

# Chromospheric activity of FGK stars in the solar vicinity. An estimation of the radial velocity jitter

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## Abstract

Chromospheric activity produces both photometric and spectroscopic variations that can be mistaken as planets. Large spots crossing the stellar disc can produce planet-like periodic variations in the light curve of a star. These spots clearly affect the spectral line profiles and their perturbations alter the line centroids creating a radial velocity jitter that might “contaminate” the variations induced by a planet. Precise chromospheric activity measurements are needed to estimate the activity-induced noise that should be expected for a given star. We obtain precise chromospheric activity measurements and projected rotational velocities for nearby ( $d < 25$  pc) cool (spectral types F to K) stars, to estimate their expected activity-related jitter. As a complementary objective, we attempt to obtain relationships between fluxes in different activity indicator lines, that permit a transformation of traditional activity indicators, *i.e.*, Ca II H & K lines, to others that hold noteworthy advantages. We used high resolution ( $\sim 50000$ ) echelle optical spectra. To determine the chromospheric emission of the stars in the sample, we used the spectral subtraction technique. Rotational velocities were determined using the cross-correlation technique. To infer activity-related radial velocity ( $RV$ ) jitter, we used empirical relationships between this jitter and the  $R'_{\text{HK}}$  index. We measured chromospheric activity, as given by different indicators throughout the optical spectra, and projected rotational velocities for 371 nearby cool stars. We have built empirical relationships among the most important chromospheric emission lines. Finally, we used the measured chromospheric activity to estimate the expected  $RV$  jitter for the active stars.