

0.1 Using low resolution optical spectra to identify young stars and their properties

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poster number:

Stellar spectra are a valuable tool for understanding young pre-main sequence stars. Some spectral lines, such as Li I, can be a direct indicator of stellar youth while other lines, e.g., H alpha or Ca II, can be used as a tracer of either disk accretion or magnetic activity that is also heightened in young stars. In our research, we used low resolution optical spectra collected from the fifth iteration of Sloan Digital Sky Survey (SDSS-V) to develop different techniques to perform a spectroscopic identification of YSOs and to analyze their properties. We present a data-driven pipeline, LineForest, that autonomously measures the equivalent width of 52 different lines in the optical spectra, including Li I, Balmer series, Paschen series, and a number of lines that can be seen in emission due to accretion. Using these lines, we construct a classifier that, to date, has confirmed the youth of >18,000 stars, including >5500 classical T Tauri stars (CTTSs). Through modeling the decrement of the lines in the Balmer series, we estimate the properties of the accretion stream of these CTTSs, such as the temperature of the accretion flow and its surface density. We examined the evolution of Li I depletion as a function of age, developing an empirical model of Li I absorption for stars with $3200 < T_{\text{eff}} < 6000$ K, and ages < 30 Myr. We also estimate veiling for these stars and examine its dependence on the wavelength.