PR Space Grant Consortium

UPR Science Payloads Built and Launched Through the RockSat-X Proyect

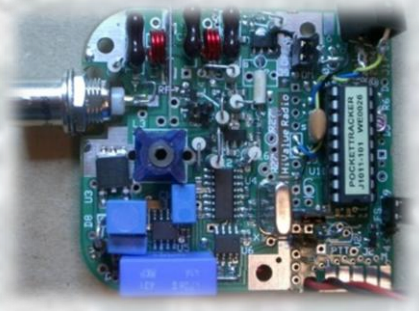
PRSGC:
- Oscar Resto
- Gladys Muñoz
- Samalis Santini
- Alexis Oquendo

Bifrost Co:
- Eric Adamsons
- Heins Kim

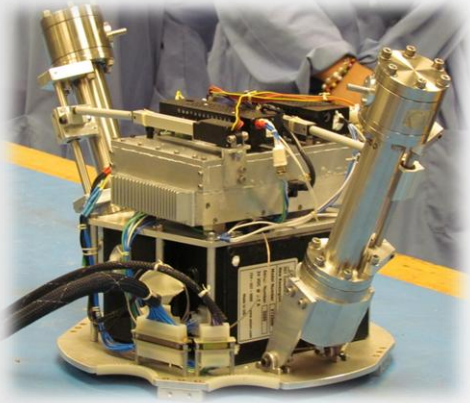
NCSGD Meeting, Oct 2, 2015, Tucson, AZ

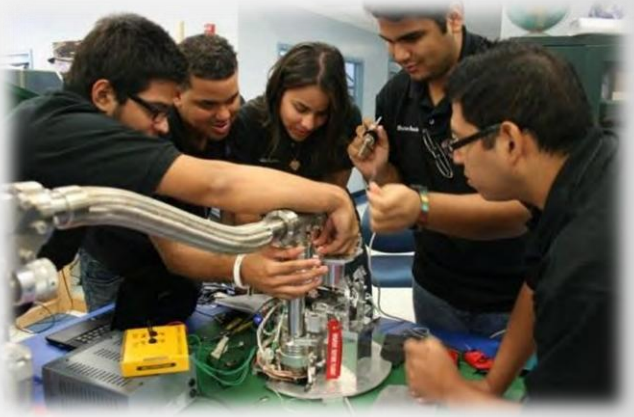
PRSGC Student Balloon Satellite Program

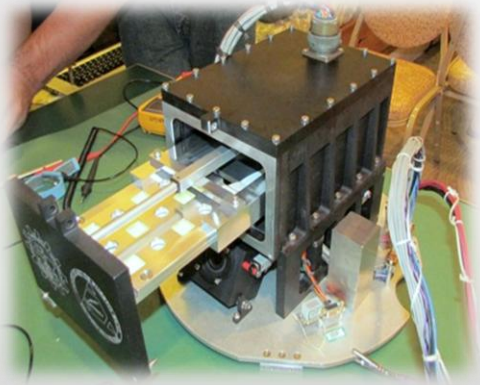
- Started in Summer 2004
- Balloon Sat Workshop in Colorado
- Elective Course CINA 5990 offered in UPR Rio Piedras 2004-2010
- Augmentation Award: $70K
- First Launch: March 2005

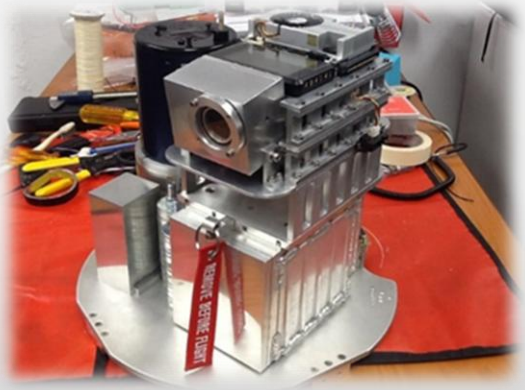


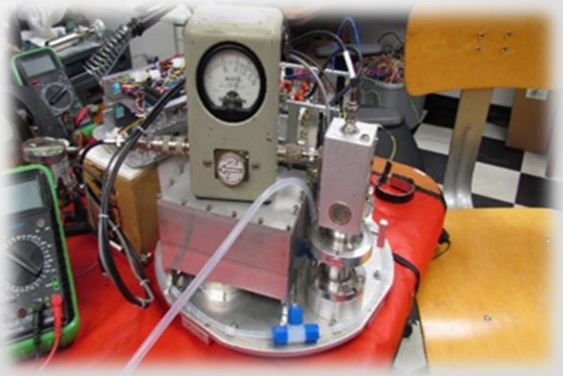
UPR NASA Hardware Project
2009-2015











Colorado Space Grant Consortium & NASA Wallops Flight Facility

- RockOn Workshops
- RockSat C, RockSat X
- Sounding Rocket Program
- Environmental Testing
- Integration, Launch and Recovery

University of Puerto Rico Río Piedras Campus

- Host Institution
- Mete 3901-3902 Course
- Chemical Physics PhD Program
- Biology Department, Prof. Steve Massey, Astrogenomics
- Computer Science Department, John G. Wilson
- IDEAS STEM Institute

University of Puerto Rico Mayagüez Campus

Participating Students:
Department of Mechanical Engineering

- Samalis Santini
- Luis Figueroa
- Alexis Oquendo

Department of Electrical Engineering

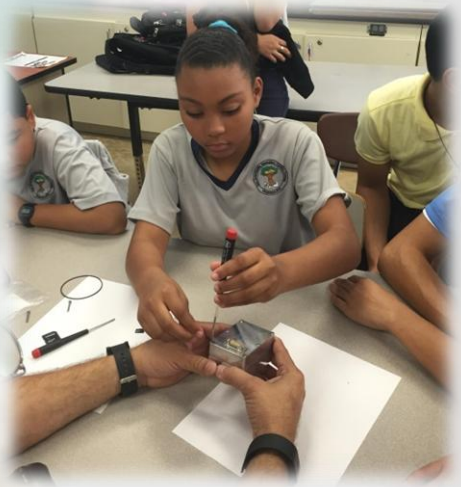
- Luis Lopez
- Eric De Leon

Department of Computer Engineering

- Edgardo Muniz

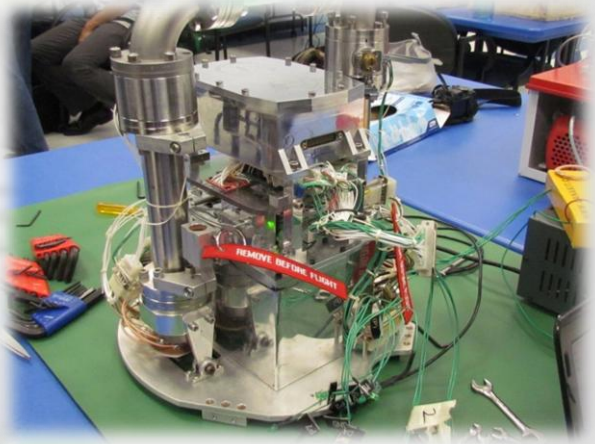
PR Department of Education
Marcelino Canino Canino School

