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Time evolution of high-energy emissions of low-mass stars: Fundamental parameters and Halpha & Ca II IRT age-activity relations

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The age-magnetic activity relations are an efficient alternative way of age-dating low mass dwarfs. Our goal is to establish new age-chromospheric activity relations for KM dwarfs. We secured high-resolution spectra for 100 stars, including a subsample of wide binary stars with well-known ages and members of young kinematic groups. We selected a subsample of M dwarfs with interferometric Teff estimates and related these quantities with spectral features in order to derive the atmospheric parameters for the entire sample. Based on PHOENIX models of stellar atmospheres, we derived a new scale of chromospheric fluxes for Ca II IRT and Halpha indicators. For Halpha and Ca II IRT lines, we found high age-activity correlations. Our method enables estimating chromospheric ages up to 7 Gyr within 0.15 dex of age uncertainty. We also found a promising agreement of our results in comparison to an independent sample of M dwarfs with known ages.

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