

## **Project Report**

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Project Title: Search for Transits of Extrasolar Planets Using the Swope Telescope at Las Campanas Observatory, Chile.

The idea of this project was to investigate new observational techniques to obtain accurate photometry of exoplanet transits using small size telescope at ground-based observatories.

Transits are small eclipses, which can be observed when a planet crosses in front of its host star, blocking part of the star's light. From the depth and duration of those eclipses, one can derive the size of the planet, which is one of the key ingredients to determine whether the planet is a gaseous ball, like Jupiter, or a denser, rocky object like Earth.

The observational campaigns were conducted at the 1-meter Swope telescope at Las Campanas Observatory of the Carnegie Institution for Science, in Chile (Lat: 29.0146° S; Lon: 70.6926°). The observations consisted of continued photometric monitoring of stars with known planets that have a large probability of transit, but with no detected transits. Another requirement was for the stars to be very stable, i.e. we selected our targets among the known exoplanet host stars with the lowest levels of stellar activity, so we could maximize the photometric precision of the observations.

The observations resulted on precision light curves of three planet hosting stars, and although none of the systems showed transits (which indicates that the orbit of the planets is highly inclined with respect to Earth), we obtained the highest photometric precisions reported until then using small ground-based telescopes. Another significant result of these investigations was the finding that very high photometric precision of bright planet host stars can be achieved by defocusing the telescopes by a large amount, which guarantees that stellar photons always fall in the same regions of the detectors (i.e. the same pixels), minimizing detector noise effects. This technique is now frequently used by other groups.

The results of this work yielded two scientific publications, which I attach to this report.