- Prof. Gladys Munoz
- Middle School Students
- Disassembling and Cleaning of Recovered Payload
- Programming of Camera Subsystem



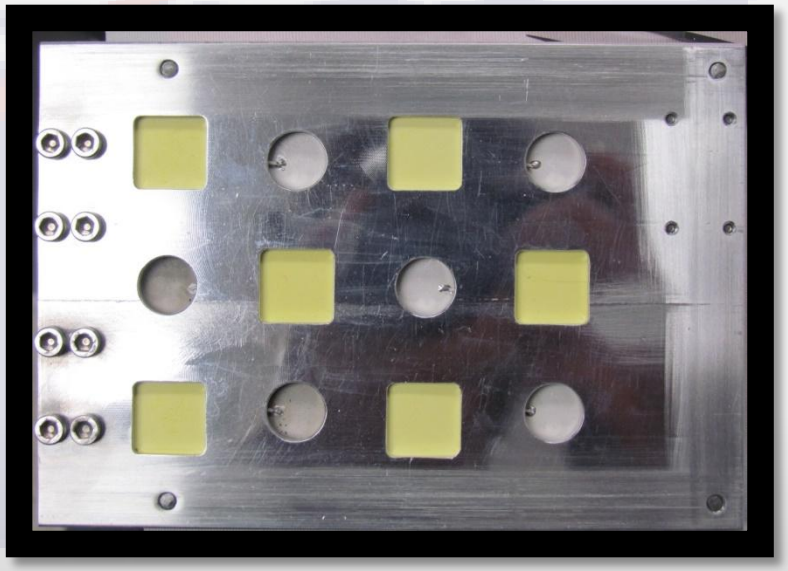
School of Machining
PR Department of Education

- Prof. Carlos Rodríguez
- Prof. José Baez
- Senior Students of Machining
- Mechanical Parts Construction for the RockSat Payload



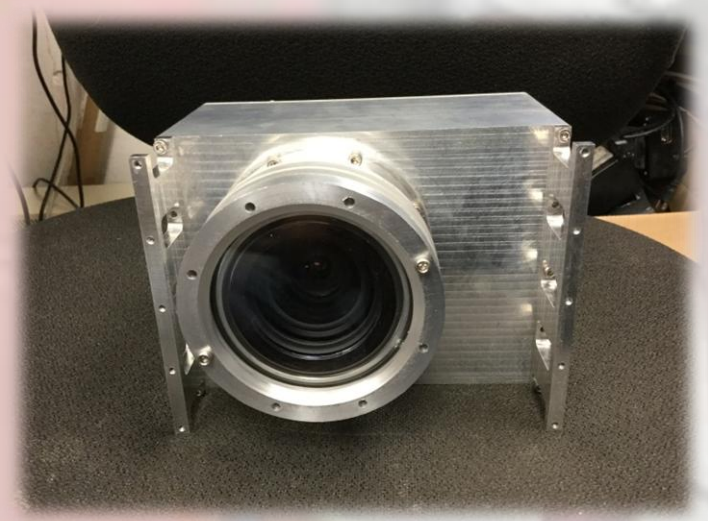
NASA Glenn Research Center

- Dr. Mary Ann Meador
- Micrometeorite Impact Capture Polyimide Aerogel



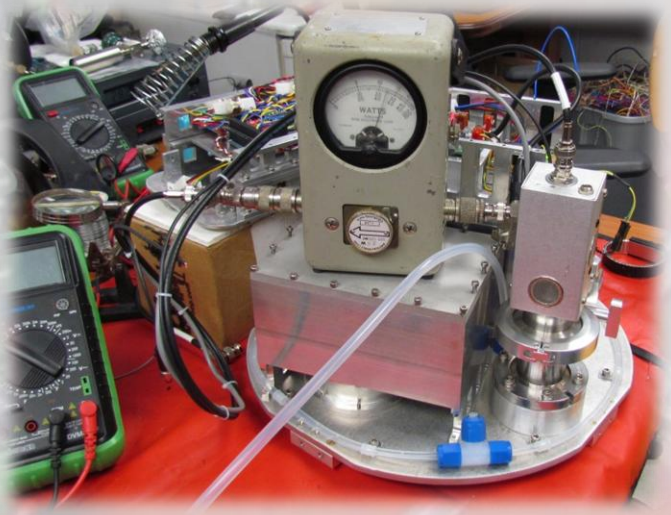
BIFRÖST

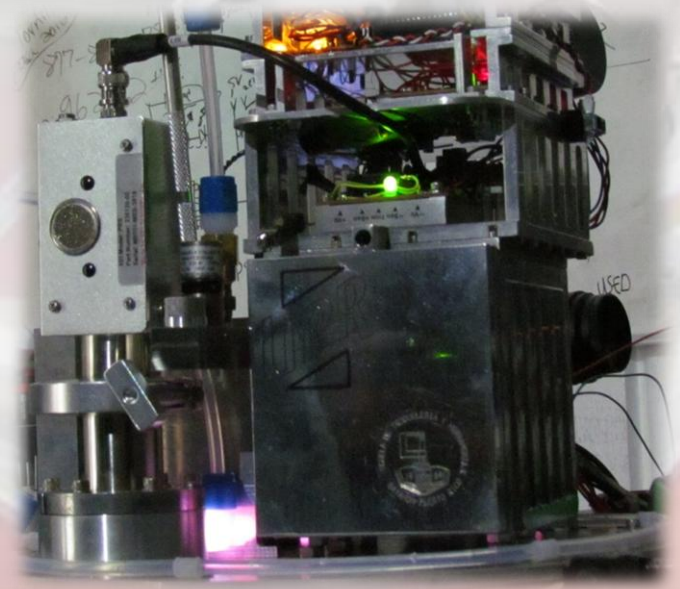
- HD Video Subsystem of the UPR RockSat Payload
- Validation of Payload Deployment and Retraction, and Time Stamping of Events
- Video Production for Communicating Science



