

“The Statistical Significance of Planetary Transit and Occultation Detections at Dome A in Antarctica”

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The increased discovery of planets through transit detections has created a demand for the characterization of exoplanets. In particular, occultation detections associated with transit events can help determine properties of extra-solar-system planets not possible with other techniques. Unfortunately, many occultation measurements are weakly detected and proper statistical assessment of the significance of the measurement is difficult. We describe a simple approach to determine the statistical significance of an occultation or transit-like detection. We employ a chi-square goodness of fit to multiple eclipse depths and eclipse times over the entire light curve. This allows us to remove the bias associated with an assumed detection time and eclipse depth and thus provide a more accurate description of whether or not the detection could be random or systematic noise or an actual event. Using data from the Antarctic telescope at Dome A (Wang et al. 2011) we are able to confirm the detection of a transit-like event at a statistical level of ~ 4 sigma. This confirms our technique but also gives confidence in the Dome A telescope's ability to find exoplanets.