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Improved characterisation of exoplanets discovered in wide-field surveys: HAT-P-29b and HAT-P-31b

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Abstract

In recent years a large population of exoplanets has been discovered thanks to ground-based surveys such as WASP and HATnet. These are typically relatively big planets in close orbits to their parent star that produce transit light curves with depths of up to a few percent which can be well observed using relatively smal-aperture ground-based telescopes. Due to the large number of planets discovered, systematic follow-up of most of these targets is often lacking. Moreover, in some discovery papers the characterisation of the planet is made with partial-transit follow-up light curves or relies entirely on the wide-field survey photometry, leading to relatively large uncertainties in the derived planetary parameters. We present follow-up photometry for two such cases, HAT-P-29b and HAT-P-31b, obtained with a 35-cm telescope based at UCL's University of London Observatory between 2011 and 2012. We find that our light curves are able to provide more accurate and/or precise parameters than those published. Follow-up observations are also important to monitor effects such as transit timing variations (TTVs), which can provide evidence for the presence of other planets in the system, and we explore the current limits on TTV detections for the two planets discussed here. The use of small-aperture telescopes provides an efficient and cost-effective way to improve the characterisation of known exoplanets, leading to an improvement in the statistical properties of these samples; and might also lead to the discovery of new exoplanets through TTV monitoring.