Evactron®
By XEI Scientific

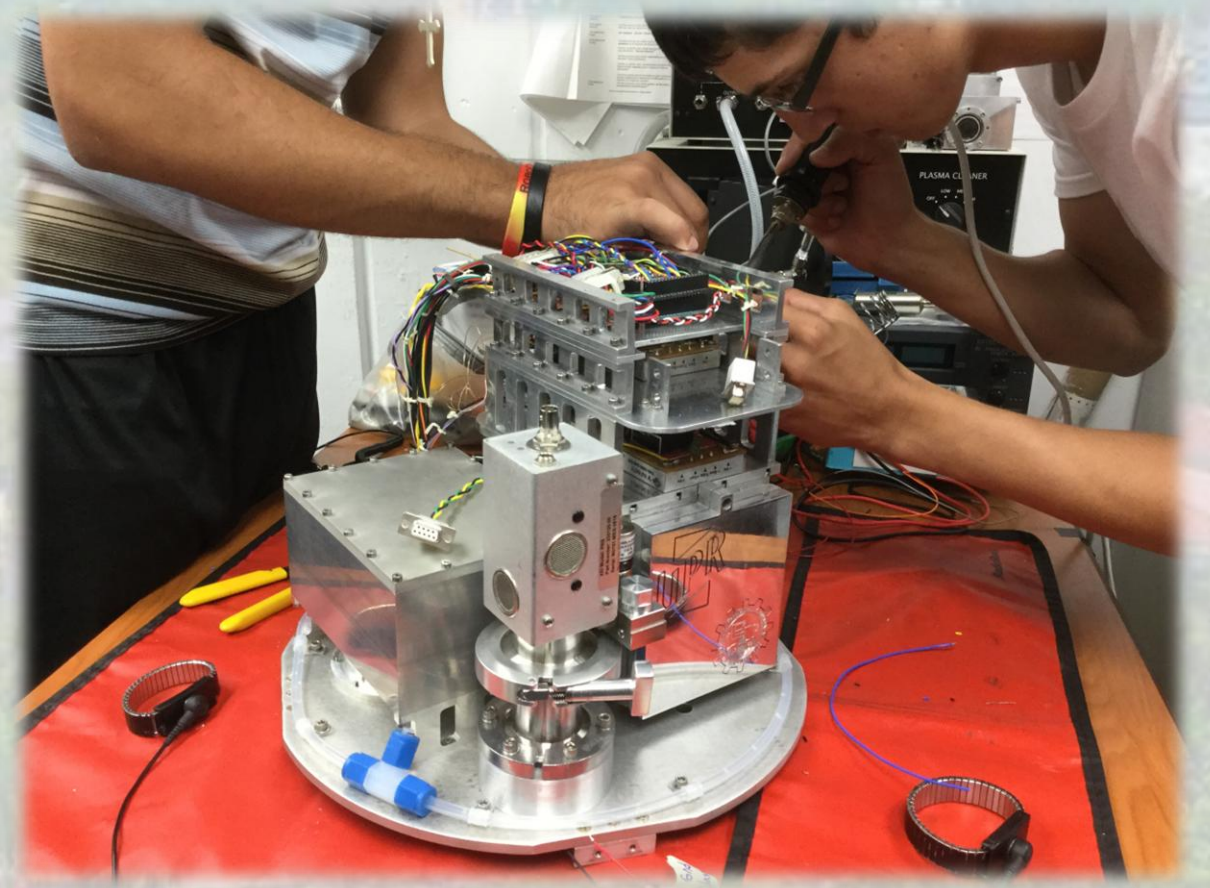
- Plasma Decontamination Generator
- Decompose Organic Compounds from the Payload During Flight by Ionized Gas Radicals





Overview of Astrobiology Mission and Payload Components

Alexis Oquendo



Sample Collection and Analysis

Sample Collection

- High density particles found within 80-160 km above sea level are collected.

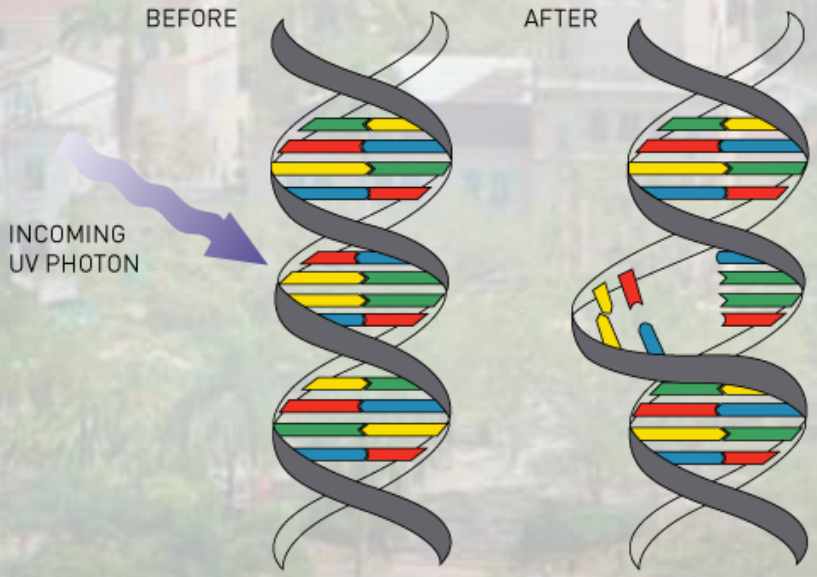
Sample Analysis

- Analysis will be done at UPR's IFN, Nanotechnology and Bioinformatics laboratories.

Decontamination Procedures

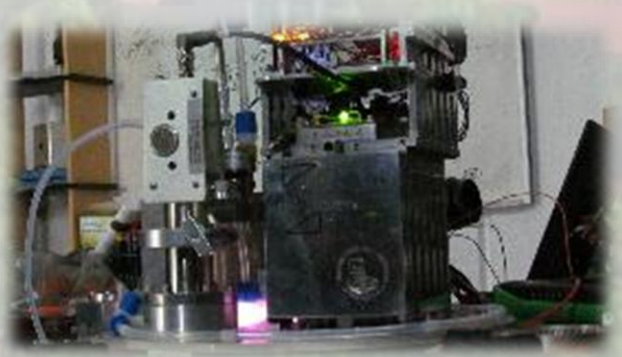
UV-C Irradiation

- UV-C destroys the genetic information in the DNA of microorganisms.

