

A Kepler 2 Campaign on Massive Young Stars
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The mechanisms of variability in young stars are rooted in both their internal structure and their circumstellar environment. Decades of photometric monitoring have shown that T Tauri stars are highly variable, and that this variability is connected with one or more of: starspot modulation, unsteady accretion, and changing line-of-sight extinction. The association between brightness behavior and physical processes is much more tenuous for the higher mass Herbig Ae/Be stars. One of just a few monitoring campaigns of large samples of Ae/Be stars, the work of Herbst & Shevchenko (1999) found a low incidence of periodicity, unlike the case for T Tauri stars, but that many objects exhibited pronounced brightness dips of up to several magnitudes on timescales of days to months.

Most photometric time series observations to date on Herbig Ae/Be stars have involved sparse monitoring over one or more ground-based observing seasons. It is now clear that high precision space-based photometry can reveal much more about the time domain properties of these young stars. In Cody & Hillenbrand (2013) we reported the possible detection of spots on a few Myr old early type (A0) candidate Taurus member (HD 31305; see figure below). This is an unexpected result, since the lack of a surface convective layer in A-type stars is not expected to give rise to a dynamo or associated magnetic activity. With a 1.5% amplitude, this surprising detection of a periodicity along with lower level aperiodic variations was afforded by the long time baseline and exquisite photometry of the *MOST* satellite.

To make headway in assessing variability in young massive stars, further targets are needed with similar high quality data. *Kepler* is poised to meet this requirement, provided that there are young massive stars in its field of view. We have scoured the vicinity of K2 field 00 and identified a set of five massive, young stars that fall on or very close to the FOV, should it be shifted up to a degree eastward. Two of our proposed targets (DS Gem and MW 137) are known young variable stars that are well-studied, and we seek to further characterize their time domain behavior with K2. The three others (HD 253327, HD 253445, and HD 253247) are candidate young stars with A and B spectral types. We propose to shift the K2 field slightly in order to monitor all five of these stars.

These observations will set the stage for much more extensive investigations of young stars over a larger range of masses – including a large sample of available B, A, and F type stars -- in the Sco-Cen region, as part of K2 field 02.

