T0122-P Collisional Accretion Experiment (CATE)

Problem Statement

- CATE will provide further insight into particle interactions similar to those in proto-planetary disks and in planetary ring systems.
- A microgravity environment is necessary to achieve the low collision velocities (< 1m/s) relevant to astrophysical environments.
- Potential users include those interested in exploring contained projectile motion in microgravity environments.

Technology Development Team

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Proposed Flight Experiment

Experiment Readiness:

- The experiment will be ready to fly by July, 2013.

Test Vehicles:

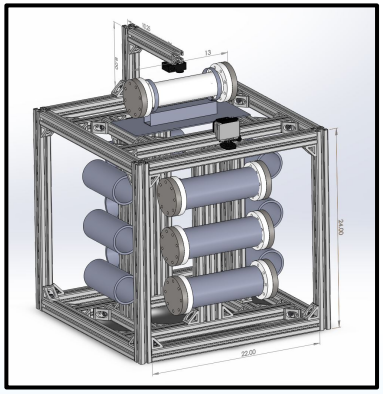
- We request flights on a parabolic airplane.

Test Environment:

- The experiment has been tested extensively in laboratory 1-*g* conditions, but has not flown in microgravity conditions. Portions of the experiment will have been tested in a Drop Tower to understand performance in μg environments.

Test Apparatus Description:

- Shown below are CAD drawings of the experiment test chamber (left), and the experiment storage unit (right).
- The experiment parameters will be determined before flight, and human interactions will control the experiment in-flight.



Technology Maturation

- Prior to flight, most of the hardware will be at TRL 4, with extensive testing in the laboratory environment. Some components will be at TRL 5, as they can be tested in-house in our Drop Tower apparatus.
- The hardware for CATE is currently being finalized and will undergo laboratory testing (1-*g* and μg) before the flight. Funds are in-house to complete this.
- There is no firm deadline for technology maturation to TRL of 6.

Objective of Proposed Experiment

- Generate low velocity collisions between particles in order to simulate conditions relevant to protoplanetary disks and planetary ring systems
- Our results will include: coefficient of restitution as a function of impact velocity; collision outcome as a function of impact velocity and particle size; total accreted dust mass as a function

TA: TA08 (Science Instruments, Observatories, and Sensor Systems)

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