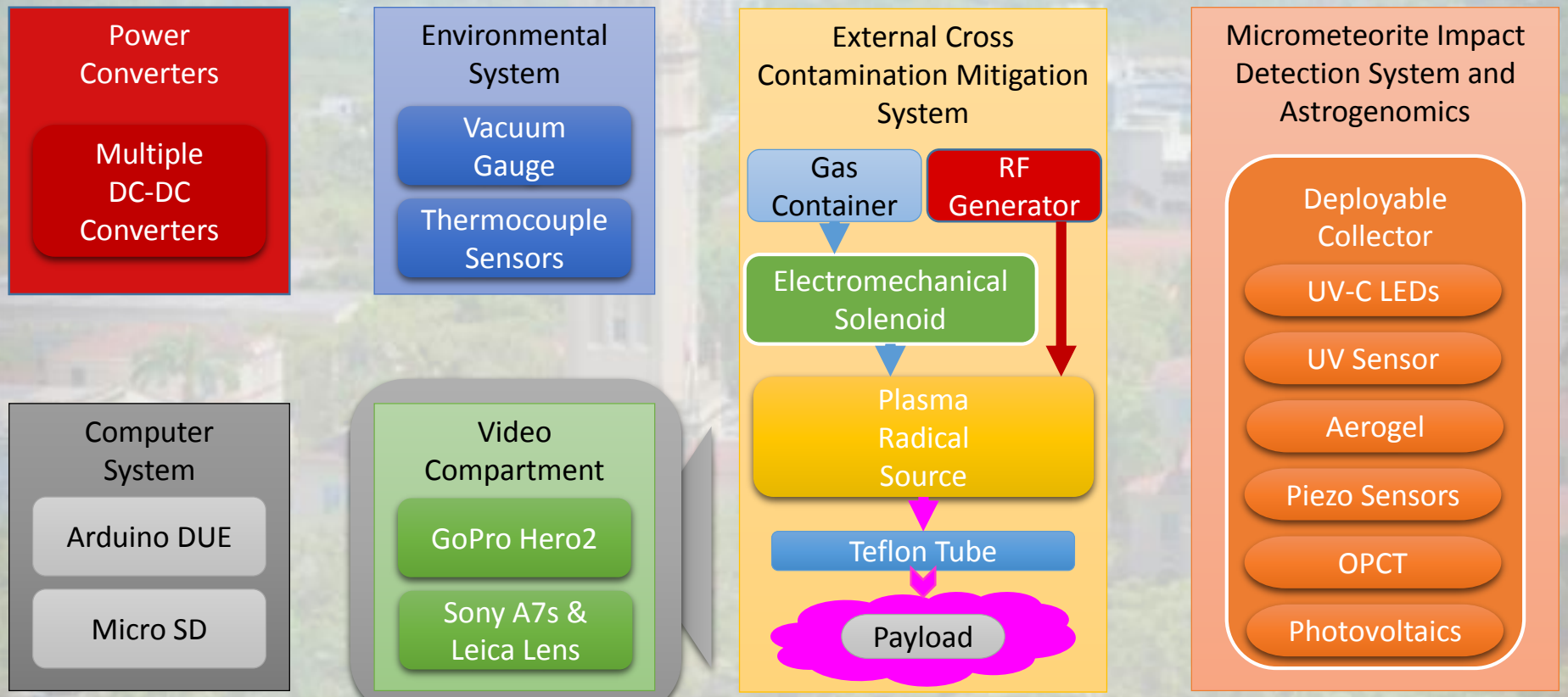


Plasma Exposure

- Plasma's ionized species break down hydrocarbon bonds of organic molecules.

