COLLIDE: Collisions Into Dust Experiment

Problem Statement

- Understand how to safely and efficiently operate equipment and scientific instruments on the surface of a dust-covered object with low surface gravity.
- This flight campain provides data on the response of regolith to low-energy disturbances in near-zero gravity environments.
- NASA exploration division and planetary scientists are the prime beneficiaries of COLLIDE.

Technology Development Team

- Dr. Joshua Colwell, University of Central Florida, jec@ucf.edu.

- Experiment funding is provided by the Center for Microgravity Research and Education at the University of Central Florida. The P.I. (Colwell) is the point of contact.
- NASA is the most likely partner in this technology development.

Proposed Flight Experiment

Experiment Readiness:

- The experiment will be ready to fly November 15, 2012.

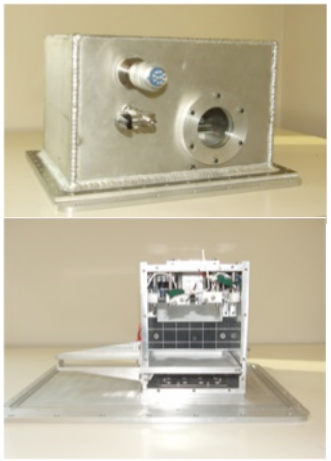
Test Vehicles:

- COLLIDE is designed for flight on a commercial reusable suborbital launch vehicle.

Test Environment:

- The experiment is modified from an experiment that flew on the space shuttle. The requested test environment is free-fall .

Test Apparatus Description:



The experiment consists of a vacuum chamber containing a regolith target tray and a low-speed projectile launcher. In free-fall, the projectile is fired into the regolith and the regolith response is recorded by a digital video camera external to the vacuum box.

Technology Maturation

- Successful operation of the experiment will advance the TRL from TRL-6 to TRL-8. Successful operation means the projectile impacts the target at the correct speed during free-float conditions and usable high-speed video data is collected.
- We have implemented automated control of the launcher and target trays and need to test it in the zero-g environment.
- There is no deadline.

Objective of Proposed Experiment

- Investigate the behavior of fine particles in dusty environments in response to human and robotic activities to provide a guide to mitigating against dust contamination in manned and unmanned exploration of the Moon, Mars, and asteroids.
- Flight data consists of high-speed video. Analysis of the data will indicate whether the technology performed as designed.

List the applicable Technology Areas addressed by your technology: TA06, TA07, TA08