



|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Publication Year</b>          | 2015                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Acceptance in OA</b>          | 2020-03-26T18:38:21Z                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Title</b>                     | VizieR Online Data Catalog: HAT-P-36 and WASP-11/HAT-P-10 light curves (Mancini+, 2015)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Authors</b>                   | Mancini, L., Esposito, M., COVINO, Elvira, Raia, G., Southworth, J., Tregloan-Reed, J., BIAZZO, Katia, Bonomo, A., DESIDERA, Silvano, LANZA, Antonino Francesco, Maciejewski, G., PORETTI, Ennio, SOZZETTI, Alessandro, BORSA, Francesco, Bruni, I., Ciceri, S., CLAUDI, Riccardo, Cosentino, R., GRATTON, Raffaele, Martinez Fiorenzano, A. F., Lodato, G., Lorenzi, V., Marzari, F., Murabito, S., AFFER, Laura, BIGNAMINI, ANDREA, BEDIN, Luigi, BOCCATO, Caterina, Damasso, Mario, Henning, T., MAGGIO, Antonio, MICELA, Giuseppina, MOLINARI, Emilio Carlo, PAGANO, Isabella, Piotto, G., RAINER, Monica, SCANDARIATO, GAETANO, SMAREGLIA, Riccardo, Zanmar Sanchez, R. |
| <b>Publisher's version (DOI)</b> | 10.26093/cds/vizier.35790136                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Handle</b>                    | <a href="http://hdl.handle.net/20.500.12386/23616">http://hdl.handle.net/20.500.12386/23616</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Journal</b>                   | VizieR Online Data Catalog                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |


**J/A+A/579/A136** HAT-P-36 and WASP-11/HAT-P-10 light curves (Mancini+, 2015)

The GAPS Programme with HARPS-N at TNG.

VIII: Observations of the Rossiter-McLaughlin effect and characterisation of the transiting planetary systems HAT-P-36 and WASP-11/HAT-P-10.

Mancini L., Esposito M., Covino E., Raia G., Southworth J., Tregloan-Reed J., Biazzo K., Bonomo A., Desidera S., Lanza A. F., Maciejewski G., Poretti E., Sozzetti A., Borsa F., Bruni I., Ciceri S., Claudi R., Cosentino R., Gratton R., Martinez Fiorenzano A. F., Lodato G., Lorenzi V., Marzari F., Murabito S., Affer L., Bignamini A., Bedin L.R., Boccato C., Damasso M., Henning T., Maggio A., Micela G., Molinari E., Pagano I., Piotto G., Rainer M., Scandariato G., Smareglia R., Zanmar Sanchez, R.

&lt;Astron. Astrophys. 579, A136 (2015)&gt;

[=2015A&A...579A.136M](#)
**ADC\_Keywords:** Stars, double and multiple ; Planets ; Photometry

**Keywords:** planetary systems - stars: fundamental parameters - techniques: photometric - techniques: radial velocities - stars: individual: HAT-P-36 - stars: individual: WASP-11/HAT-P-10

**Abstract:**

Orbital obliquity is thought to be a fundamental parameter in tracing the physical mechanisms that cause the migration of giant planets from the snow line down to roughly  $10^{-2}$  au from their host stars. We are carrying out a large programme to estimate the spin-orbit alignment of a sample of transiting planetary systems to study what the possible configurations of orbital obliquity are and whether they correlate with other stellar or planetary properties.

We determine the true and the projected obliquity of HAT-P-36 and WASP-11/HAT-P-10 systems, respectively, which are both composed of a relatively cool star (with effective temperature  $T_{\text{eff}} < 6100$  K) and a hot-Jupiter planet.

Thanks to the high-resolution spectrograph HARPS-N, we observed the Rossiter-McLaughlin effect for both systems by acquiring precise (3-8 m/s) radial-velocity measurements during planetary transit events. We also present photometric observations comprising six light curves that cover five transit events, which were obtained using three medium-class telescopes. One transit of WASP-11/HAT-P-10 was followed simultaneously from two observatories. The three transit light curves of HAT-P-36 b show anomalies that are attributable to starspot complexes on the surface of the parent star, in agreement with the analysis of its spectra that indicates moderate activity ( $\log R'_{\text{HK}} = -4.65$  dex). By analysing the complete HATNet data set of HAT-P-36, we estimated the stellar rotation period by detecting a periodic photometric modulation in the light curve caused by star spots, obtaining  $\text{Prot} = 15.3 \pm 0.4$  days, which implies that the inclination of the stellar rotational axis with respect to the line of sight is  $i = 65 \pm 34$  degrees.

