



# Flight Opportunities

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## In This Issue

### News:

- NASA Selects Three Winners in Inaugural TechLeap Prize Challenge

### Recent Flights:

- Action! Filming a Simulated Lunar Landing From the Dusty Desert Floor
- Suborbital Testing Puts Moon-Bound Computing System Through its Paces

### Opportunities:

- NASA TechRise Student Challenge Applications due November 3

### Spotlight:

- After Successful Parabolic Flight Testing, Ring-Sheared Drop Experiment Arrives at the International Space Station

### Community of Practice:

- Lessons From the Launchpad: Rehearse Flight Procedures With Your Team

### Events:

- ASGSR 2021 Meeting: November 3-6
- ASCEND 2021: November 8-17

Enjoy!  
The Flight Opportunities team

## NASA Selects Three Winners in Inaugural TechLeap Prize Challenge



NASA  
**TechLeap**  
PRIZE

NASA has named three winners in the first TechLeap Prize competition, Autonomous Observation Challenge No. 1. The proposed solutions will help rapidly advance small spacecraft technologies for autonomous observation of events on Earth and beyond, as well as improve communications and computing power in small spacecraft applications. Winning teams have each received an initial \$200,000 prize to begin building their payloads for a later suborbital flight test. The winning teams are:

**The Bronco Space Club at Cal Poly Pomona (Pomona, California):** The team's Bronco Ember technology is designed to autonomously detect, track, and log terrestrial phenomena such as wildfires.

**Orion Labs, LLC (Nunn, Colorado):** The company plans to demonstrate the capabilities of quantum machine learning aboard a small spacecraft to reduce downlink bandwidth requirements.

**Texas A&M SEAK Lab (College Station, Texas):** The team plans to develop a system using visible and infrared imaging to identify and classify plumes in Earth's atmosphere automatically.

Read the [NASA web feature](#) to learn more about TechLeap and the selection criteria.

## Recent Flights

### Action! Filming a Simulated Lunar Landing From the Dusty Desert Floor

Video capture during future lunar landings could play an important role in contributing to researchers' understanding of disturbances in lunar surface materials – called regolith – caused by the lander's rocket plume. With support from Flight Opportunities, on Oct. 14, 2021, researchers from Los Angeles-based Zandef Deksit put a high-tech video capture and regolith sensor payload called ExoCam to the test. The desert environment of Mojave, California, provided a stand-in for the surface of the Moon, and the Xodiac vertical takeoff vertical landing (VTVL) platform from Masten Space Systems was the test vehicle. Read the [NASA web feature](#) to learn more about the payload and the flight test.



*Zandef Deksit's ExoCam in its metal cage rests on the desert surface of Mojave, California. Masten Space Systems's Xodiac vehicle can be seen in the ExoCam's viewfinder and in the distance. Credits: Zandef Deksit, Inc./Jason Achilles Mezilis*



*Flights on Raven Aerostar's Thunderhead System balloon in July and September 2021 in Sioux Falls, South Dakota provided the latest testing for RadPC ahead of a lunar demonstration scheduled for 2023. Credits: Montana State University*

### Suborbital Testing Puts Moon-Bound Computing System Through its Paces

On July 28 and September 22, 2021, researchers from Montana State University (MSU) launched a radiation-tolerant computing system called RadPC on a high-altitude balloon in Sioux Falls, South Dakota from Raven Aerostar with support from Flight Opportunities. These flights are the latest in a series of suborbital demonstrations that have helped advance RadPC ahead of an orbital mission -- the technology is scheduled to fly to the Moon in 2023 for testing on the lunar surface to validate its functionality for long-duration space missions. [Read the NASA web feature](#) to learn more about the flights that have led to MSU's success, and check out the recent [Community of Practice webinar featuring RadPC](#) principal investigator Dr. Brock LaMeres.

***"There would have been no chance of us achieving this success without Flight Opportunities. There's simply no way you can get into these types of orbital missions unless you have flight heritage and you've shown through flight testing that you've actually taken the steps to understand how to build the systems NASA needs."***

***—Dr. Brock LaMeres, RadPC principal investigator, MSU***



## NASA TechRise Student Challenge Entries Due November 3

The deadline for NASA's first TechRise Student Challenge is just around the corner. Visit the [TechRise Student Challenge website](#) for full details and encourage any students you know to get started on an entry today. There is still plenty of time, and the website has lots of resources to guide their application.

