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A GIANO@TNG view of the atmosphere of transiting Hot Jupiters

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Abstract

We present near-infrared transmission spectroscopy of a sample of transiting hot Jupiters with the GIANO spectrograph on the Telescopio Nazionale Galileo (TNG). GIANO offers the opportunity to probe at high spectral resolution the planet's atmosphere simultaneously over the Y-H-J-K bands, a 21-fold increase in wavelength coverage with respect to the existing studies, e.g. based on CRIRES data. We use the high-dispersion spectroscopy technique described in Brogi, Giacobbe et al. (2018 for the GIANO data and we carry out a cross-correlation analysis with different models of planetary spectra looking for the presence at high confidence of different molecular species. We discuss the prospects for detection of the individual contributions of the molecular species (e.g., water, methane, carbon dioxide, hydrogen cyanide) and for constraining the planet C/O ratio with the GIANO data, ultimately gauging the prospects for establishing GIANO among the leading instruments for characterizing exoplanet atmospheres.