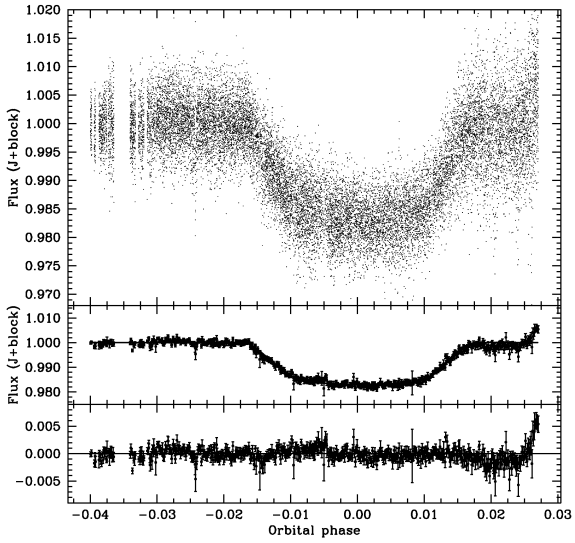

Fig. 1. A high time resolution light curve of the primary transit of the hot extrasolar planet WASP-2b. The upper panel shows the complete light curve, with its approximately 18,000 points. The mid-panel shows the light curve where each point represents a 20 seconds bin, with a final r.m.s. of around 1 mmag. The bottom panel shows the residuals after removing the best fitting model of a transit.

the detector field of view limits the application of, for instance, PSF or deconvolution photometry.

3. RESULTS AND DISCUSSION

We applied this high cadence method to analyze the transits of the extrasolar planet WASP-2b. This planet was discovered by Collier-Cameron et al. (2007). It is a 0.88 ± 0.11 M_J planet with radius of 0.95 ± 0.3 R_J, around the star WASP-2 in a 2.15226 day period orbit. The obtained light curve, in the J filter, is shown in Figure 1. The best fitting model in this case includes a quadratic limb-darkening law, with parameters obtained from Claret (2000), and the shape of the model follows the prescriptions of Mandel & Agol (2005). The fitting procedure includes as free parameters the central time of the transit T_C, the planet-to-star area ratio p, and the inclination angle i. The determination of the errors in the parameters was carried out with a bootstrapping simulation, similar to the procedure described in Caceres et al. (2009). This procedure takes into account the effects of the correlated noise (e.g. Pont et al. 2006) in the obtained light curve.

We also applied this technique to the secondary eclipse of the planet WASP-4b (Wilson et al. 2008), in the K_S filter. The obtained light curve is shown in Figure 2. The fitting procedure is similar to the one

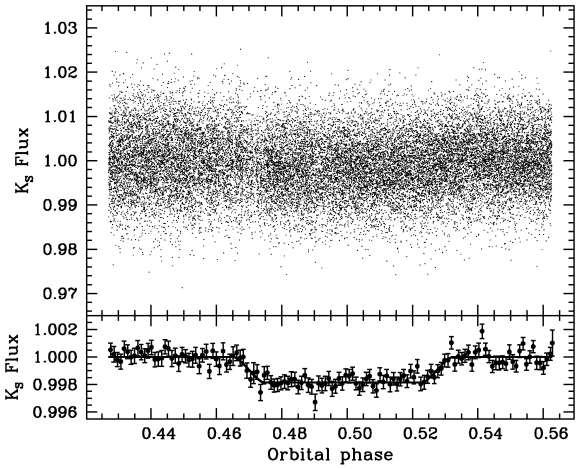

Fig. 2. A high time resolution light curve of the secondary eclipse of the highly irradiated extrasolar planet WASP-4b. The total number of points in the complete light curve is approximately 25,000, and the r.m.s. achieved in the binned figure is around 0.5 mmag. The best fitting model is shown in the second panel, and it considers a zero limb darkening.

of WASP-2b, but in this case the secondary eclipse model corresponds to a transit model without limb-darkening, and with a depth scaled to the desired depth. The free parameters in this case are the central eclipse time T_C, the depth d, and the eclipse length τ_e.

The high-cadence method described here is an excellent tool for obtaining accurate light curves of transits of extrasolar planets, that allow a good characterization of its physical parameters. The challenging detection of the thermal emission in the NIR is also within the capability of this method, and it is a good complement to space based observations.

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