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Title: A Kepler Galaxy Survey: Establishing the Temporal Baseline for Extragalactic Systems
Type: Poster
Session: Galactic and Extragalactic Astrophysics
Abstract: Kepler's combination of high photometric precision and near-continuous observing cadence permits new insight on galaxies, by opening up the time domain in previously unavailable detail. We report on the analysis of ~1200 individual light curves of ~150 galaxies observed during Quarters 1-8. This survey is sensitive to both continuous variability, especially low-level variations from embedded active nuclei, and random episodic events, such as supernovae. Our goals are to (a) define the photometric baseline of galactic systems over a range of amplitudes and timescales, (b) quantify the existence and amplitude of AGN signals in galaxy cores, (c) provide a direct measure of supernovae rates across galaxy types, complementary to ground-based supernova searches, and (d) quantify the early brightening of detected supernova as the explosion rises to peak luminosity. In general, galaxies lacking active nuclei are not expected to be variable, constituting a population of quiescent sources useful for monitoring the photometric stability of Kepler. In this initial dataset we find on order 10 systems with excess variability, but caution that robust identification of low-level variations remains challenging in the context of systematic structure in the light curves. Several systems show variable behavior in 1-2 quarters but are otherwise quiescent in other quarters. These data provide an initial look at the temporal behavior of extragalactic systems.
As a step towards analysis of the entire Kepler galaxy database (4-12 quarters of data for ~500 galaxies), we are constructing the Kepler Galaxy Legacy Archive. This archive federates the time series photometry with morphological and photometric parameters for each galaxy along with complete observing logs and photometric statistics derived from the light curves. In particular we collate data from several recently developed multiwavelength catalogs of the Kepler field to refine the properties of the observed galaxies, especially the UBV survey of Everett (2012).

We also provide an update on the status of an associated software toolkit, written in IDL, for Kepler data analysis. Two examples of the procedures in this toolkit are: (a) a module to define the fractional area of a target galaxy within the optimal and full apertures, useful for supernova coverage statistics, and (b)
filtering of the entire observed pixel set for each source to identify transients occurring outside of the pipeline-defined optimal aperture.

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