

Individual Evaluation

PI Name: Jason Wright

PI Institution: The Pennsylvania State University

Proposal No.: 14-ASTRO14F-0096

Proposal Title: Finding the Lowest Mass Exoplanet with Improved Radial Velocimetry

Submitting Organization: PENNSYLVANIA STATE UNIVERSITY, THE

Student Name:

Sharon Wang

Brief Description of Research:

The proposal aims to aid in the detection of exoplanets with lower masses or larger orbits than currently known by improving the sensitivity of current RV instruments. The improvement will be obtained through improved masking of contaminating telluric lines in ground-based spectroscopic observations. The proposal also seeks to improve the statistical weighting scheme which is employ when determining the RV signal from a spectra. Together the proposal seeks to allow the detection of smaller velocity exoplanets using the facilities of HET, MINERVA, and KECK.

Criteria: Academic Qualification of Student

Excellent=5

Criteria: Quality of Proposed Research

Very Good=4.5

Criteria: Relevance to NASA Priorities

Excellent=5

Criteria: Soundness of Approach/Feasibility

Very Good=4

Criteria: Understanding of Research Area

Excellent=5

Enter sum of criteria score:

23.5

Strengths:

The proposal addresses an important challenge in detecting exoplanets: precisely measuring radial velocities. There is a clear description of why well-calibrated spectra are crucial to obtain precise radial velocities and what we need to do - remove telluric line systematics, improve wavelength-dependent statistical weighting, testing the iodine atlas.

The proposal has demonstrated the ability to mask contaminating telluric lines. A pilot study has been completed which presented many interesting results and emphasizes the feasibility of the current study.

The proposed work has direct and broad implications on improving the radial velocity precision of instruments on a range of telescopes - from larger facilities to Keck and HET to smaller telescopes with instruments like CHIRON and MINERVA.

Weaknesses:

The proposal did not demonstrate how this work improves upon previous efforts. Emphasis was placed upon how previous methods fell short and there was not a comparison of the expected improvement by the new method.

A weakness of the proposal is that there is no detailed outline of the work proposed. It is difficult to judge if the proposed work is feasible within the timeframe of the grant.

Overall Evaluation:

Very Good=4.5

Rationale for Overall Evaluation:

The proposal demonstrates the timely need for improved RV followup of the Kepler planetary candidates. The proposed work will allow better characterization of select targets as previous confirmation schemes implicitly depend on the dynamical interactions between masses in a potentially exoplanetary system. With improved RV analysis of Kepler data, these methods can readily be applied to the upcoming TESS and JWST missions as many of the followup programs will have similar protocols and deliverables. The proposed three-pronged approach is ideal to making significant progress on this issue. The proposal does not set a detailed workplan or timeline. In spite of this, the clarity of the steps outlined in the proposal overcomes this.