

# The WHAT Project

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**Abstract.** WHAT is a small-aperture short focal length automated telescope with an  $8.2^\circ \times 8.2^\circ$  field of view, located at the Wise Observatory, Israel. The system is similar to the HATNet telescopes† and is aimed at searching for transiting extrasolar planets and variable objects. Operational since 2004, WHAT has accumulated  $\sim 100000$  exposures of several fields and was part of the discovery of the transiting planet HD147506b. Further description of WHAT can be found at: <http://wise-obs.tau.ac.il/~what>.

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WHAT is a Wise observatory Hungarian-made Automated Telescope, located at the Wise Observatory in Mizpe Ramon, Israel. It is operated under a collaboration between the Wise Observatory of the Tel-Aviv University and Konkoly Observatory of the Hungarian Academy of Sciences. Similar to other HAT telescopes (Bakos *et al.* 2002, 2004), WHAT is a combination of a fully automated telescope mount, clamshell dome (to protect the telescope),  $2\text{K} \times 2\text{K}$  (4 megapixel) CCD, 200 mm f/1.8 Telephoto lens, PC running RealTime Linux and a software environment (ProMount) controlling all the above.

WHAT operation is fully automated. The only manual interaction is that of establishing weather conditions and enabling the telescope on each evening. This nightly monitoring is done by a teamwork from Wise and Konkoly Observatories.

WHAT monitors the intensity of many thousands of stars in large fields of views,  $8.2^\circ \times 8.2^\circ$  each, searching for transiting planets and variable stars. The position of WHAT at a longitude of  $34^\circ 46'$  E makes the HATNet-WHAT an around-the-globe network. WHAT is located 9.7 hours in longitude from the four HAT instruments at FLWO, Arizona, and 11.3 hours from the two HAT instruments at Mauna Kea, Hawaii. A wide span around the globe is important for continuous observations of the HATNet fields, increasing the number of observed transit events.

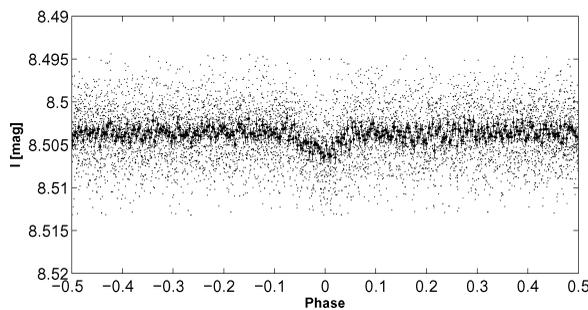
Since it has become operational in 2004 WHAT has accumulated some 100000 exposures of several fields, most of which were observed in collaboration with other HATNet instruments. Table 1 lists the amount of data obtained by WHAT for fields where a total of more than 4000 HATNet-WHAT observations have already been done.

Analysis of the data and identification of transiting planet candidates, showing a transit-like signal, is usually done independently in Konkoly, CfA and Tel Aviv. The detected candidates are debated within the group and those found worthy are passed on for spectroscopic follow-up observations. Figure 1 shows one of our candidates, HTR177-004, with a clear transit-like signal and a magnitude drop of only 3 mmag. Although

† <http://cfa-www.harvard.edu/~gbakos/HAT/>, see Bakos *et al.* in this volume.

**Table 1.** List of HATNet fields where WHAT obtained a significant fraction of the observations, and a total of over 4000 observations were done by HATNet-WHAT. The left-most column lists the HATNet field number, the middle column lists the number of WHAT observations and total amount of HATNet-WHAT observations, and the right-most column gives the collaborating HATNet telescope ID.

HATNet Field Number	WHAT/Total	Collaborating Telescope
211	1486/4429	HAT-8
210	3088/6169	HAT-6
212	4873/4873	
221	5937/5937	
177	3047/9396	HAT-7
189	1506/6816	HAT-10
236	5498/5498	
192	4711/12137	HAT-9
149	3210/10156	HAT-7
247	4559/4559	
248	5180/5180	



**Figure 1.** Phase folded light curve of HTR177-004, showing a transit-like shape with a 3 mmag depth. This target was identified as a blend by follow-up observations. The binned light curve is overplotted, in bold. The period is 0.57 days and the light curve contains 7350 measurements.

recent spectroscopic follow-up observations identified this candidate as a false positive, it demonstrates the capability of HATNet-WHAT.

Preliminary spectroscopic follow-up of most of the HATNet-WHAT candidates is done with the CfA Digital Speedometer (DS, Latham 1992), where obvious false positives are identified. Candidates which pass the DS screening are followed up with SOPHIE at the OHP 1.93-m telescope (Bouchy *et al.* 2006).

WHAT has participated in the discovery of the transiting planet HD147506b, also known as HAT-P-2b (Bakos *et al.* 2007). The host star was observed by 4 instruments, resulting in 26461 individual measurements. The large amount of measurements and the spread of instruments around the globe enabled the detection of this planet, with a relatively long period of 5.63 days and shallow transit of 5 mmag.

## References

- Bakos *et al.* 2002, *PASP*, 114, 974  
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 Bouchy & the SOPHIE team 2006, *Tenth Anniversary of 51 Peg-b*, 319  
 Latham 1992, *IAU Colloq. 135, Complementary Approaches to Double and Multiple Star Research*, 110