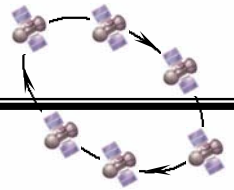
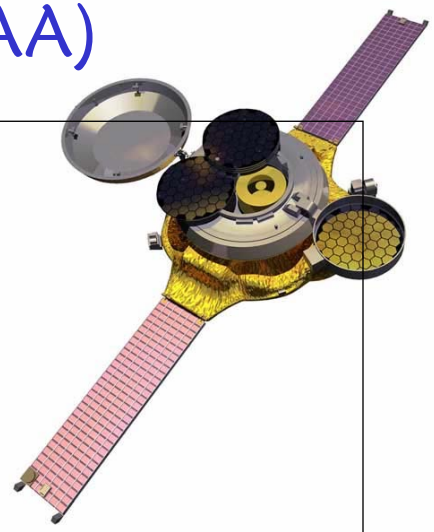


Space Design Projects for 2005-2006

- New Decelerator System for Capsules Reentering from Deep Space (AIAA)
- Sounding Rocket Mission to Complement Radiation Belt Storm Probes (RBSP) Mission
- A Self-Sustaining System for Global Terrain Exploration and Environmental Sampling on Titan (Dr. Woolsey)
- An Electrodynamic Tether Demonstration Mission for Highly Agile Spacecraft

New Decelerator System for Capsules Reentering from Deep Space (AIAA)



- Sample return missions use hyperbolic reentry trajectories
- Challenge: Design capsules and deceleration systems that are simple, low-mass, autonomous, and reliable
- An alternative for decelerating the reentering capsule at high altitudes can be provided by a long trailing **tether**
- Use return-to-Earth profile of deep-space reentry capsule such as Genesis to design a **tether-based** deceleration system to significantly reduce the maximum temperatures on the capsule and the decelerator itself

Sounding Rocket Mission to Complement Radiation Belt Storm Probes (RBSP) Mission

- In May 2005, a VT student-designed payload was launched to ~60 miles on an Improved Orion Sounding Rocket, from Wallops Island Flight Facility on the Eastern Shore
- This project involves design of a sounding rocket payload and mission to complement the coming RBSP Mission
- Primary science involves magnetic field
- Design challenge includes design/selection of science instrument, payload subsystems, and specific launch vehicle and site selection

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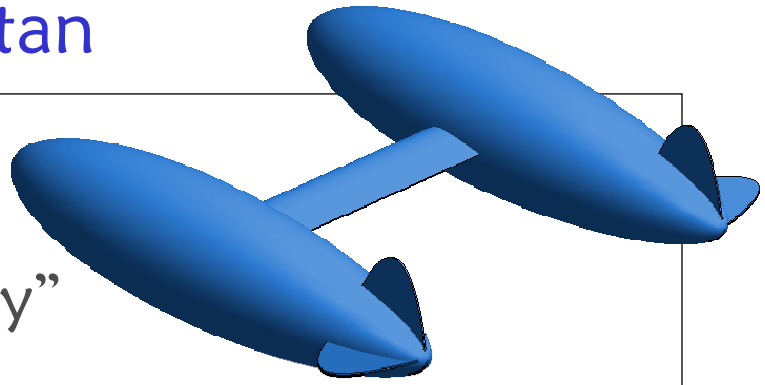
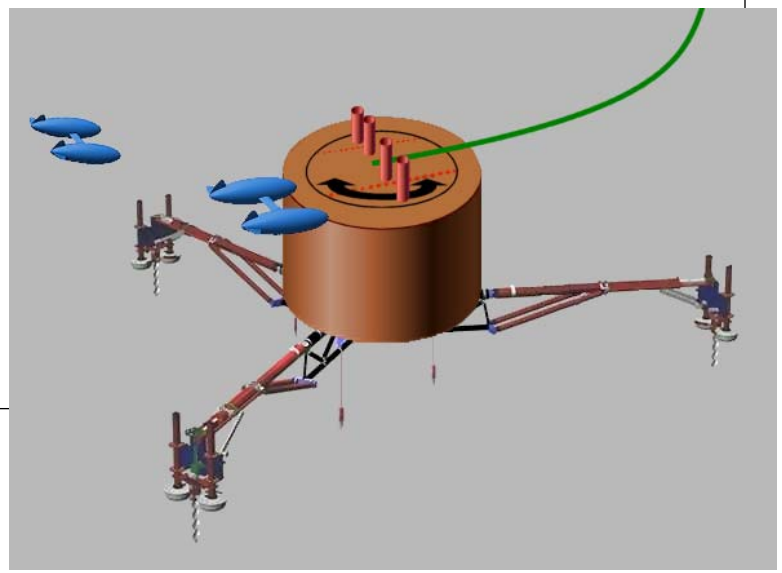
A Self-Sustaining System for Global Terrain Exploration and Environmental Sampling on Titan



- Buoyancy driven gliders to explore and image the terrain, sample the atmosphere, and perform "light-duty" surface sampling
- A fixed docking station to store energy (possibly generated by a **tethered**, high-altitude wind energy harvester), recharge vehicles, upload science data, and download new missions



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An Electrodynamic Tether Demonstration Mission for Highly Agile Spacecraft

- Electrodynamic **tethers** have been proposed for a variety of applications, including passive deorbit, payload reboost, and power generation
- Design Challenge: develop a demonstration mission design for an electrodynamic **tether** with emphasis on being highly maneuverable
- Goals:
  Develop metrics for characterizing the agility of an EDT spacecraft;
  Characterize the limits of performance of EDT spacecraft