

**Opportunity Title:** Solar System: Development of Protocols and Techniques for Analysis of Planetary Materials and Analogs Using Laser Mass Spectrometry

**Opportunity Reference Code:** 0107-NPP-NOV23-GSFC-PlanetSci

**Organization** National Aeronautics and Space Administration (NASA)

**Reference Code** 0107-NPP-NOV23-GSFC-PlanetSci

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

**Description** Proposals are invited that focus on developing novel approaches, techniques, and protocols for analyzing the chemical, organic, and isotopic composition of planetary materials using laser mass spectrometry along with associated or complementary techniques. The development of analytical protocols may also be used in fundamental studies for astrobiology and exobiology where laser mass spectrometry of solid-phase samples plays a central role. Examples of potential research topics include: (1) Development and testing of novel laser-based ion sources and/or analytical protocols for mass spectrometers including (i) prompt and/or post-ionization, (ii) chemical imaging, (iii) stigmatic ion extraction, and/or (iv) pulsed ion gating; (2) Analysis of complex non-volatile organics in natural and synthetic analog samples (e.g., for Mars or Titan), standards, and meteorites, including combined use of laser and non-laser methods to calibrate identification of compounds in mixtures; (3) Application of pulsed laser irradiation and cluster formation to simulate hypervelocity impact plasma chemical synthesis.

Studies should take advantage of existing mass spectrometry and related laboratory facilities (e.g., laser TOF-MS prototypes, neutral and plasma-sampling mass and energy analyzers, and facility GC-MS and LC-MS) for the instrument protocol development, sample analysis, and simulation activities. Studies may also utilize sample extraction and preparation facilities designed for analytical and prototype development work such as precision subsampling tools and myriad available tools typically used in analysis of rock and meteorite samples. Specific research topics should address elements of the NASA Astrobiology roadmap, or supporting science for current and future missions, such as method development analyzing surface samples on Mars, Titan, Enceladus, and Europa.

Experience in instrument development and operation, pulsed lasers, high vacuum systems, mass spectrometry, ion optics and detectors, and laboratory instrument controls and programming is required.

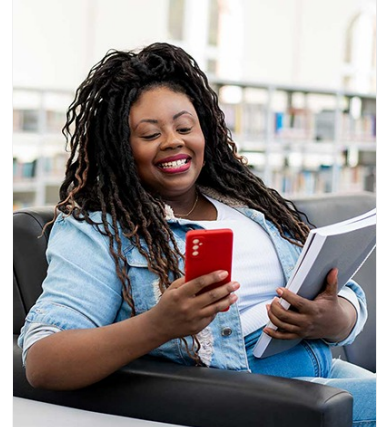
**Location:**

Goddard Space Flight Center  
Greenbelt, Maryland

**Field of Science:** Planetary Science

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

**Eligibility Requirements** • **Degree:** Doctoral Degree.