We used the new spectroscopic and photometric data to revise the main physical parameters and measure the sky-projected misalignment angle of the two systems. We found  $\lambda = -14 \pm 18^\circ$  for HAT-P-36 and  $\lambda = -7 \pm 5^\circ$  for WASP-11/HAT-P-10, indicating in both cases a good spin-orbit alignment. In the case of HAT-P-36, we were also able to estimate an upper limit of its real obliquity, which turned out to be  $< 63^\circ$ .

**Description:**

3 light curves of three transit events of the extrasolar planet HAT-P-36b and 3 light curves of two transit events of the extrasolar planet WASP-11b/HAT-P-10b. Three of the datasets were obtained using the Zeiss 1.23-m telescope (filter: Cousins I) at the Observatory of Calar Alto (Spain), two with the Cassini 1.52-m telescope (filter: Gunn r) at the Astronomical Observatory of Bologna in Loiano (Italy), and one with the IAC 80-cm telescope (filter: Cousins R) at the Teide Observatory on the island of Tenerife (Spain).

**Objects:**

| RA          | (2000)      | DE | Designation(s)             | (Period)       |
|-------------|-------------|----|----------------------------|----------------|
| 12 33 03.91 | +44 54 55.2 |    | HAT-P-36 = TYC 3020-2221-1 | (P=1.32734683) |
| 03 09 28.54 | +30 40 24.7 |    | WASP-11 = TYC 2340-1714-1  | (P=3.72247967) |

**File Summary:**

| FileName                   | Lrecl | Records | Explanations                                         |
|----------------------------|-------|---------|------------------------------------------------------|
| ReadMe                     | 80    | .       | This file                                            |
| <a href="#">h36ca1.dat</a> | 37    | 166     | Photometry of HAT-P-36 on 2014-04-14 (I CA 1.23m)    |
| <a href="#">h36ca2.dat</a> | 37    | 145     | Photometry of HAT-P-36 on 2014-04-18 (I CA 1.23m)    |
| <a href="#">h36lo.dat</a>  | 37    | 98      | Photometry of HAT-P-36 on 2013-04-14 (r Loiano 1.5m) |

20/3/2020J/A+A/579/A136

|                            |    |     |                                                     |
|----------------------------|----|-----|-----------------------------------------------------|
| <a href="#">w1lca.dat</a>  | 37 | 125 | Photometry of WASP-11 on 2014-10-02 (I CA 1.23m)    |
| <a href="#">w1liac.dat</a> | 37 | 179 | Photometry of WASP-11 on 2014-10-01 (R IAC 0.80m)   |
| <a href="#">w1llo.dat</a>  | 37 | 101 | Photometry of WASP-11 on 2009-11-14 (r Loiano 1.5m) |

See also:  
[J/A+A/554/A28](#) : Qatar-1 differential light curve (Covino+, 2013)  
[J/A+A/575/A111](#) : GAPS V: Global analysis of the XO-2 system (Damasso+, 2015)  
[J/A+A/575/L15](#) : TrES-4b (Sozzetti+, 2015)

Byte-by-byte Description of file: [h36\\*.dat](#) [w1l\\*.dat](#)

| Bytes  | Format | Units               | Label | Explanations                                                       |
|--------|--------|---------------------|-------|--------------------------------------------------------------------|
| 1- 13  | F13.7  | <a href="#">d</a>   | BJD   | Barycentric JD for the midpoint of observation (TDB) (BJD-2400000) |
| 16- 25 | F10.7  | <a href="#">mag</a> | mag   | Differential magnitude of the target                               |
| 29- 37 | F9.7   | <a href="#">mag</a> | e_mag | Measurement error of the magnitude                                 |

Acknowledgements:  
Luigi Mancini, [mancini\(at\)mpia.de](mailto:mancini(at)mpia.de)  
Max Planck Institute for Astronomy, Germany

References:  
Covino et al., Paper I [2013A&A...554A..28C](#), Cat. [J/A+A/554/A28](#)  
Desidera et al., Paper II [2013A&A...554A..29D](#)  
Esposito et al., Paper III [2014A&A...564L..13E](#)  
Desidera et al., Paper IV [2014A&A...567L...6D](#)  
Sozzetti et al., Paper VI [2015A&A...575L..15S](#), Cat. [J/A+A/575/L15](#)  
Damasso et al., Paper VII [2015A&A...575A.111D](#), Cat. [J/A+A/575/A111](#)

(End) Luigi Mancini [Max Planck Inst.], Patricia Vannier [CDS] 03-Jun-2015

The document above follows the rules of the [Standard Description for Astronomical Catalogues](#); from this documentation it is possible to generate *f77* program to load files [into arrays](#) or [line by line](#)