Four NASA-sponsored experiments set to launch on Virgin Galactic spacecraft

December 13 2018

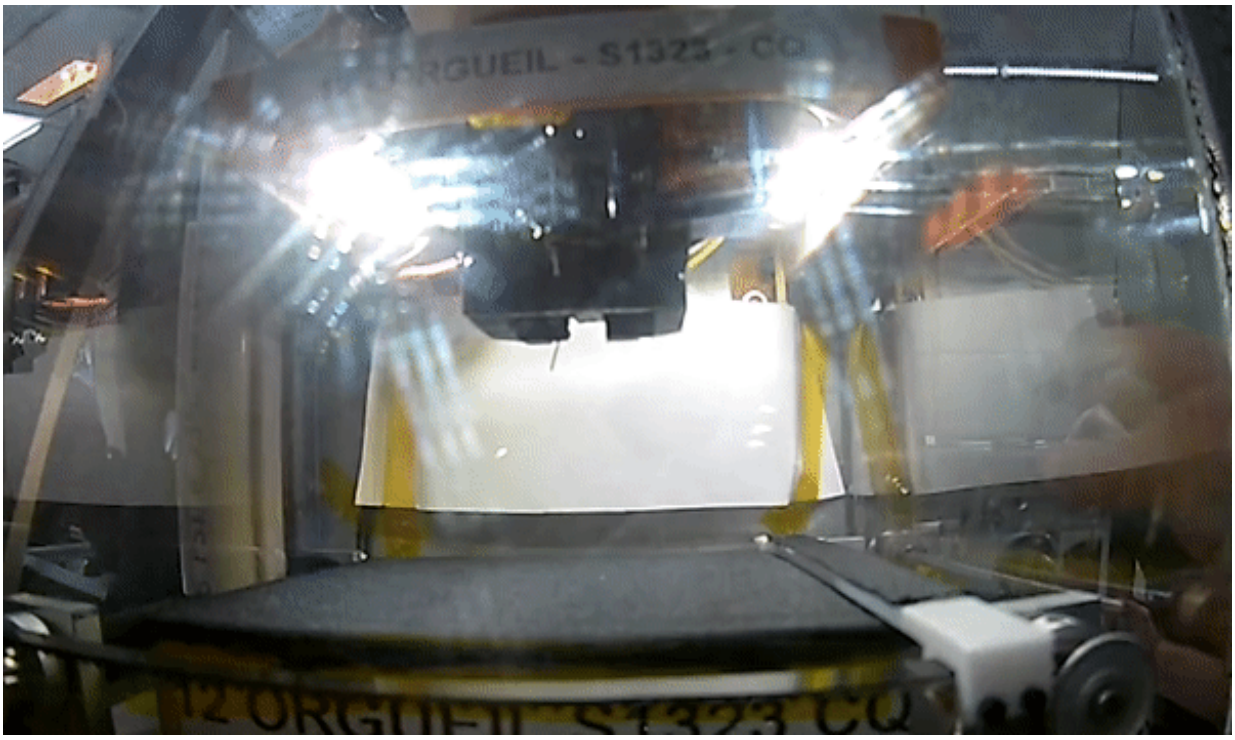
Virgin Galactic's VSS Unity SpaceShipTwo conducted a supersonic test flight in July 2018. Credit: Virgin Galactic

A winged spacecraft will soon take off with four NASA-supported technology experiments onboard. Virgin Galactic's SpaceShipTwo will separate from the WhiteKnightTwo twin-fuselage carrier aircraft and continue its rocket-powered test flight.

The flight, scheduled for no earlier than Dec. 13, is Virgin Galactic's first mission for NASA. The agency's Flight Opportunities program helped the four experiments hitch a ride on SpaceShipTwo. The program purchased flight services, the accommodation and ride, from Virgin Galactic for the payloads. During the flight, the payloads will collect valuable data needed to mature the technologies for use on future missions.

