Long Cadence Super-Red Targets – *Kepler* K2 Campaign 2 and 3

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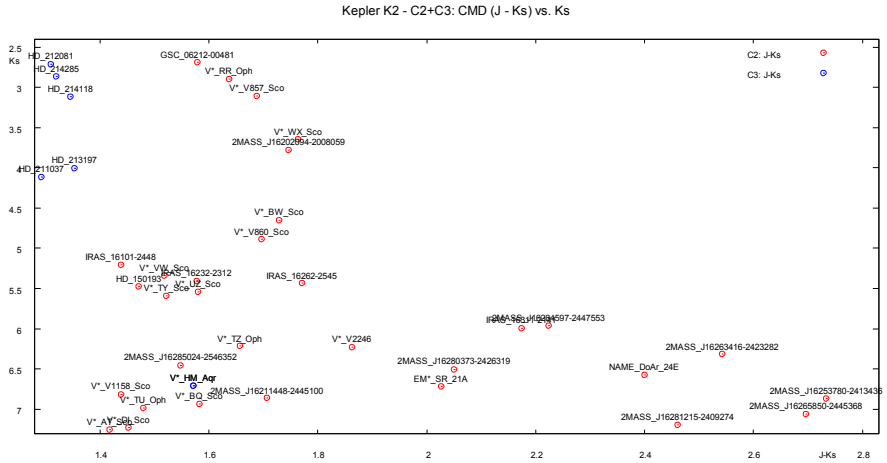
For Campaign 0 and 1 we proposed a study of the reddest stellar targets in the Kepler FoV. Most of them are likely red giants, AGB stars, and post-AGB objects; some stars are of uncertain nature. As outlined below, information on variability is a key quantity for a proper characterization of the stars and for identification of outstanding objects among the reddest stars, e.g. post-AGB objects. Here we propose the continuation of our Campaign 0 and 2 programs. Again we used J-K_s colour plus basic information from Simbad, 2MASS and EPIC databases as selection criteria. Our selection for C2 includes 48 objects, for C3 35 objects in total, two are not in EPIC but fall upon active silicon, and few are very close to it. The mix of objects in the K2-C2 and C3 fields is again somewhat different from the previous Campaigns. In Field 2 we have 4 YSOs, finding a variability difference between YSOs and AGB stars from a 80 days photometry time series could be an interesting output from the project. Furthermore we have some Miras (e.g. EPIC 203748709) and 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. 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.



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