Transiting Planets
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Optical Follow up Photometry of the Transiting Extrasolar Planet XO-2

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Abstract. We present three full z-band transit light curves for the extrasolar planet XO-2 obtained with KeplerCam and the FLWO 1.2m telescope. The system parameters were determined fitting the data to transit models using a Markov Chain Monte Carlo simulation (MCMC). The main results presented in this poster are revised values for the parameters R_p/R_s, a/R_s and b.

1. Overview

We present preliminary results of an ongoing TLC (Holman *et al.* 2006) campaign to obtain high quality transit photometry of the extrasolar planet XO-2b (Burke *et al.* 2007). The main goal is to measure precise transit times and, if possible, refine the system physical parameters. In this work we describe the analysis of three high S/N transit light curves. The transits were observed in the z band with KeplerCam and the FLWO 1.2 m telescope. By combining high cadence light curves is possible to average the random noise and reduce the scatter significantly (Fig. 1 and 2)

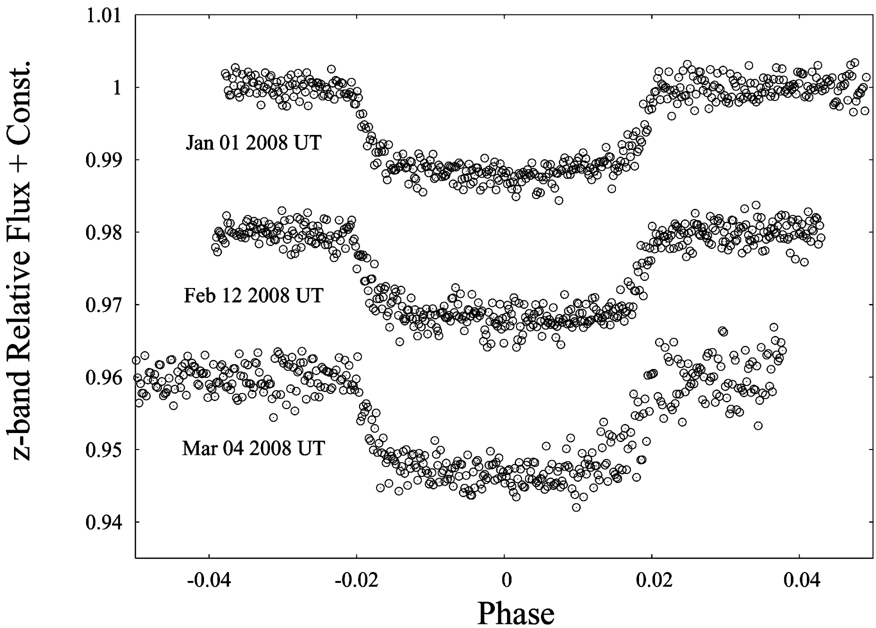

Figure 1. Individual light curves

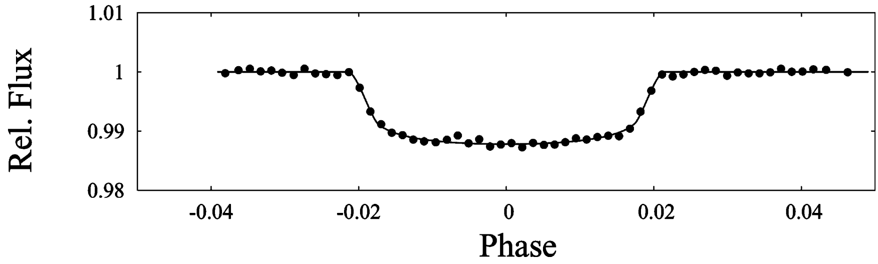

Figure 2. Combined light curves, 16x binning

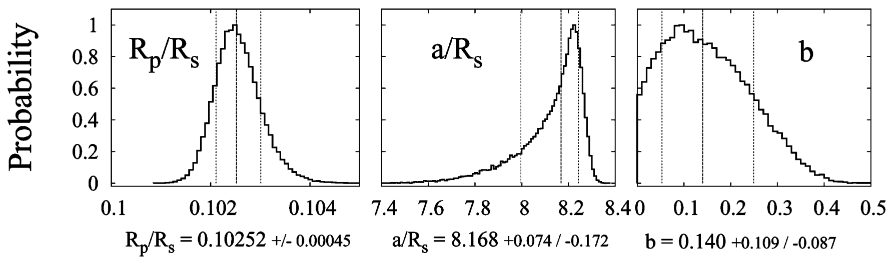

Figure 3. Light curve MCMC modeling results

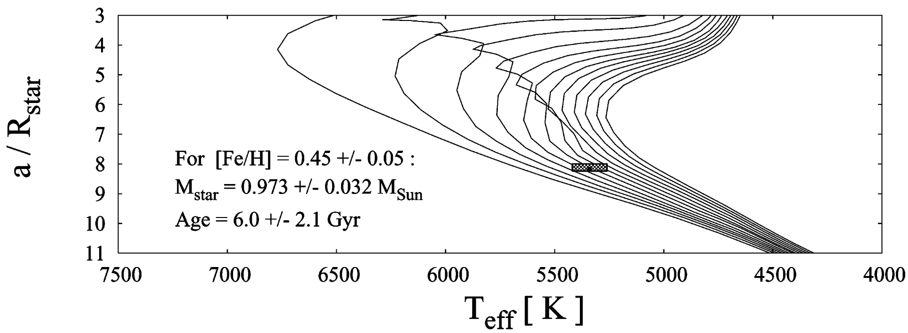

Figure 4. Y^2 isochrone fit

The data was analyzed using the transit models of Mandel & Agol (2002) and a Markov-chain Monte Carlo simulation (MCMC) to obtain the radius ratio between the planet and the star R_p/R_s, the ratio between the orbit's semi major axis and the radius of the star a/R_s , and the impact parameter b (Fig. 3). The mass (M_s) and age of the primary star were estimated by comparing its density (related to a/R_s), metallicty ($[Fe/H] = 0.45 \pm 0.05$) and temperature ($Teff = 5340 + / - 80\ K$) (Burke *et al.* 2007, Torres *et al.* 2008) with the values predicted by stellar models, in this case the Y^2 isochrones (Demarque *et al.* 2004). (Fig. 4)

Once M_s was known, the planet's mass M_p and the semi major axis a could be derived using the orbit's period ($P = 2.61587d$) and it's radial velocity semi amplitude ($K_s = 85 \pm 8\ m\ s^{-1}$) (Burke *et al.* 2007) together with Newton and Kepler's laws. Finally, the radii of the star and planet were obtained combining a, a/R_s and R_p/R_s. (Fig. 5)

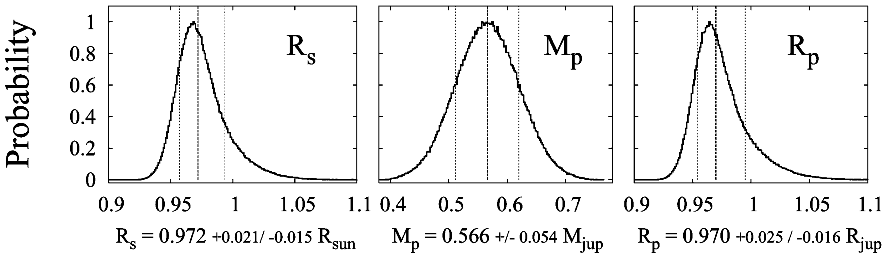

Figure 5. Mass and Radius

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