Chromospheric and Transition Region Emission Properties of G, K, and M dwarf Exoplanet Host Stars

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Abstract

Exoplanet magnetic fields have proven notoriously hard to detect, despite theoretical predictions of substantial magnetic field strengths on close-in extrasolar giant planets. It has been suggested that stellar and planetary magnetic field interactions can manifest as enhanced stellar activity relative to nominal age-rotation-activity relationships for main sequence stars or enhanced activity on stars hosting short-period massive planets. In a recent study of M and K dwarf exoplanet host stars, we demonstrated a significant correlation between the relative luminosity in high-temperature stellar emission lines (L(ion)/L_Bol) and the “star-planet interaction strength”, M_plan/a_plan. Here, we expand on that work with a survey of G, K, and M dwarf exoplanet host stars obtained in two

recent far-ultraviolet spectroscopic programs with the Hubble Space Telescope. We have measured the relative luminosities of stellar lines C II, Si III, Si IV, and N V (formation temperatures from 30,000 - 150,000 K) in a sample of ~60 exoplanet host stars and an additional ~40 dwarf stars without known planets. We present results on star-planet interaction signals as a function of spectral type and line formation temperature, as well as a statistical comparison of stars with and without planets.