## Spotlight

### After Successful Parabolic Flight Testing, Ring-Sheared Drop Experiment Arrives at the International Space Station

Following successful Flight Opportunities-supported parabolic flight testing on Zero Gravity Corporation's G-FORCE ONE aircraft in April and May, 2021, the Ring-Sheared Drop (RSD) experiment from NASA's Marshall Space Flight Center arrived at the International Space Station on Northrop Grumman's NG-16 Cygnus spacecraft on August 12, 2021.

Developed by researchers at Marshall and Rensselaer Polytechnic Institute of Troy, New York, the RSD experiment enables study of the formation of potentially destructive amyloid fibrils, or protein clusters, like those found in the brain tissue of patients battling neurodegenerative diseases such as Alzheimer's and Parkinson's. In Earth-based experiments, researchers had determined that amyloid fibrils may be created by shear flow, or the difference in flow velocity between adjacent layers of a liquid. In the case of ground experiments, that formation is affected by the presence of container walls and by convection, or the circular motion that occurs when warmer liquid rises while cooler liquid descends.



*Photo information: European Space Agency Astronaut Thomas Pesquet works on the Ring-Sheared Drop experiment inside the U.S. Destiny laboratory module's Microgravity Science Glovebox on the International Space Station.*

Conducting the experiments in microgravity enabled liquid specimens to form spherical drops, containing themselves via surface tension. Researchers on the parabolic flights “pinned” a droplet of liquid between two rings to cultivate amyloid fibrils for study.

Louise Strutzenberg, co-investigator for the experiment at Marshall, commented on the value of Flight Opportunities ahead of the RSD deployment to the station: “The parabolic demonstration proved that our modified hardware is capable of deploying and pinning each of the protein solutions that will be used on the station. The lessons learned will prepare us to take the next steps.”

Sridhar Gorti, principal investigator for the experiment at Marshall, also commented on the value for scientific discovery: “This flight opportunity is enhancing our knowledge of how fluids behave in space and is bringing us closer to a breakthrough that could help explain the development of neurological diseases such as Alzheimer’s and Parkinson’s. The team, a government sponsored collaboration with [academia] and industry, is passionate about unlocking the mechanisms of these devastating diseases.”

## Community of Practice

### Lessons From the Launchpad

#### Rehearse Flight Procedures with Your Team

*Running an all-hands-on-deck rehearsal prior to flight is an invaluable step to help everyone on the research team know what role they play, and how each aspect of the flight experiment will run on the day of flight. It can also expose holes or errors in the procedures. This is especially true for human-tended parabolic flights in which researchers may need to plan to be in a specific position at a given time to run part of the experiment.*



**Assign and document clear roles and responsibilities** and make sure that each team member fully understands them.

**Consider the timing of each step of the experiment** and rehearse those timings carefully with the researchers involved to make sure that they are accurate; adjust if needed prior to flight.

**Designate one team member to serve as a “stage manager”** to document and verify all hardware and software is in the proper place and all researchers are in the correct place at the start of the experiment.

**Learn more about this topic** by checking out the Community of Practice monthly webinar series. Recent recorded sessions, such as [Shared Experiences in Space](#) with Drs. George Pantalos and Rob Ferl, provide insights into pre-flight preparation and rehearsal of roles and responsibilities.

*Do you have other pre-flight rehearsal tips to share with the Flight Opportunities community? [Email them to the newsletter editor](#) for possible publication in a future issue.*



## Mark Your Calendars

### **American Society for Gravitational and Space Research (ASGSR) 2021 Meeting November 3-6, 2021 - Baltimore, Maryland**

Moderated by Flight Opportunities Program Integrator Danielle McCulloch, join program-supported researchers Drs. George Pantalos (University of Louisville), Rob Ferl (University of Florida - Gainesville) and Louise Strutzenberg (NASA's Marshall Space Flight Center) for "Leveraging Suborbital Flight Tests to Advance Science and Technology" scheduled for November 4, 2021 at 12 p.m. EDT.

### **ASCEND 2021**

#### **November 8-17, 2021 - Las Vegas, Washington, D.C., and online**

Join Flight Opportunities Program Manager John Kelly for the virtual collaborative session "Expanding Suborbital Testing: NASA Flight Opportunities and Commercial Partners Advance New Capabilities" scheduled for November 8, 2021 at 11:45 a.m. PST.

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Flight Opportunities is part of NASA's Space Technology Mission Directorate.