Long Cadence Super-Red Targets – *Kepler* K2 Campaign 1

E. Hartig[1], erich.hartig@univie.ac.at, T. Lebzelter[1], thomas.lebzelter@univie.ac.at,

K.H. Hinkle[2], hinkle@noao.edu

[1]University of Vienna, Department of Astrophysics, Vienna, Austria; [2]NOAO, Tucson, USA

For Campaign 0, we proposed a study of the reddest stellar targets in the Kepler FoV. Most of them are likely red giants, AGB stars, and post-AGB objects; some stars are of uncertain nature. As outlined below, information on variability is a key quantity for a proper characterization of the stars and for identification of outstanding objects among the reddest stars, e.g. post-AGB objects. Here we propose the continuation of our Campaign 0 program. Again we used J-K_s colour plus basic information from Simbad, GSC 2.3, and AAVSO database as selection criteria. Our selection includes 58 objects in total, 37 of them are confirmed with K2fov to fall upon silicon, and the rest is very close to it. The mix of objects in the K2-C1 field is somewhat different from Campaign 0. The Field 1 includes at least one carbon star (EPIC 201581144) and one Mira (EPIC 201805002) on active silicon, for the other stars their nature and the cause for their redness in the near infrared needs to be explored.

Scientific Justification

Deep monitoring of large fields in the sky allow to build up a valuable sample covering the main groups of very red stars (e.g. Hartig et al. 2011). From our selection criteria we expect that most of these objects will be highly evolved stars of low or intermediate mass where the red colour stems from a combination of low surface temperature and circumstellar extinction. The various evolutionary stages show characteristic variability pattern that allow a proper classification (RGB, AGB, post-AGB – see, e.g., Feast et al. 1989, Wood et al 1999, Lebzelter & Wood 2005). This helps to identify rare cases among them that help to complete our understanding of these evolutionary stages and to study their space distribution. As an example we point out star TYC 278-630-1 (EPIC 2018443661) of our sample (very close to active silicon). Its spectral classification as G9III in combination with its red near-infrared colour makes it very interesting as a possible RV Tau star. Not less important is the study of details in the light change, in particular for the not so well studied Carbon stars as outlined in detail in our Campaign 0 proposal. While the 82 days monitoring period may be seen a bit short for the study of variability in these objects, we note that the Kepler measurements will be combined with literature data and newly obtained ground based observations at the Vienna observatory.

Kepler K2 - Campain 1 - Very Red Stellar Objects - CMD J-Ks vs Ks
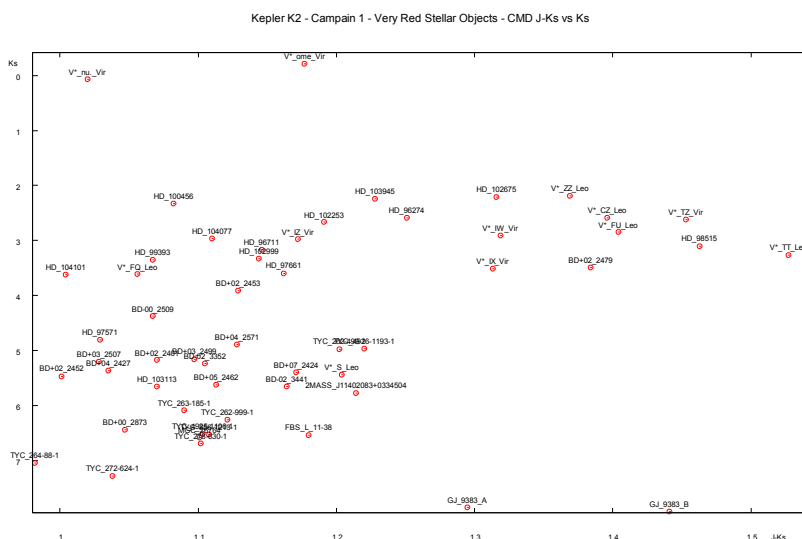
The figure shows the colour-magnitude diagram (CMD) for the proposed targets.

References:

Feast, M. et al. 1989, A period-luminosity-colour relation for Mira variables, A period-luminosity-colour relation for Mira variables, 1989MNRAS, 241, 375

Hartig, E. et al., 2011, Is There an AGB Star in NGC 6791? 2011 ASPC, 445, p 451

Lebzelter, T. & Wood, P.R., 2005, Long period variables in 47 Tuc: direct evidence for lost mass, A&A, 441, 1117

Wood, P. et al., 1999, MACHO Observations of LMC red giants: Miras and semi-regular pulsators, 1999IAUS, 191, 151