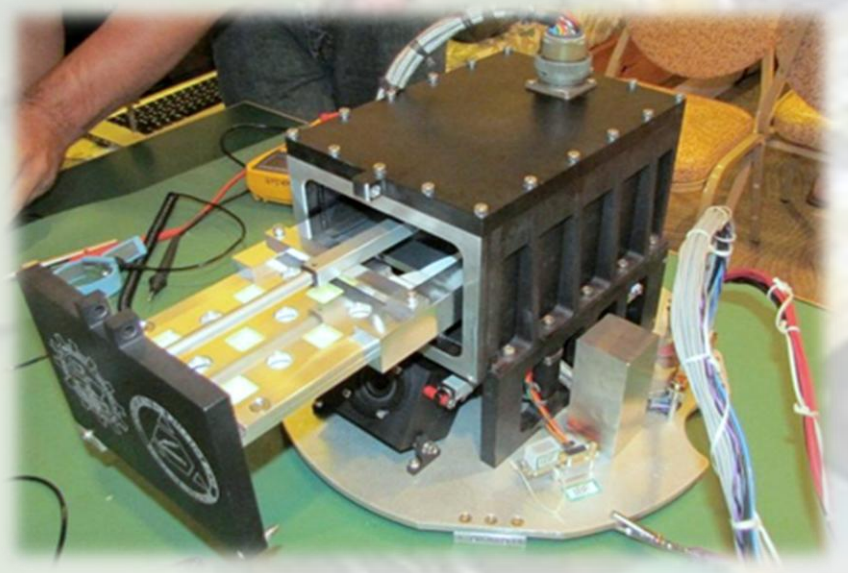


Payload Components

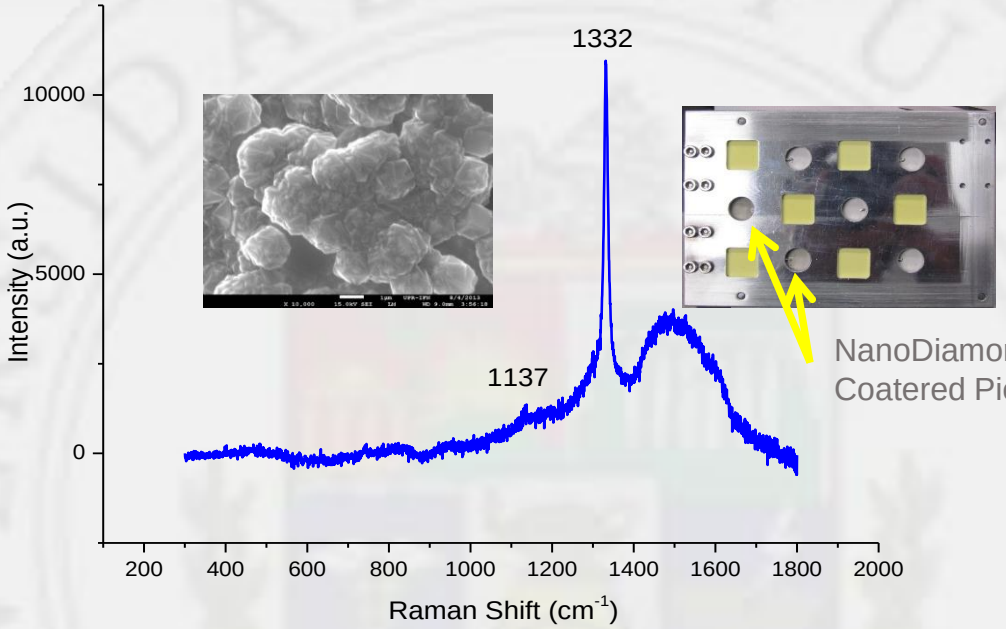


Sample Collection Subsystem Design

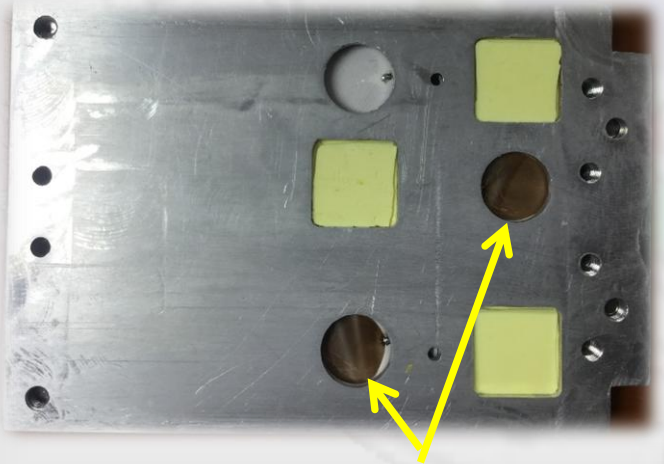
Samalis Santini



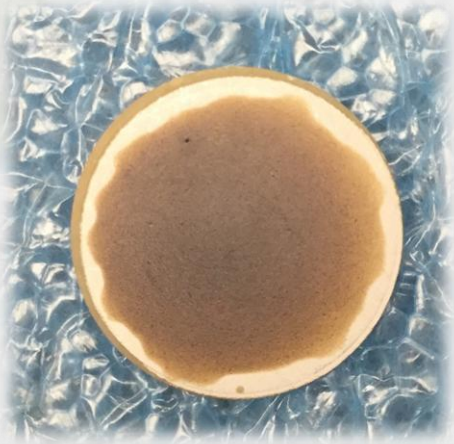
Sensor Devices Subsystem Evolution for **Harsh Environments**



2013 Diamond Coated Piezo Sensor



2014 Paper Graphene
Coated Piezo Sensor



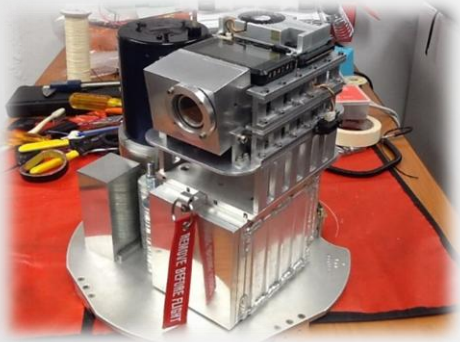
2015 Oxide Graphene
Coated Piezo Sensor

Sample Collection Subsystem Evolution

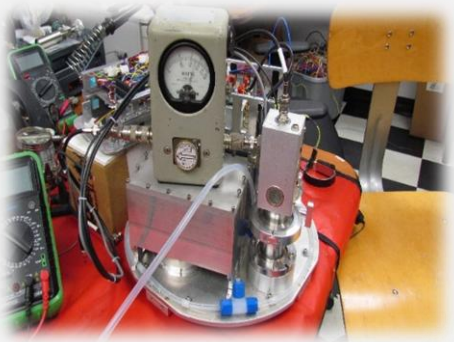
UPR 2011 Payload

UPR 2012 Payload

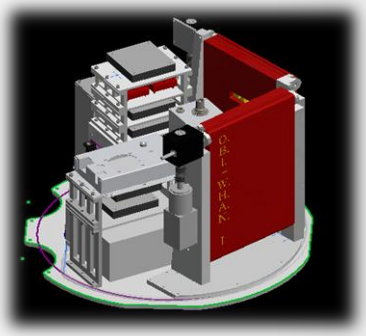
UPR 2013 Payload



UPR 2014 Payload

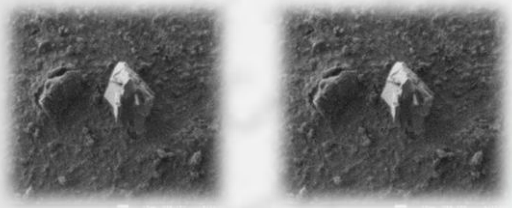


UPR 2015 Payload

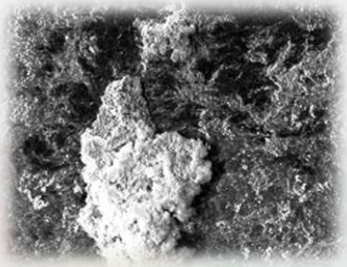


UPR 2016 Payload Concept

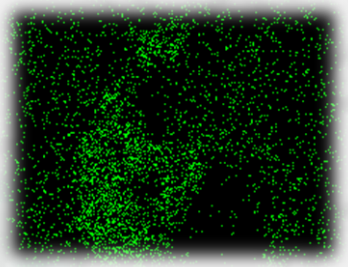
Results from Previous Flights



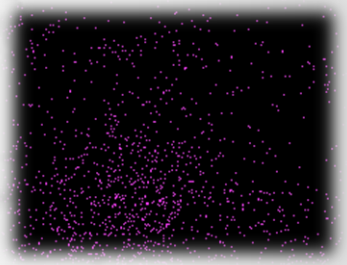
Scanning Electron Microscope Images of Possible Micrometeorite Impacts on Aerogel



