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BROAD-BAND TRANSMISSION SPECTRA OF HOT JUPITERS

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We have carried out a campaign to characterize the hot Jupiters WASP-5b, WASP-44b, and WASP-46b using multi-band photometry collected at the Observatório do Pico Dos Dias in Brazil. We have determined the planetary physical properties and new transit ephemerides for these systems. The new orbital parameters and physical properties are consistent with previous estimates. We also studied the transit times including our new ephemerides. We did not find variations of a linear trend due to extra companions. Finally, we studied the fractional radius variation as a function of wavelength for these systems.

An exoplanet's orbit oriented along the line of sight provides unmatchable access to a list of both planetary astrophysical properties and orbital elements. The Hot Jupiters (HJs) are a class of large and gaseous planets similar to Jupiter, but orbiting very close to their host stars ($a \leq 0.1 AU$). Despite the large number of HJs discovered fundamental questions about their formation and evolution are still under debate, so the determination of their fundamental parameters is crucial to constrain models of formation and evolution of HJs.

We present precision relative photometry of three HJs: WASP-5b, WASP-44b and, WASP-46b (Anderson et al. 2008, 2012). WASP-5b is a Hot-Jupiter with a mass of $M_P = 1.64\,M_J$ and a radius of $R_P = 1.17\,R_J$ transiting a bright ($V = 12.3$) G4V star on a $1.63 - days$ orbit. WASP-44b has a mass of $M_P = 0.89\,M_J$ and a radius of $R_P = 1.00\,R_J$ orbiting a bright ($V = 12.9$) G8V star with an orbital period of $2.42 - days$. WASP-46b is massive ($M_P = 2.10\,M_J$) hot Jupiter with a radius of $R_P = 1.31\,R_J$ eclipsing a bright ($V = 12.9$) G6V star on a $1.43 - days$ orbit.

Multi-band transit observations allow to study the fractional radii variation as a function of the wavelength. The planetary radius R_p derived from transit observations may vary with the wavelength, once it can appear slightly larger when observed at wavelengths where the atmosphere contains strong opacity sources. These changes are at first approximation the broad-band transmission spectrum (e.g. Nikolov et al. 2013). At all passbands we fitted the transits using an MCMC approach for each of the HJs in our sample. Figure 1 shows the broad-band spectrum for the planet WASP-46b. Red squares are our measurements and black squares are previous results. The dotted line is a linear fit to our measurements. Our determination of the radius at the V-band is consistent with Anderson et al. (2008) (not included in the plot) but different from other previous determinations. Due to the small number of observed photometric bands for this system we cannot have an unambiguous view to describe a conclusive scenario for any correlation between the planetary radius and wavebands. Further observations are necessary to improve the understanding of the atmosphere of WASP-46b.

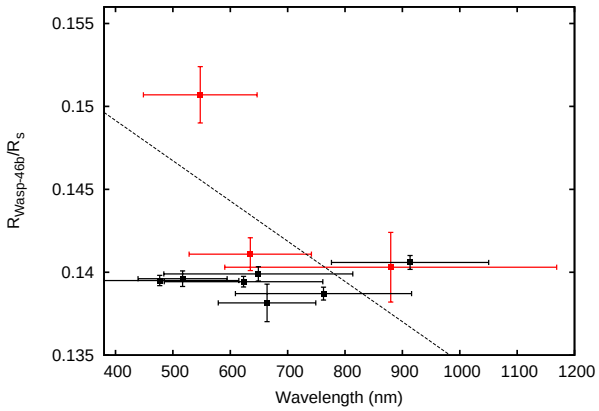

Fig. 1. Planet to star radius of WASP-46b as a function of the observed band.

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