

Opportunity Title: Exoplanets Classification

Opportunity Reference Code: 0204-NPP-NOV23-JPL-Astrophys

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0204-NPP-NOV23-JPL-Astrophys

Application Deadline 11/1/2023 6:00:59 PM Eastern Time Zone

Description Since the detection of the very first exoplanet in 1992, humans have gained a new perspective of their place in the cosmos. That first detection ended up flourishing into the field of exoplanetary science and we find ourselves currently in a golden era of new discovery. We have found worlds rich in diversity which inspire us to think beyond the limits of our own Solar System. The ultimate objective of this work is to create a classification scheme for exoplanets that can characterize the diversity of planets in the context of understanding the formation and evolution processes of star-planetary systems. The goal is to develop a universally accepted, data driven taxonomy that allows for accurate representation of any planet.

Though most research in current academia focuses on very specific questions, our work is motivated by the overall architecture of exoplanetary systems and bigger picture ideas in order to gain a better and more accurate perspective of planets and stars within our galaxy and ultimately the universe. We hypothesize that the initial physical parameters of the nebula, in which stars and planets are formed, determine the properties of exoplanets and the systems that we observe today.

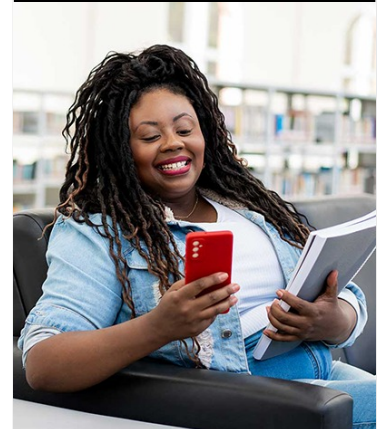
We seek an qualified postdoctoral fellow who are interested in the following tasks:

1. **Observational Data Analysis.** Use data from NASA Exoplanet Archive to conduct detailed analysis of exoplanets and their host star properties. We will quantify physical relations among: (a) spectral type, metallicity, mass, angular momentum of the stars; (b) mass, angular momentum of the planetary system; (c) mass, radius, orbit, density and temperature of the planets.

2. **Bias Analysis and Numerical Simulation.** The relations among physical parameters found in Task 1 contain biases caused by the method of observation. Thus, we will use simulations to assess the biases and analyze different populations of samples.

3 **Building a Robust Classification System.** Create an H-R alike diagram of planetary classification with quantitative boundaries and universal naming conventions. We will also use the new classification system to determine which class of exoplanets is most probable for habitability and thus worthy of follow-up observations for future ground and space-based instruments.

References: Stern, S. A., & Levison, H. F.(2002), Regarding the criteria for planethood and proposed planetary classification schemes, Highlights of Astronomy, 12, 205.



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Location:

Jet Propulsion Laboratory
Pasadena, California

Field of Science: Astrophysics

Advisors:

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818-354-7135

Applications with citizens from Designated Countries will not be accepted at this time, unless they are Legal Permanent Residents of the United States. A complete list of Designated Countries can be found at: <https://www.nasa.gov/oiiir/export-control>.

Eligibility is currently open to:

- U.S. Citizens;
- U.S. Lawful Permanent Residents (LPR);
- Foreign Nationals eligible for an Exchange Visitor J-1 visa status; and,
- Applicants for LPR, asylees, or refugees in the U.S. at the time of application with 1) a valid EAD card and 2) I-485 or I-589 forms in pending status

Eligibility Requirements

- **Degree:** Doctoral Degree.