Las Cumbres Observatory
Global Telescope Network

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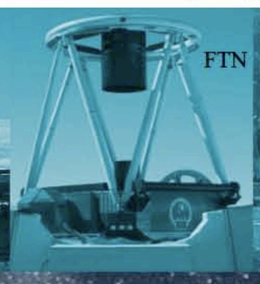
The LCOGT Network

Motivated by the increasing need for observational resources for the study of time domain astronomy, the Las Cumbres Observatory Global Telescope (LCOGT; http://lcogt.net) Network is a private foundation, whose goal is to build a global network of robotic telescopes for scientific research and research-based education. Once completed, the network will become a unique tool, accessible by the astronomical community and capable of continuous (24/7) monitoring from both the Northern and Southern Hemispheres. The network currently includes 2 x 2m telescopes, already making an impact in the field of exoplanet research. In the next few years they will be joined by at least 12 x 1m telescopes and at least 20 x 0.4m telescopes, in 5 to 8 sites. The increasing amount of LCOGT observational resources in the coming years will be of great service to the astronomical community in general, and the exoplanet community in particular.



LCOGT facility in Goleta, CA


LCOGT workshop

Current Status

The network currently consists of two 2m telescopes, Faulkes Telescope South (FTS), located at Siding Spring Observatory, Australia, and Faulkes Telescope North (FTN), located on Mt. Haleakala on the Hawaiian island of Maui. Two 0.4m telescopes are also located within the FTN clamshell dome (see Fig. 1), and they are currently being commissioned.

Figure 1: The 2m FTN at Mt. Haleakala, Maui, Hawaii. Two 0.4m telescopes, encircled in red, are located within the clamshell dome. Those are the network's first 0.4m telescopes that have been deployed, currently being commissioned.

LCOGT Science

The LCOGT science team includes two UCSB faculty members and close to 10 postdocs and project scientists. Within the domain of time-variable astronomy LCOGT focuses primarily on two observational fields: SuperNovae and Exoplanets. LCOGT is taking part in most of the important SuperNovae surveys, including the SuperNova Legacy Survey, Pan-STARRS, the Palomar Transient Factory, and the La Silla/QUEST SuperNova search. The study of exoplanets is carried out through observations of microlensing and transiting planets. We present here several results of observations of transiting planets done by LCOGT telescopes. The LCOGT-based network for the detection of microlensing planets, RoboNet (Tsapras et al. 2009), is presented in an adjacent poster.

A few other projects are currently on-going at LCOGT. Among them is the commissioning of a high-speed camera mounted on FTN, to be used for lucky imaging and observations of Kuiper Belt Objects occultations and other short time scale phenomena. In addition, members of the LCOGT science team are involved in the study of other variable stars (e.g., Lister et al. 2009) and open clusters (e.g., Cieza & Baliber 2007).

We also note here that LCOGT is developing a medium-resolution (R=25,000) fiber-fed spectrograph, for stellar spectroscopy. It will reach a radial velocity accuracy on the order of 100 m/s, making it capable of identifying planetary transit false positives. The spectrograph is expected to be mounted on the Byrne Observatory telescope for on-sky testing during 2010, and will eventually be mounted on the 1m telescopes.

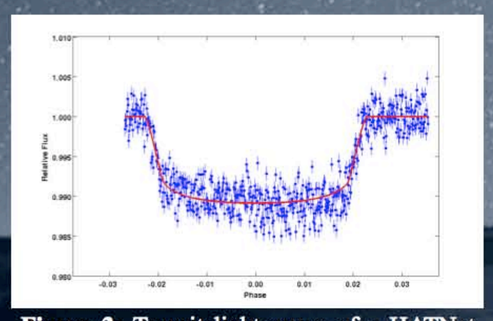


Figure 3: Transit light curve of a HATNet candidate taken by FTN on February 2010, in the Sloan-i band. Cadence was 2 frames per minute and the observed drop in flux is about 1 %. This candidate is now confirmed as a planet, to be published soon.

