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U-BAND PHOTOMETRY AS A SIGNATURE OF GAS ACCRETION IN YOUNG LOW-MASS STARS

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Low-mass pre-main-sequence stars can be classified as accreting/non-accreting by using a spectral-index dependent criterion based on the equivalent width of the Hα emission line. This limit defines the boundary between Classical T Tauri Stars (CTTS) and Weak-lined T Tauri Stars (WTTS) (Barrado et. al 2003). Some of these stars in nearby associations also show an excess in the *U* magnitude with respect to the Main Sequence, which cannot be solely explained by chromospheric activity. We propose that this excess can be correlated to the Hα accretion criterion due to the fact that hot shocked gas, that accretes onto the stellar surface, generates high energy photons that can be traced by observations in the *U* band.

We calculate the prediction interval for a least squares regression of excess in U magnitude (Exc*U*) vs. Equivalent Width (EW) separation from the accretion limit as a function of Spectral Type (SpT). We plot the value of the prediction interval corresponding to an EW separation from accretion value of zero, corresponding to the accretion boundary (Fig.1) for a sample of stars from the Herbig & Bell (1988) catalog. In this catalog stars are classified as: TTauri (tt), Weak (wt), and of unknown type. We plot the regression estimator for the intercept, which sets a boundary that separates tt and wt from its Exc*U* for each SpT interval.

Then we use spectroscopic and photometric data for individual stars in young stellar associations, specifically: MBM12 (3 Myr), TW Hydra (8 Myr), BPMG (11 Myr), LCC (15 Myr), UCL (17 Myr), and TUC-HOR (30 Myr) (Restrepo 2014). In Figure 2 we make the same plot as above using the complete sample of stars. We see a decrease in the prediction interval for the intercept in the SpT intervals 50-52 due to adding new data to this region. This allows us to think that it is possible to classify stars from their excess in U magnitude.

Thus we propose to increase the number of accreting stars in our sample to better trace the region where evolutionary tracks for young accreting low-mass stars may lie.

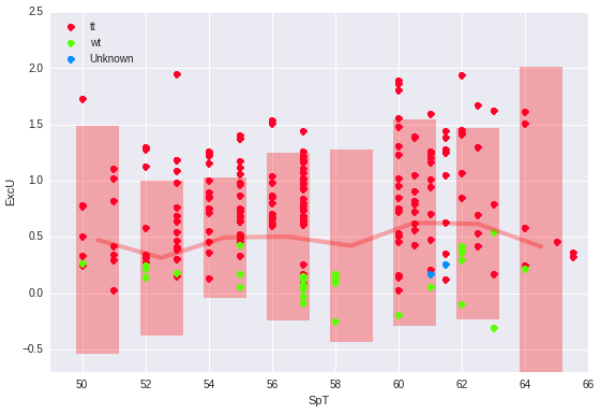

Fig. 1. Prediction intervals vs. SpT for several young stars for each spectral window. The continous line indicates the expected value of the estimator for each interval.

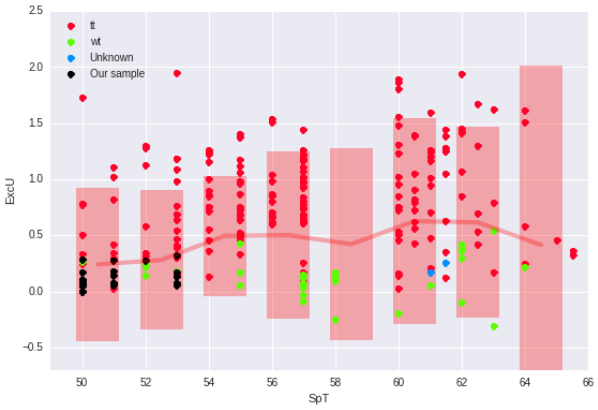

Fig. 2. Same as above, but including our own sample of stars.

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