

Short Cadence Cepheid targets – K2 Campaign 0

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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 of Cepheids. So far only three stars were observed in this manner: V1154 Cyg (KIC 7548061) by *Kepler* and SZ Tau and RT Aur by MOST [1,2,3]. MOST is able to observe one target only for about a month, a short time span compared to typical Cepheid pulsation periods. Therefore short-cadence observations of several Cepheids in the K2 mission will greatly enhance our knowledge about these stars.

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

– The sampling of the short-cadence data provide a unique tool to study the cycle-to-cycle fluctuations and other possible dynamical effects in the pulsation. Fundamental-mode and first-overtone stars may also show differences, e.g. additional radial and/or nonradial modes are expected in the latter group [4].

– A potential W Virginis or population II Cepheid star, BB Gem is included in the list (No. 7). Such stars have not been observed by any photometric mission before. W Virginis stars are expected to show more irregular light curves than classical Cepheids: period doubling or even chaos can occur in them [5,6,7].

– DT Gem (No. 3) is a potential anomalous Cepheid, a relatively high-mass core-He burning pulsator. The origins and ages of these stars are still debated: they appear to be single, relatively young stars, but some of them may be old objects, blue stragglers that evolved into the instability strip [8]. *Kepler* may provide the first high-accuracy photometry of this class as well and might shed some light on their origins.

Targets We propose 8 targets for SC observations. The stars are a small subset of the Cepheid long-cadence target list and span a wide brightness range between 6.69 and 13.1 magnitudes. The proposed targets are relatively close to the Ecliptic and the Galactic plane therefore the proposal would greatly benefit from moving the field-of-view towards M35.

References:

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