Secondary Electron Image

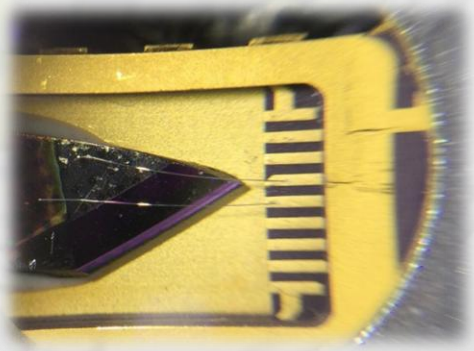


EDS Oxygen ka signal



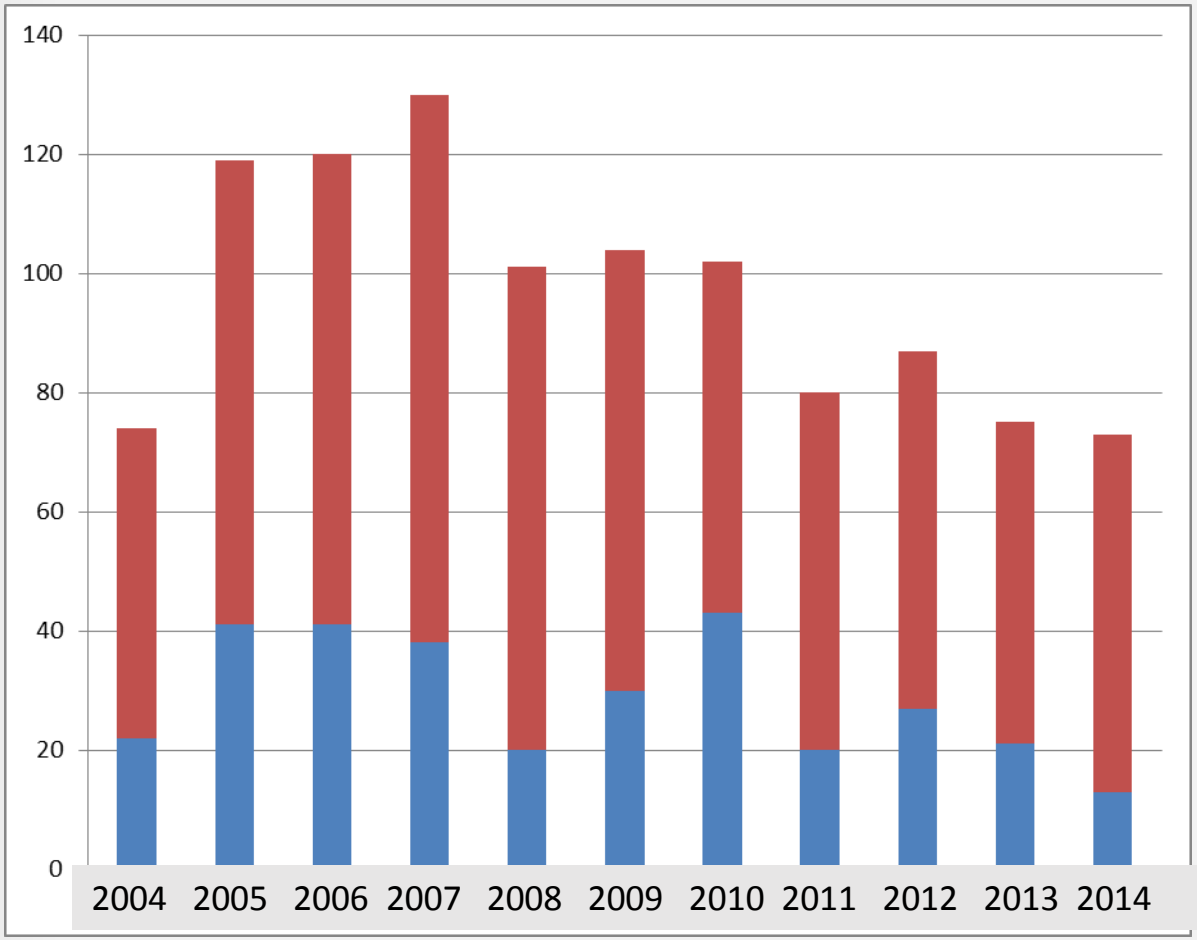
EDS Aluminum ka signal

Prototypes of Ferroelectric Photovoltaic Cells



Involvement of College and Precollege Students and Workforce Development Examples

Students Impacted by Hardware Projects Sponsored by PRSGC



College Students

Pre-college Students

Total Impacted Students:

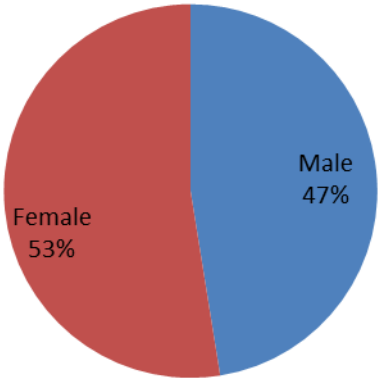
316 Pre-College

749 College

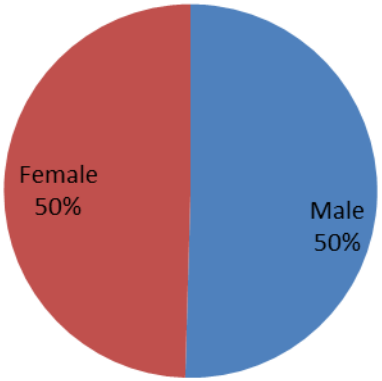
1,065 TOTAL

Students Impacted by Hardware Projects Sponsored by PRSGC

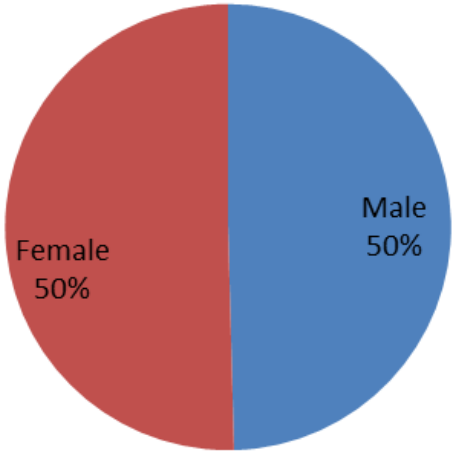
Pre-college Students by Gender



College Students by Gender



Aggregate Data by Gender



Total Impacted Students:

531 Male
534 Female
1,065 TOTAL

Workforce Development Anecdotes

Dr. Francisco Solá
Scientist
NASA Glenn Research Center

Workforce Development Anecdotes

Ms. Yanina Colón

NASA DEVELOP Program Lead

NASA Langley Research Center

Workforce Development Anecdotes

Mr. Giovanni Colberg

NASA WISE Program Lead

NASA Langley Research Center

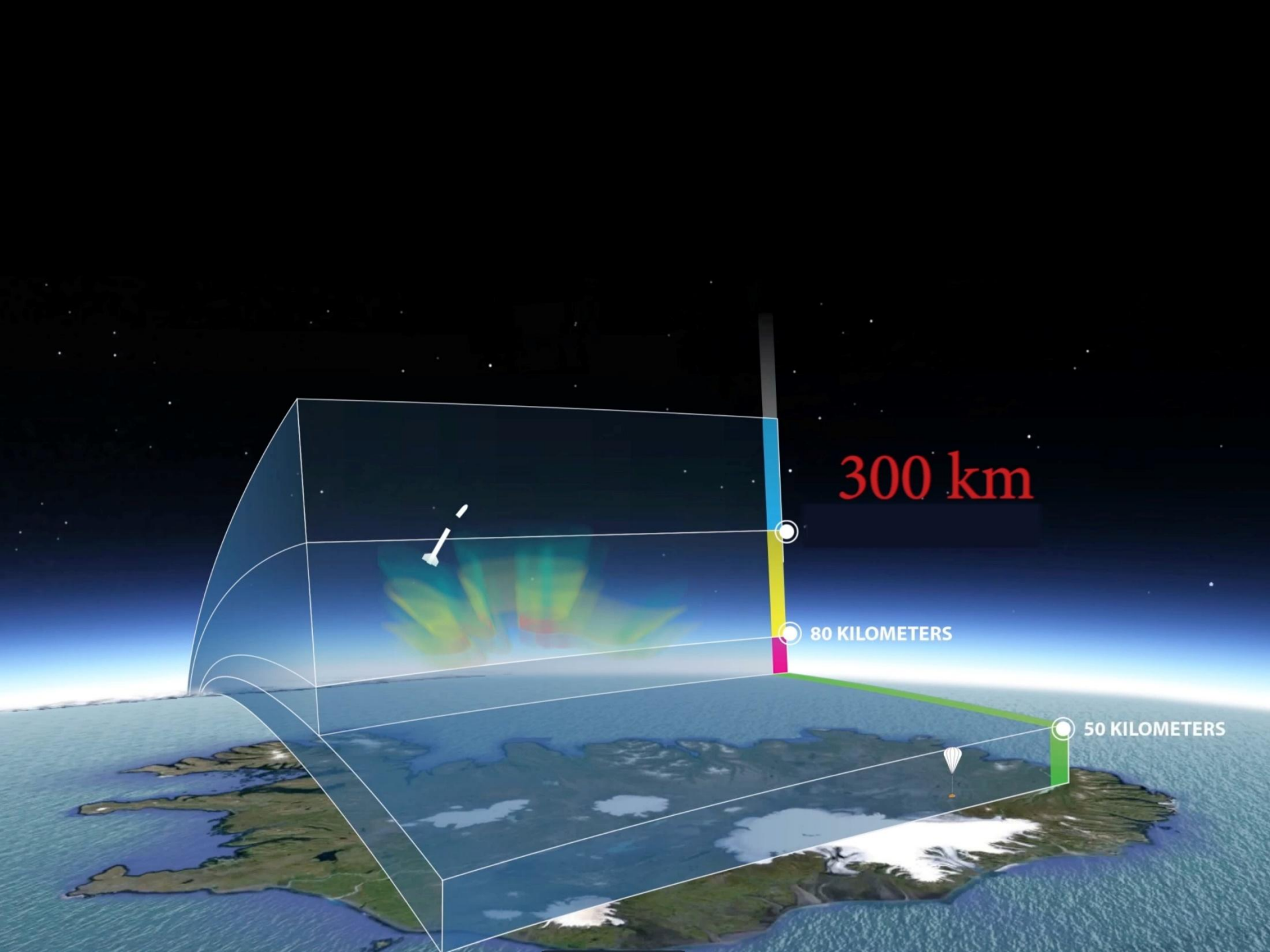
