

NDSEG Essay 2 / Ryan Yamada / Advisor: James P. Lloyd

My previous research focused on variability in Weak-line emission T Tauri stars (WTTSs), progenitors of stars like our sun. WTTSs are periodic variables because of starspots that track the rotation period of the star. I have observed these objects in optical and near-infrared wavelengths at Table Mountain Observatory using 1-meter Pomona telescope. I also applied theoretical models for magnetic disk braking to populations of WTTSs, and found that observations matched the requirements for disk braking to explain the presence of slow rotators. From my literature research I am familiar with statistical tests for variability, as well as the subtleties of acquiring precise differential photometry in the near-infrared (the wavelengths of choice for observing WTTSs). My experience observing and reducing data should completely transfer to the detection of planetary transits. Familiarity with starspot observations will also help me develop diagnostic methods to distinguish between magnetic phenomena and planetary transits.

Using a 0.3 meter telescope, I also observed and modeled the transit of Algol, an eclipsing binary that experiences a dip of over one magnitude. By taking data in B, V, and R filters, I was able to constrain the spectral class (and therefore the temperature) of the primary and secondary. By assuming a circular orbit and spherical stars, I was able to fit a transit curve to constrain the inclination angle. The model, observation techniques, and analysis are precisely what I will need for a study on extrasolar planet transits. I can generalize this model to take into account other effects, such as orbital eccentricity and limb darkening.

I also have experience observing at the Palomar 200-inch telescope. I used the PHARO near-IR camera and non-redundant aperture masks, which achieve resolution better than the Hubble Space Telescope. I observed solar-type and low-mass dwarfs selected for their high radial velocities, with the goal of directly imaging

the companions and determining whether they are brown dwarfs or planets.

I also have observational experience in spectroscopy and lab experience in optics, signal processing and electronics, which will lay the groundwork for radial velocity observations for extrasolar planets and work on adaptive optics systems.