

Defining the Transit Method Observation Limits of the Athabasca University Robotic Telescope

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The transit method has demonstrated itself to be one of the most successful techniques of exoplanetary observation and detection due to its efficiency and sensitivity, both for in orbit and ground based observations [1]. Transit method detections are achieved by observing repeated fluctuations in a star's apparent magnitude, caused by the passing of planet across the star within Earth's orbital plane [2]. This study explores the observation limits of the Athabasca University Robotic Telescope (AURT) when utilized for exoplanet transit observations and discoveries. The AURT is a Newtonian reflector model telescope with an equatorial model situated behind the Athabasca University main campus in Northern Alberta with the ability to be controlled remotely. Attached to the telescope is a CCD imager used to capture images of observations that can then be used later on for analysis [3]. Being able to control the telescope remotely makes it a useful undergraduate research tool. Factors such as weather, temperature, maintenance, and telescope parameters were recorded and tested in order to determine the significance of their impact on exoplanet research. Observations using the telescope were scheduled remotely over the Skynet Robotic Telescope Network and Muniwin software was used to analyze light curves. The SIMBAD astronomical database was used for referencing the successful exposures and ds9 SAO image software was used in calculating field of view. This information was then compiled and used to develop an observation strategy specifically tailored to using the AURT to discover new exoplanets. The observation strategy includes information on exposure ratios, observation length and frequency, optimal observation opportunities, and recommended target star clusters.

References [1] "Transit Photometry: A Method for Finding Earths". The Planetary Society. <http://www.planetary.org/explore/space-topics/exoplanets/transit-photometry.html>

[2] Jason T. Wright and B. Scott Gaudi, "Exoplanet Detection Methods." (2012).

[3] "Athabasca University Robotic Telescope." *AU Geophysical Observatory*. Last updated September 6, 2013, <http://augo.athabascau.ca/information/aurt/>.