Near-Future Plans

In the next 1-2 years LCOGT will deploy telescopes at several sites. The deployment of the network in the Southern hemisphere will commence first. Construction has already begun at CTIO (Chile), where we plan to put 3 x 1m and 6 x 0.4m telescopes on the ridge next to the 2MASS telescope. We have a site agreement in place with SAAO (South Africa) and the exact location for our telescopes has been identified. Construction at SAAO is expected to begin during 2010, and we plan to put up to 3 x 1m and 4 x 0.4m telescopes there. The third node of our 0.4m and 1m network in the South will be in Australia, possibly at Siding Spring next to FTS, but we are considering other sites as well. In the North, we are now negotiating a site agreement with the IAC to put telescopes at Tenerife (Canary Islands, Spain). Our intention is to have two other Northern nodes of the network in Asia and Southwest North America, where a few possibilities are being investigated.

Another site now being commissioned is the Byrne Observatory at UC's Sedgwick Reserve in the Santa Ynez valley, approximately 30 miles from LCOGT's base in Goleta. This site currently has a 0.8m telescope and will be used for testing new instruments and for education.

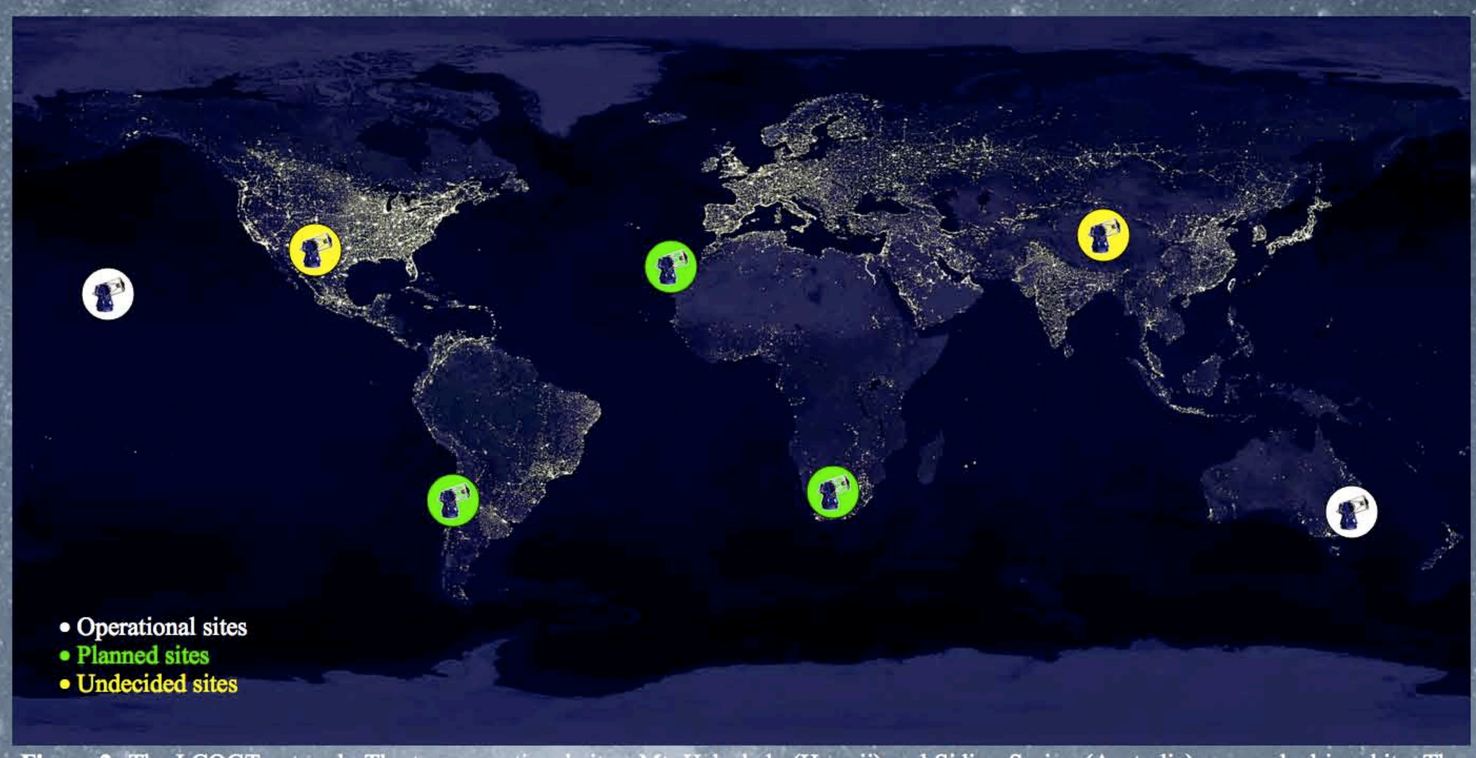


Figure 2: The LCOGT network. The two operational sites, Mt. Haleakala (Hawaii) and Siding Spring (Australia) are marked in white. The three planned sites, CTIO (Chile), SAAO (South Africa) and Tenerife (Canary Islands, Spain) are marked in green. Two additional sites will be located in Asia and Southwest North America, although their exact location is undecided yet. Those are marked in yellow.

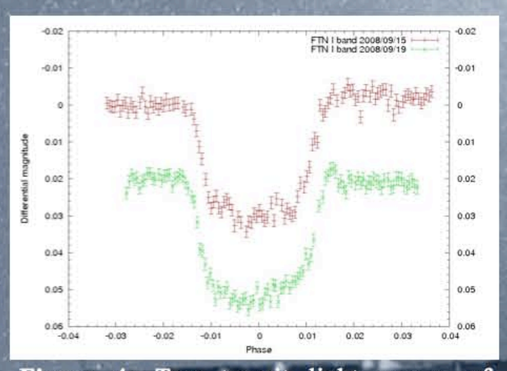


Figure 4: Two transit light curves of WASP-10b, taken by FTN on September 2008, in the I band.

