Research Proposal Referee Feedback Form

Astronomy 3Y03

Winter 2017

Title of Research Proposal:Peter Gysbers

Author of Research Proposal: HD 101065: Przybylski’s Star

1. Does the proposal conform to the presentation standards (e.g. 3 pages in ApJ format/5 pages in single column format, no more than 1 page of references)? If not, please comment.

The proposal is missing a header containing the author’s name, on each page. Otherwise, the proposal appears to conform to the presentation standards.

1. Is the abstract understandable to a non-expert audience and sufficiently informative? Provide details to support your assessment.

The abstract is easy enough for an audience that is in the discipline of astrophysics, but not experts in rotating A-type stars, to understand. It contains useful information about the nature of roAp stars, and summarizes the traits that make them unique subjects of study, mentioning their unusual abundances of lanthanides and iron-group elements, and their fast rotation. However, the abstract does not mention the objective of the project, or any proposed methodology. After reading the abstract, one still has no information on what the project is, what it aims to do, or how it will do that. It would be good to have the background information present now transition into a little bit of motivation for why study of HD 101065 is important to stellar astrophysics. That could be followed by an explanation of what exactly the project hopes to illuminate about the nature of roAp stars, and finally how that might be accomplished. If new observations will be made, it is probably not necessary to go into detail in the abstract about which telescopes would make them, or what methods will be used to reduce the data. It would be helpful, though, to know what kinds of observations will be made. To analyze the star’s variability, will time-series data be required? If so, what frequency is necessary to capture its variability? A short summary of this information would be a great addition to the abstract.

1. Do you understand what object(s) the author is describing, and what we understand about them so far? Provide suggestions to improve the sections on recent progress and the literature review. Have the authors made enough use of the primary literature?

The author gives a competent summary of what makes roAp stars special, and what a few of the unanswered questions about them are. The description of its physical properties, including its temperature, composition, spectrum, and magnetic field, gives a broad if shallow understanding of their character. However, while the literature review names the hypotheses for the presence of radioactive short-lived elements, it does not explain them. If these possible explanations are important to the author’s proposed research, they should be described to greater detail. The recent progress section states the most important conclusions of two models of the star, an atmospheric model and an asteroseismological model, some of their implications, and how they differ. It would be good to discuss these models to greater depth, though, if their findings are to be built upon in the proposed project. What information from these models will be used in the proposed project’s analysis? How do these models work, and how do they differ physically, in order to produce their differing results? The author does well to cite primary literature for the information included in the proposal, and should continue in the same way as more is added.

1. Do you understand the objective of the proposed research (observation or calculation) and the methodology? Has the author been specific about what (s)he will do to answer the research question? Provide suggestions to improve these sections.

The author does not say much about the proposed research and its methodology. The author describes the objective of the proposed research as improving structural models of HD 101065 using new spectral data concerning the abundances and oscillations in abundance of rare earth elements and radioactive isotopes. However, in terms of objectives, it would be good to know how exactly new data on rare earth elements and radioactive isotopes would help refine models of HD 101065 and other roAp stars. Do the existing models have differing predictions, which would be supported or refuted by additional spectral data? If so, what are they, and what results of the proposed research would support or refute them? The author does not provide any description of the methodology for this research. Will time-series data be collected to quantify the variability in rare earth elements and radioactive isotopes? If so, with what frequency? Here, it would be useful to know what devices/telescopes would be used to collect this data; if it/they is/are large, will it be possible to observe with them frequently enough to capture the variability? Is the author looking to characterize the variability (find the shape of the curve of abundance over time), or simply measure the amplitude of the variability? In the latter case, high-frequency observations may not be necessary. Then, once data is collected, how will it be analyzed? Is the author intending to use the same data analysis methods as have been used in previous studies of HD 101065, or will novel analyses be made to explore different of its properties and their variations? If the data will be used to improve structural models of the star, in what way might they be improved, and how does the new spectral data differ from existing data, to allow for improvements that have not been made already?

1. Has the author described the anticipated significance of the work in a convincing way? Provide suggestions to improve this section.

The author has not described the potential impacts if the work, so this section should be added. The author could think of what the state of research on pulsars with planetary systems would be like after the proposed project is complete, and compare that with what it is like now. If the objective of the proposed research is to improve structural models of roAp stars, will that improvement allow other researchers to pursue research paths that have thus far been off-limits? How might this research contribute to a more general understanding of stellar dynamics, and ultimately physics as a whole?

1. Has the author clearly identified and appropriately cited work that is not their own? If not, provide clear examples where additional citations are warranted.

Yes, the author has clearly identified and cited the work of others. The author has included a References section, and makes sure that each piece of information in the proposal is accompanied by an in-text citation corresponding to one of them. This good practice should be continued as the author continues to add to the proposal.