Workforce Development Anecdotes

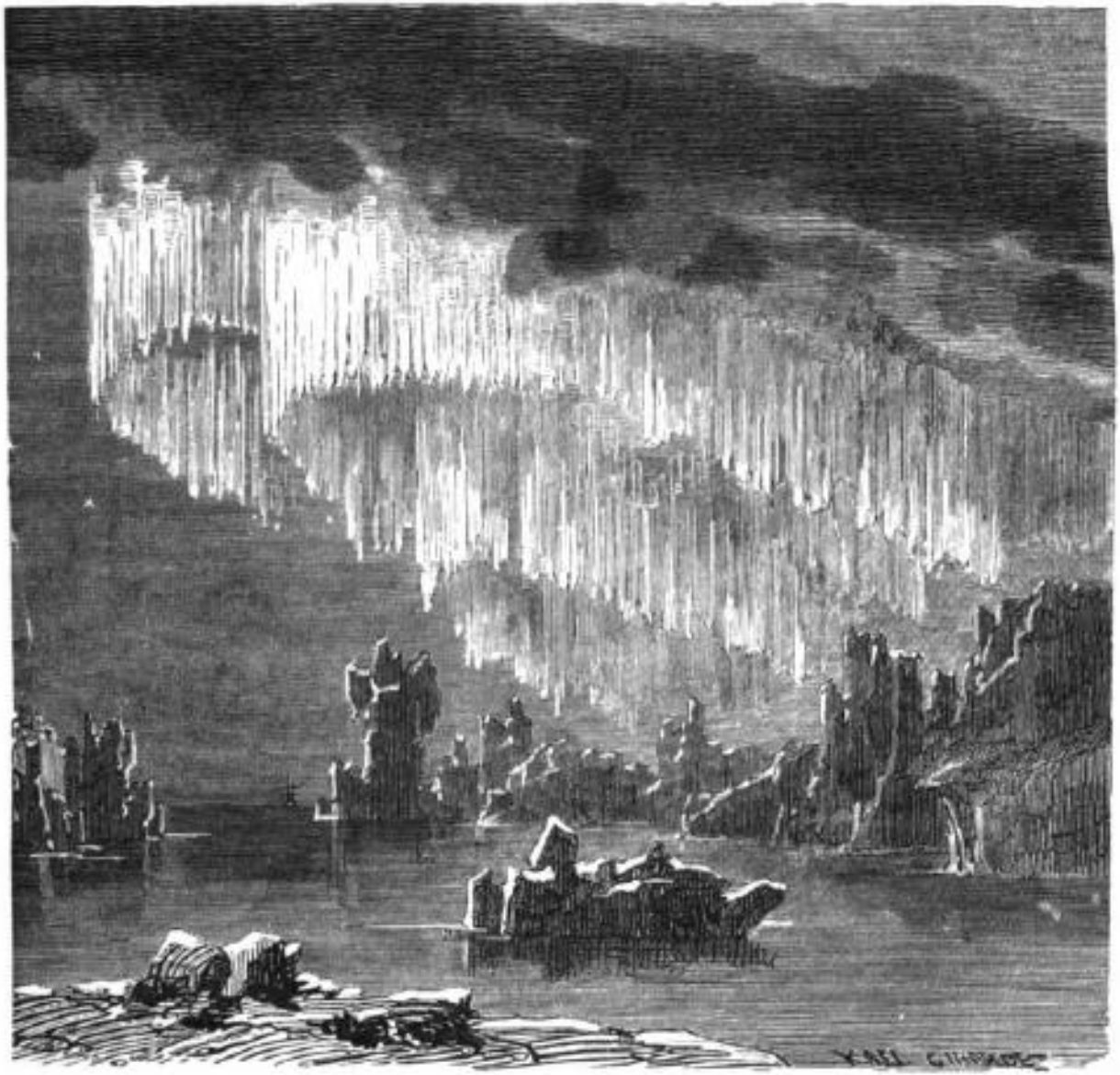
Mr. Samuel Díaz

Machinist

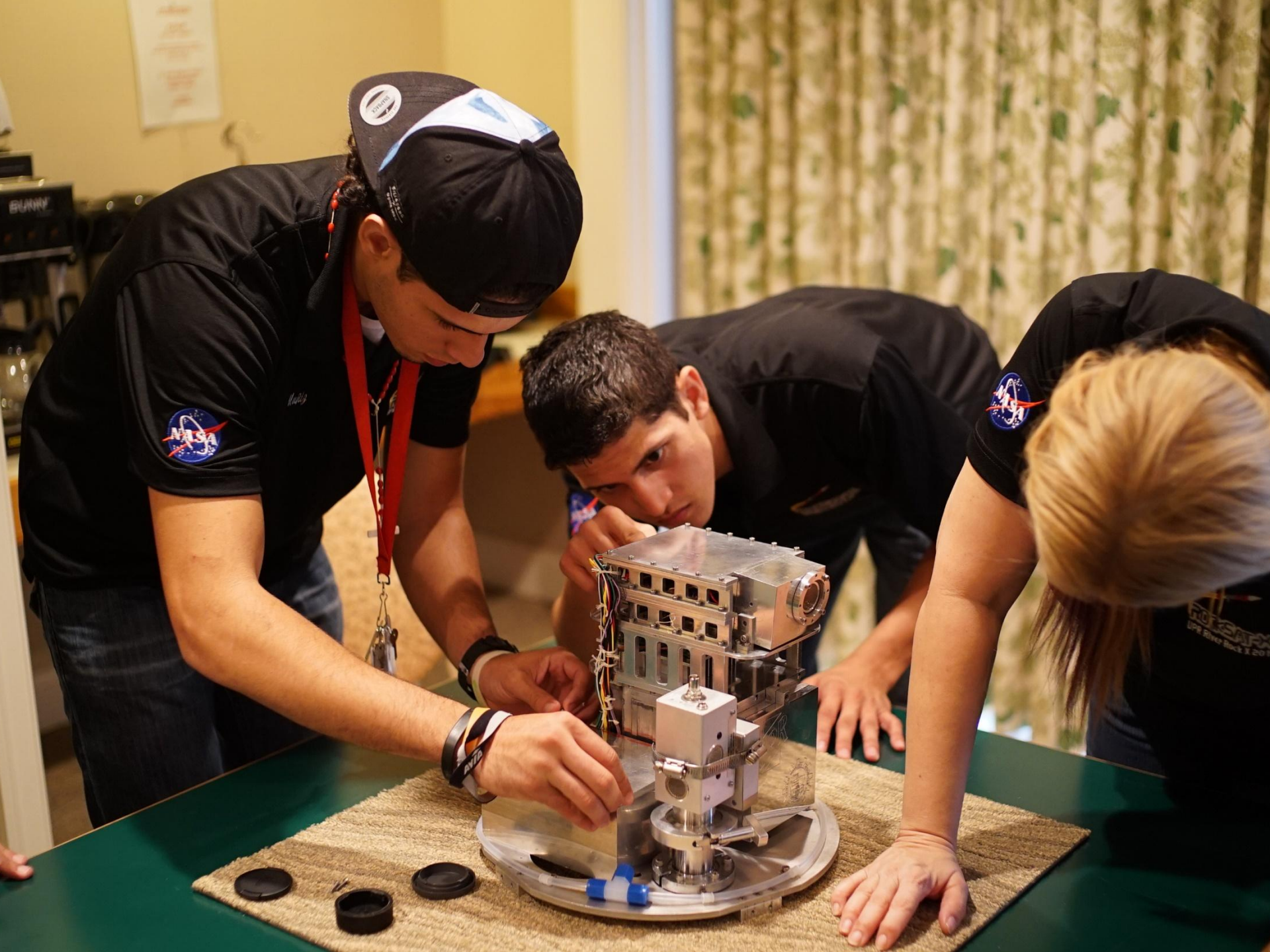
NASA Wallops Flight Facility


BIFRÖST
INTO THE AURORA
bifrostaurora.org

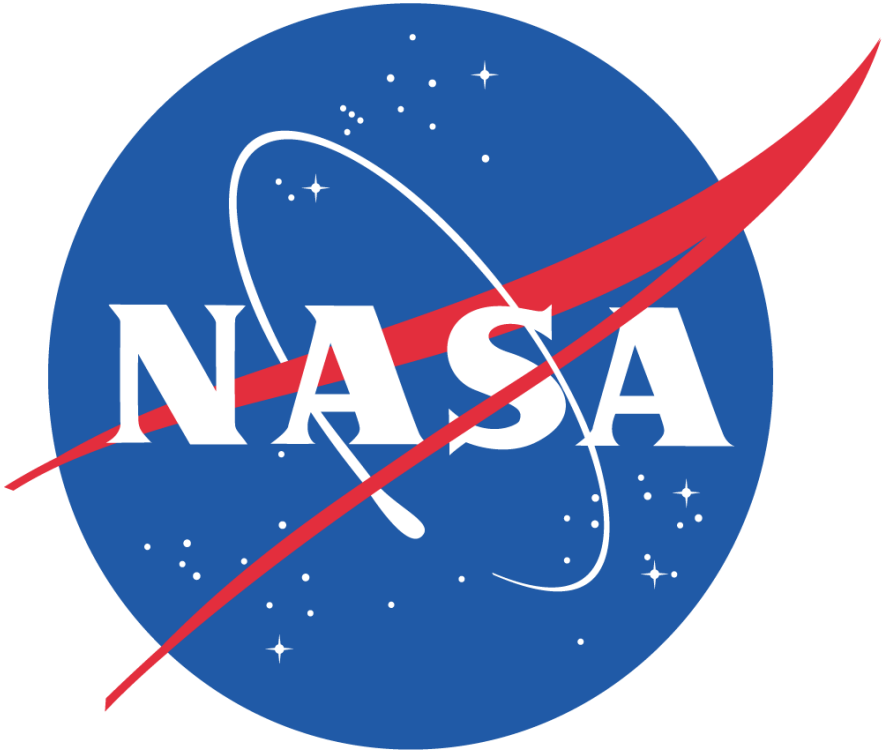

300 km
80 KILOMETERS
50 KILOMETERS



THE RED LIGHT IN THE SKY, OR THE AURORA BOREALIS.


NASA
NASA


KURT


NASA


Puerto Rico Space Grant Consortium
NASA