Long Cadence Super-Red Targets – *Kepler* K2 Campaign 0

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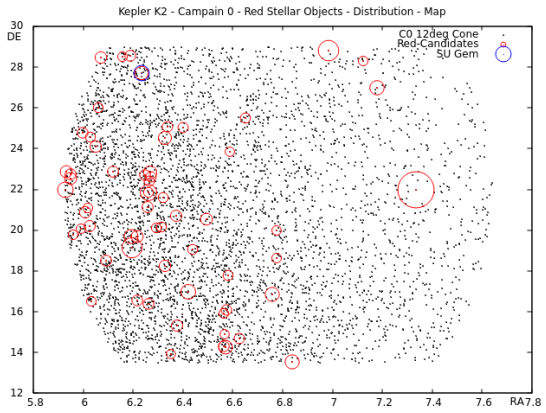
Close to the Galactic plane, within the wider FoV of the Kepler K2 Campaign 0, we find several hundred red stellar objects with a J-K_s colour greater than 0.8. With this proposal we want to put a focus on the reddest stellar objects among them. Our selection includes 62 objects in total, a part of which will be within the finally selected Kepler FoV. The majority of our sample are carbon stars plus some other stars on the AGB. A young stellar object, V1308 Ori, has been excluded. The selection criteria were 2MASS colours J-K_s greater than 1.75 and K_s less than 7 mag plus the availability of some basic information from Simbad, GSC 2.3, and AAVSO data base to ensure that we select stellar objects only. A 12 deg radius search cone around the anticipated Kepler FoV central coordinates was used.

Scientific Justification

Carbon stars are highly interesting objects playing a critical role in the cosmic matter cycle. Material processed in the interior and mixed to the surface is returned to the interstellar medium by efficient mass loss. There is common agreement in the scientific literature that pulsation is a dominant factor for the mass loss during this evolutionary stage. However, detailed studies of the pulsational behaviour of carbon stars are rare. For a large fraction of the C-stars in our sample, there has been no investigation of their variability at all. However, such information would be highly relevant, in particular for the galactic anti-centre region since there is a long standing discussion on a reduced mass loss rate in metal poor C-stars extending their life time in order to explain their existence at larger radial distances from the galactic centre (Jura et al. 1989). Furthermore, C-stars are hardly checked for short time variability. Studies in this context have been mainly based on O-rich stars in the past (e.g. Lebzelter et al. 2011). Even though the pulsation periods of C-stars are expected to be much longer than the planned time span of the Kepler observations of 83 days, both for the basic detection of variability and even more the study of short period variability behaviour the forthcoming Kepler campaign will provide an excellent data base.



We would like to point out to one further object in our sample, the **RV Tau star** SU Gem. RV Tau stars are as post-AGB objects closely related to the C-stars at the tip of the AGB. These objects are very rare, and little is known on their atmospheric dynamics. Their periods are typically of the order of a few ten days, so the Kepler time sampling will provide perfect material for their study. We note that we observed already successfully one RV Tau star during the nominal Kepler mission, so that a comparison between the two stars will be possible. This target has the highest priority in our sample.

In the figure above we indicate the distribution of our sample in the sky. The size of the circles reflects the stars' colours. The Kepler observations will be supported by literature data and ground based observations at the Vienna observatory.

References:

Jura et al. 1989, ApJ, 924,
Lebzelter T., 2011, Astronomy & Astrophysics, Volume 530, id. A35, 8 pp.