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Opportunity Title: The Pandora SmallSat: Multiwavelength Characterization of Exoplanets and their Host Stars
Opportunity Reference Code: 0255-NPP-MAR25-GSFC-Astrophys

Organization National Aeronautics and Space Administration (NASA)

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How to Apply All applications must be submitted in Zintellect

Please visit the NASA Postdoctoral Program website for application instructions and requirements: How to Apply | NASA Postdoctoral Program (orau.org)

A complete application to the NASA Postdoctoral Program includes:

1. Research proposal
2. Three letters of recommendation
3. Official doctoral transcript documents

Application Deadline 3/1/2025 6:00:59 PM Eastern Time Zone

Description

About the NASA Postdoctoral Program

The NASA Postdoctoral Program (NPP) offers unique research opportunities to highly-talented scientists to engage in ongoing NASA research projects at a NASA Center, NASA Headquarters, or at a NASA-affiliated research institute. These one- to three-year fellowships are competitive and are designed to advance NASA's missions in space science, Earth science, aeronautics, space operations, exploration systems, and astrobiology.

Description:

The Pandora SmallSat is a flight project designed to study the atmospheres of exoplanets. It was selected as part of NASA's Astrophysics Pioneers Program, and would start science operation in 2025. Transmission spectroscopy of transiting exoplanets provides our best opportunity to identify the makeup of planetary atmospheres in the coming decade. Stellar brightness variations due to star spots, however, can impact these measurements and contaminate the observed spectra. Pandora's goal is to disentangle star and planet signals in transmission spectra to reliably determine exoplanet atmosphere compositions. Pandora will collect long duration photometric observations with a visible-light channel and simultaneous spectra with a near-IR channel. The broad-wavelength coverage will provide constraints on the spot and faculae covering fractions of low-mass exoplanet host stars and the impact of these active regions on exoplanetary transmission spectra. Pandora will subsequently identify atmospheric compositions of exoplanets, and robustly determine which planets are covered by clouds and hazes. Pandora will observe at least 20 exoplanets with sizes ranging from Earth-size to Jupiter-size and host stars spanning mid-K to late-M spectral types. The project is made possible by leveraging investments in other projects, including an all-aluminum 0.45-meter Cassegrain telescope design, and a NIR sensor chip assembly from the James Webb Space Telescope. By design, Pandora has a diverse team, with over half of the mission leadership roles filled by early career scientists and engineers, demonstrating the high value of SmallSats for developing the next generation of space mission leaders.

NASA's Goddard Space Flight Center is home to the Pandora Science Operations Center, which will be developing simulation software, target selection and observing optimization strategies, and contributing to the Pandora Science Pipeline. We seek a postdoctoral candidate who would contribute to the development and operations of Pandora. The Pandora Science Pipeline is

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responsible for turning downlinked, uncalibrated data into calibrated images, light curves, and time-series spectra. A successful candidate would be anticipated to contribute to the development of algorithms and methods for maximizing the science return from Pandora. We anticipate the successful candidate will contribute simulation and analysis software that could be incorporated into the Pandora Science Pipeline, and participate in Pandora science activities. We are particularly interested in candidates with experience in the collaborative development of scientific/open source software in Python, utilizing tools such as Git. Owing to the Pandora's instrument having heritage with JWST, experience with JWST instruments and software would be a benefit.

We also welcome candidates interested in the EXoplanet Climate Infrared TElescope (EXCITE) experiment, which is a 0.5m infrared spectrograph that flies from a high-altitude balloon. EXCITE's primary science mission is to perform phase-resolved spectroscopy of hot Jupiter-type exoplanets in the near- infrared. EXCITE is a moderate-sized international collaboration that partners governmental, academic, and private sector institutions in the United States, Canada, United Kingdom, and Italy. EXCITE flew its North American engineering flight in August 2024, and is next preparing for a science flight from the Antarctic. This opportunity will provide hands-on research experience in the preparation and deployment of the EXCITE payload, with topic areas including: infrared detectors and readout, cryogenics and cryocoolers, optics, data acquisition, balloon attitude control, science modeling, and science data analysis.

Qualifications for the Pandora opportunity include a Ph.D. in astronomy, physics, computer science or a related discipline. Prior experience with any of the following skills is desirable: astronomical software development, exoplanet transmission spectroscopy, atmospheres simulations, cool star astronomy, stellar spectra, NIR observational astronomy with HST/JWST, data analysis, systematics correction, time-series astronomy, astronomy image simulation development, Python, supercomputing/cluster computing, open source coding practices, software packaging, documentation.

The ideal candidate for the EXCITE component shall have a doctorate in physics/astrophysics, with specific experience in developing instrumentation for stratospheric balloon and/or space applications. The candidate shall have specialized experimental experience in at least one of the following topic areas: infrared detectors and readout, cryogenics and cryocoolers, infrared optics, balloon attitude control systems, exoplanet observational modeling, exoplanet observational data analysis. The candidate shall also have significant programming experience in a language such as Python, Matlab, or IDL. The ideal candidate will also be experienced in mechanical design, with proficiency in SolidWorks or equivalent.

Field of Science: Astrophysics

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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:

- 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

Point of Contact Mikeala

Eligibility Requirements

- **Degree:** Doctoral Degree.