"The anticipated addition of SpaceShipTwo to a growing list of commercial vehicles supporting suborbital research is exciting," said Ryan Dibley, Flight Opportunities campaign manager at NASA's Armstrong Flight Research Center in Edwards, California. "Inexpensive access to suborbital space greatly benefits the technology research and broader spaceflight communities."

NASA's investment in the growing suborbital space industry and strong economy in low-Earth orbit allows the agency to focus on farther horizons. NASA will venture forward to the Moon – this time to stay, in a measured, sustainable fashion - in order to develop new opportunities and prepare for astronauts to explore Mars.



Video of the Physics of Regolith Impacts in Microgravity Experiment, or PRIME, to study the response of asteroidal or lunar regolith in reduced gravity conditions on parabolic airplane flights. The Collisions Into Dust Experiment, or COLLIDE, studies the same phenomena but with longer duration and better quality microgravity on a suborbital flight. Data collected onboard Virgin Galactic's SpaceShipTwo will help the experiment obtain data from slower impacts as well as study the behavior of the regolith and ejecta after the impact. Credit: Josh Colwell/University of Central Florida

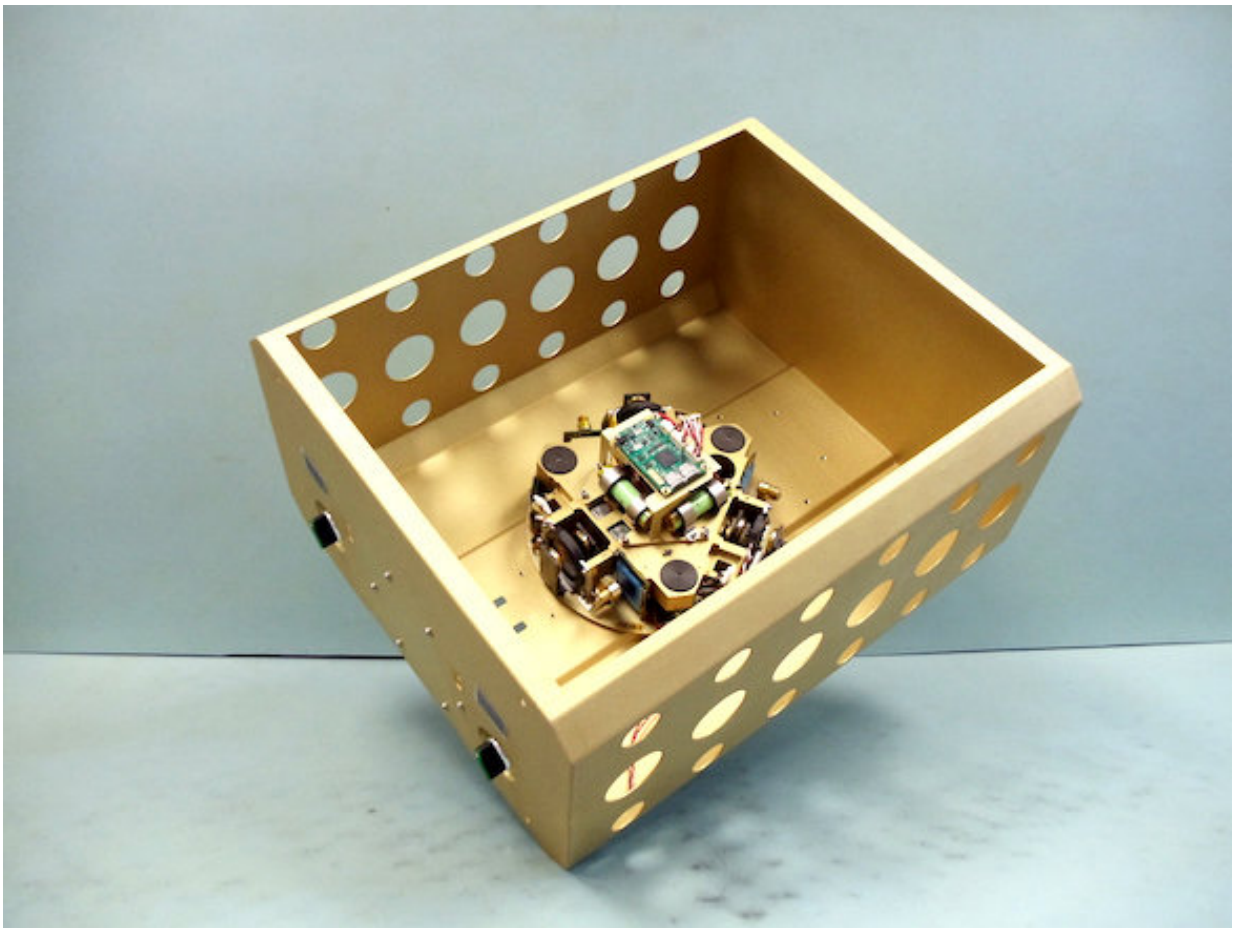
The planned technology demonstrations onboard SpaceShipTwo could prove useful for exploration missions. For Principal Investigator Josh Colwell at the University of Central Florida in Orlando, the Virgin Galactic flight will help further refine the Collisions Into Dust Experiment (COLLIDE). The experiment aims to map the behavior of dust particles on planetary surfaces. Suborbital flights let Colwell and his team gather data useful for designing exploration architectures at the

