRAS, 426, 108

[5] Smolec et al., 2012, MNRAS, 419, 2407