LCOGT and Transiting Planets

LCOGT scientists are collaborating with most of the transiting planet surveys, including WASP (North and South), HATNet, TrES, MEarth, CoRoT and Kepler. A large fraction of FTN and FTS telescope time is devoted for observations of planetary transit candidates, in order to resolve candidates blended with nearby stars in survey images and obtain high precision photometry. This is usually done before or contemporaneously with the gathering of high resolution spectroscopic observations at other telescopes. Light curves obtained with LCOGT telescopes were part of the discovery of many of the currently known transiting planets, e.g., WASP-4b (Wilson et al. 2008), WASP-19b (Hebb et al. 2010), TrES-3 (O'Donovan et al. 2007) and CoRoT-9b (Deeg et al. 2010). A few light curves are presented here, in Figs. 3-5. LCOGT also participates in follow-up studies of known transiting exoplanets. For example, Hidas et al. (2010) describes a follow-up campaign led by LCOGT researchers where almost complete coverage of the HD 80606b 12 hour transit was obtained in February 2009.

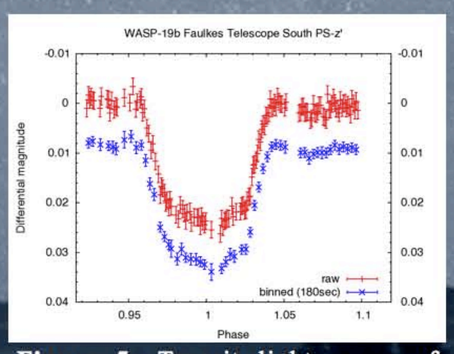


Figure 5: Transit light curve of WASP-19b, taken by FTS on December 2008, in the Z band. As of March 20, 2010, WASP-19b has the shortest orbital period among all known planets, and the LCOGT light curve was part of its discovery paper (Hebb et al. 2010).

References:
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Deeg et al. 2010, Nature, 464, 384
Hebb et al. 2010, ApJ, 708, 224
Hidas et al. 2010, MNRAS, submitted (arXiv:1002.1052)
Lister et al. 2009, Decadal Survey White Paper (arXiv:0902.2966)
O'Donovan et al. 2007, ApJ, 663, 37
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