Moon, Mars and beyond.

The presence of dust on asteroids and moons with low surface gravity introduces challenges for both human and robotic missions. Particles can damage hardware and contaminate habitats. Understanding dust dynamics could help NASA design better tools and systems for exploration missions.

On this microgravity flight, COLLIDE will simulate the dusty surface of an asteroid and a surface impact. The experiment will collect high-quality video of the dust dispersing.

"We want to see how dust in microgravity behaves when it's disturbed. How fast will it fly around? How careful do you have to be to avoid disturbing the surface too much? If you have a hard landing and disturb the surface a lot, how long will you have to wait for the dust to clear?" Colwell explained.



The Vibration Isolation Platform from Controlled Dynamics Inc. has completed five successful Flight Opportunities-sponsored flights on suborbital reusable launch vehicles (sRLVs). The scheduled flight on SpaceShipTwo will mark its sixth. Credit: Controlled Dynamics Inc.

Here on Earth, this isn't as much of a concern. Colwell explained that in space, where the absence of gravity complicates every task at hand, such considerations are significant for mission planning.

"If you have a small dust disturbance and can work around it, great. If the dust particles have enough speed, they can contaminate and stick to equipment well above the surface, posing problems for safety as well as

mission success," Colwell said.

COLLIDE data collected on its first to suborbital space, as well as data from a related experiment previously tested on NASA-sponsored parabolic aircraft flights, could help future human and robotic explorers throughout the solar system. The other technology payloads slated for the SpaceShipTwo flight are:

- Microgravity Multi-Phase Flow Experiment for Suborbital Testing. NASA's Johnson Space Center in Houston. Life support systems are an integral part of a deep space habitation capability. They typically include processes where liquids and gases interact, therefore requiring special treatment in space. This two-phase system separates gas and liquid in microgravity. The technology could also be applied to in-situ resource utilization, power systems, propellant transfer and more.
- Validating Telemetric Imaging Hardware for Crew-Assisted and Crew-Autonomous Biological Imaging in Suborbital Applications. University of Florida in Gainesville. In order to live in deep space, astronauts will have to grow their own food. This experiment studies how microgravity affects plant growth. The experiment uses a biological fluorescent imaging instrument designed to collect data on the biological response of a plant, or plant tissue.
- Vibration Isolation Platform. Controlled Dynamics Inc. in Huntington Beach, California. Spacecraft and payloads are subject to intense launch environments. This mounting interface for orbital and suborbital vehicles is designed to lessen disturbances on payloads during launch, re-entry and landing.

All four payloads are currently scheduled for future flight demonstrations, enabling researchers to gather additional data and mature their technologies.

Provided by NASA