K2 Proposal on behalf of KASC WG3 (Field 2)

Asteroseismology of O-type stars

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O-stars have always been poorly studied due to their rarity. In the nominal Kepler mission, there were no O-stars observed because of the rather high Galactic latitude of the observed field. As a result, none of these stars could benefit so far from having long-term high-quality photometric *Kepler* observations to perform seismic studies to get a better insight of their internal structure and processes. A better knowledge of these massive stars is an important missing piece of information to improve our general knowledge of stellar evolution as these stars are the progenitors of supernovae enriching the stellar environmnent with heavy elements and that lead to black holes.

Ground based observations indicated that the β Cephei pulsations do not occur in stars hotter than about O9. However, the satellite mission CoRoT provided high precision photometry for a few O-type stars and revealed variability of a yet not well-understood nature for all of them (Degroote et al. 2010, A&A, 519, A38; Briquet et al. 2011, A&A, 527, A112; Blomme et al. 2011, A&A, 533, A4; Mahy et al. 2011, A&A, 519, A38). Mass loss is likely to be a contributing factor. It has also been suggested that the occurance of shallow convective layers could be held responsible for the occurance of stochastically driven pulsations (Cantiello et al., 2009, A&A, 499, 297). It would be very valuable to determine to which extend all the O-stars are periodically variable in light.

It is therefore of utmost importance to observe all the O-type stars with K2 to be able to unravel the mysteries of the most massive main-sequence stars. There are 3 known O-type stars flagged as being on active silicon for field 2 (EPIC 205703810, 202691120, 202929357). Long cadence observations should be sufficient since the pulsations are likely to be of short period.