

Opportunity Title: Life Detection in Water-Ice Matrices

Opportunity Reference Code: 0001-NPP-NOV23-JPL-PlanetSci

Organization National Aeronautics and Space Administration (NASA)

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

Description Planetary scientists often rely on the polar ice-covered regions on Earth as analogs for the polar regions of Mars. Ancient ice cores dated using stable isotopes of trapped gases are studied to characterize the types of cold-adapted bacteria or archaea living within them. Our laboratory is developing two types of in situ life detection instruments. The first instrument is used for identifying and then characterizing microbes within ice using ultraviolet fluorescence followed by analysis with quantum dot labeled antibodies using flow cytometry. The second instrument is being developed to analyze gases trapped within ice such as carbon dioxide and methane. This instrument may use cavity ring down or photoacoustic spectroscopy coupled to mid-infrared sources to perform concentration and isotopic ratio measurements. Both instruments are being designed to screen large volumes of melt-ice for putative life, bioremanants, or their metabolic products as the cryobot descends into the ice. In order to make these instruments a reality, candidates with interest and expertise relating to laser systems, nonlinear optics, pattern recognition, and software engineering are encouraged to apply and would assist us in designing, building and testing our prototypes. Applicants with interest and expertise in isotopic dating of ice, molecular methods, and in planetary science are also encouraged to apply as they would be invaluable in characterizing the ice samples used in the experiments and helping us formulate the science justification for these instruments by drawing parallels between our work with ancient ice cores and the potential science return of our instruments during exploration of polar regions of Mars for the icy moons of Jupiter (Europa, Ganymede, and Callisto), Saturn (Enceladus) or Pluto (Charon).

Location:

Jet Propulsion Laboratory
Pasadena, California

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/oiir/export-control>.

Eligibility is currently open to:



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- 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

This opportunity may require the following: 1- Mandatory drug testing; 2-Random drug testing; 3- Testing prior to initiation of fellowship appointment.

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