

Title: Puerto Rico Space Partnership for Research, Innovation and Training to Engage the Next Generation of Explorers (PR-SPRInT)

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Summary: As our nation leads the effort to perform long-term space missions and exploration, the next generations of technologies that can effectively fulfill the unique technical and scientific challenges to reach out in space are to be developed. In meeting this goal, the training and education of a new and diverse workforce of scientists, engineers and entrepreneurs will be critical. As a strategy to collaborate in meeting these goals, herein we present the Puerto Rico Space Partnership for Research, Innovation and Training (PR-SPRInT) to Engage the Next Generation of Explorers. The PR-SPRInT is a strategic partnership between four institutions of higher education to cover all educational levels from 2-year, 4-year and graduate programs. Participants from University of Puerto Rico Campuses, Río Piedras (R-2), Mayagüez (R-2), and Cayey (4-year students) and Universidad del Turabo (2-year students) constitute the partnership. Researchers, undergraduate (13) and graduate students (10) will collaborate with the Ames Research Center, and JPL in the development of materials and devices for applications in life support systems and energy storage.

The PR-SPRInT has designed activities to assure that the participants receive the necessary and appropriate professional training to allow them to persist in their educational goals and remain engaged in NASA related activities. The participating students and faculty will perform NASA related research in support of the educational plan. Besides being immersed in NASA relevant research, the participant students will receive: 1) professional development training, 2) interventions related to entrepreneurship (Business School at UPR) and 3) design/prototyping training (e.g. 3D printing, School of Architecture). The PR-SPRInT fellows will also participate in NASA Center-based research experiences as a strategy to expose them to the research performed in the different NASA Centers. The PR-SPRInT will also promote formal (i.e. coursework development at undergraduate and graduate levels) and informal education (i.e. outreach) activities in the community of schools across Puerto Rico, in order to increase awareness and motivate 7-12 students and teachers by leveraging the material from the NASA Education Portal.

Guided by the NASA Space Technology Roadmap Areas (TA03 and TA06), PR-SPRInT will engage in the following interdisciplinary research and education groups (IREGs): IREG 1: Human Centered Research, Environmental Control and Life Support to Enable Long term Duration Missions: This IREG will be working on innovation, research and education in air revitalization, water reclamation and purification, and resource recovery. In particular, robust adsorbent materials and composites for CO₂ removal and treatment, and membrane-based water purification systems will be developed.

IREG 2: Design and Development of High-Performance

Batteries for Space Exploration Missions: This IREG will be working in energy storage and will develop advanced materials for Li-based batteries focused on solid-state batteries.

The primary objective of the PR-SPRInT is to strengthen STEM education through the NASA technical areas of relevance as outlined in this proposal. Altogether, the outcomes of this project will provide for institutionalization of the best practices on teaching, innovation and research and will also help to sustain the efforts after the project cycle is completed through TRL increments, SBIR/STTR proposals and commercialization of the products of research.