

Opportunity Title: Unlocking the nature of dark matter through strong gravitational lensing

Opportunity Reference Code: 0198-NPP-NOV23-JPL-Astrophys

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0198-NPP-NOV23-JPL-Astrophys

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

Description Strong gravitational lensing by galaxies provides a unique and direct means of probing dark-matter structure on sub-galactic scales, shedding light on fundamental dark-matter physics. Over the past several years, the Sloan Lens ACS Survey (SLACS; Bolton et al. 2006), the Strong Lensing Legacy Survey (SL2S; Gavazzi et al. 2012), and the Boss Emission Line Lens Survey (BELLS; Brownstein et al. 2011) are just a few of many new projects discovering numerous quadruple-image lenses particularly well suited for this purpose. Upcoming Projects such as WFIRST, Euclid and LSST are forecast to image over 100,000 additional strong lens systems (Collett et al. 2015). The expanded sample size of strong lens systems will transform the statistical power of existing techniques, and motivates the development of new analysis methods to extract the subtle imprints of tiny sub-galactic dark-matter structure on lensing observables. The NPP postdoctoral fellow working with me at JPL will carry out research with the broad aim of constraining the nature of dark matter through strong gravitational lensing. The applicant will further the development of existing analysis methods, applying them to existing and soon to be published data on strong lens systems. The applicant will also aid in the development of new inferential techniques to probe the nature of dark matter through strong lensing, anticipating the expanded sample size and the future observational capabilities of JWST and complementary ground-based facilities.

References:

Quantifying the power spectrum of small-scale structure in semi-analytic galaxies ,

<https://arxiv.org/abs/2308.13313>

Beyond subhalos: Probing the collective effect of the Universe's small-scale structure with gravitational lensing,

<https://arxiv.org/abs/2308.13313>

Dark census: Statistically detecting the satellite populations of distant galaxies, Dark census: Statistically detecting the satellite populations of distant galaxies

Location:

Jet Propulsion Laboratory
Pasadena, California

Field of Science: Astrophysics

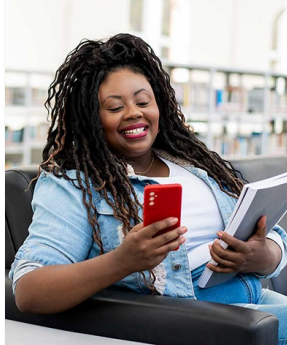
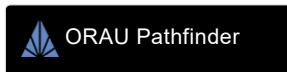
Advisors:

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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/oijr/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



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application with 1) a valid EAD card and 2) I-485 or I-589 forms in pending status

Eligibility Requirements

- **Degree:** Doctoral Degree.