

Opportunity Title: Gravitational Physics in Space: Theory and Experiment

Opportunity Reference Code: 0016-NPP-NOV23-JPL-Astrophys

Organization: National Aeronautics and Space Administration (NASA)

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

Description: Our current research is focused on: (1) theoretical support for high-precision spacecraft navigation, including models of relativistic gravitational and small non-gravitational forces, data processing, and state prediction/reconstruction algorithms, (2) relativistic modeling for lunar laser ranging (LLR) at a sub-millimeter range accuracy, (3) theory of gravitational-wave astronomy, including wave generation, propagation and experimental methods of their detection; (4) relativistic theory of high-precision astronomical reference frames for needs of deep-space navigation and astrometry; (5) theoretical modeling and data analysis of data from modern optical interferometry and pulsar timing experiments; (6) development of analytical and numerical techniques for white-light fringe parameter estimation, (7) development of new concepts to test gravitational theories and feasibility studies of new missions that aim to study gravitation. Our research supports gravitational experiments with various space-based architectures and interprets signals from various astrophysical sources. Emphasis is placed on (1) the tests of general relativity and its alternatives, (2) detection and study of anomalous forces influencing the orbits of spacecraft. Additional opportunities exist in the development of the LATOR mission, modeling and data analysis for the LLR experiments, tests of gravity with interplanetary probes, and in the study of the anomalous behavior of the Pioneer 10 and 11 spacecraft.

[1]. Turyshv, S.G, et al., "The Study of the Pioneer Anomaly: New Data and Objectives for New Investigation." Int. J. Modern Physics D 15, 1-55 (2006), gr-qc/0512121

[2]. Turyshv, S.G, Shao, M., and Nordvedt, K. L. "Experimental Design for the LATOR Mission." Int. J. Modern Phys. 13, 2035-2063 (2004), gr-qc/0410044 [3]. Williams, J.G., Turyshv, S.G., Boggs, D.H., "Progress in Lunar Laser Ranging Tests of Relativistic Gravity." Phys. Rev. Lett. 93, 261101 (2004), gr-qc/0411113

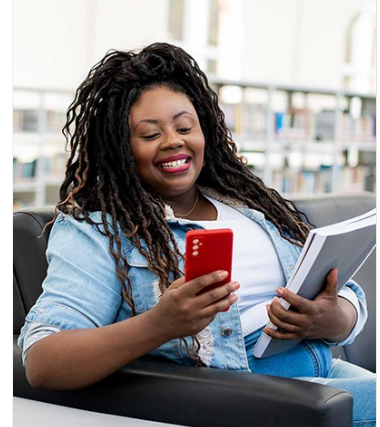
Location:

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/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.