To: Kepler Science Center Review Staff

Please consider the following proposal for the proposed Campaign 0 of the NASA K2 Mission:

The precise photometric capabilities of the Kepler satellite telescope make it an excellent platform from which to conduct variable star photometry. During the initial Kepler Mission numerous new variable stars, both intrinsic and eclipsing, were discovered and studied with previously unavailable precision and long-term sampling (e.g., Slawson et al. 2011; Benko et al. 2010). With the proposed K2 mission there is the hope that the variable star community will still have the opportunity to obtain precise photometric data from a number of new targets. Roughly every three months in the coming years, a plethora of information can be extracted from these data, including an inventory of variable stars populating each campaign field. We propose the K2 phase of the Kepler mission in Field0 should include acquisition of photometric data on a variety of variable star targets in selected open clusters, with the ultimate goal of characterizing them in the context of evolution and distance estimation.

The Galactic anti-center is home to at least 15 new open star clusters discovered by Koposov et al. (2008). At least one of these deep-sky objects (Koposov 62) falls within the confines of the proposed Kepler Field0. In addition, one other poorly studied target (NGC 2331) merits closer investigation regarding its actual existence as an open cluster. The expectation is that we will be able to study and then define the distribution of variable stars within each of these two targets. Depending upon the quality of the resulting photometry, period-luminosity relationships from pulsating stars, such as RR Lyrae and Cepheids, could be used to refine the age and distance moduli to these open clusters. We propose that only long cadence (30 minute) photometry will be necessary to meet the goals of this study without any special considerations outside those which will be employed for the primary mission.

Following successful collection of the data our group plans to complete analyses using a variety of computer applications designed to identify variable stars and perform periodicity analyses. These tools, which we already have significant experience in using to analyze variable star data (e.g. Alton 2010; Alton 2013), will allow us to quickly and efficiently extract the desired stellar parameters, and lend further information about the nature of these open clusters.

Included with this proposal, please find a comma delimited file containing the 2MASS designation, RAJ2000, DECJ2000, and Jmag for the brighter stars contained in both open clusters identified above. Please note we understand there are a large number of targets listed. If need be, all stars fainter than Jmag 13 can be excluded, reducing the number of targets significantly, while still accomplishing our goals. If one of the above clusters will not fall on active silicon in the final field, we would still like to acquire data on the other. Thank you for your time and consideration,

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References:
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