K2 target proposal for Campaign 2

Known members of rho Ophiuci and Upper Sco

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Following from previous proposals submitted for campaigns 0 and 1, we propose to observe 616 members of the rho Ophiuci and Upper Sco star-forming region in K2 campaign 2.

These targets represent a unique opportunity to monitor the photometric variability of very young stars over a wide range of masses. The full science case for K2 observations of young stars in star forming regions and open clusters was described in the white paper by Aigrain et al. (2013, arXiv:1309.0737). Succintly, these observations will provide important diagnostics of accretion-related processes, magnetic activity, rotation, and pre-main sequence pulsation. They will also enable us to search for transits and eclipses by stellar, sub-stellar and planetary companions, and hence to constrain the incidence of short-period binaries and planets and the mass-radius relation for these objects, in an age range where such constraints are currently extremely scarce.

We include all the known members of rho Ophiuci which are being observed spectroscopically with VLT/FLAMES as part of the GAIA-ESO Survey (Gilmore, Randich et al., 2012, ESO Messenger, 147, 25), plus the list of objects selected by this survey, but which could not be observed with FLAMES due to fibre conflicts. We also selected additional targets from the following literature sources (including only spectroscopically confirmed members, rather than candidate members):

- Carpenter et al. (2006, ApJL, 651, 49): *Evidence for mass-dependent circumstellar disk evolution in the 5Myr old upper Scorpius OB association*.
- Muzic et al. (2012, ApJ, 744, 134): *Substellar Objects in Nearby Young Clusters (SONYC) V. New brown dwarfs in rho Ophiuchi*.
- Lodieu et al. (2011, A&A, 527, 24): *Multi-fibre optical spectroscopy of low-mass stars and brown dwarfs in Upper Scorpius*.
- Gutermuth et al. (2009, ApJS, 184, 18): *A Spitzer survey of young stellar clusters within one kiloparsec of the Sun: cluster core extraction and basic structural analysis.*
- Wilking et al. (2005 AJ 130 1733): *Optical spectroscopy of the surface population of the rho Ophiuchi molecular cloud: the first wave of star formation.*
- Erickson11 (2011, AJ, 142, 140): *The initial mass function and disk frequency of the rho Ophiuchi cloud: an extinction-limited sample.*

The target list was generated by concatenating the lists from the sources above, removing duplicate sources, cross-matching with EPIC and NOMAD (NOMAD R-band magnitudes were used for targets not in EPIC), limiting the magnitude to R<19, and using the K2fov tool to select only the objects which fall on silicon in K2 campaign 2. Note that a significant fraction of our objects were not in EPIC, this is probably due to the high extinction in the field. A significant number of our targets are faint (17 < KepMag < 19), but these are particularly interesting because they extend well into the brown dwarf regime, and should be included if possible.

We request normal cadence for all our targets.