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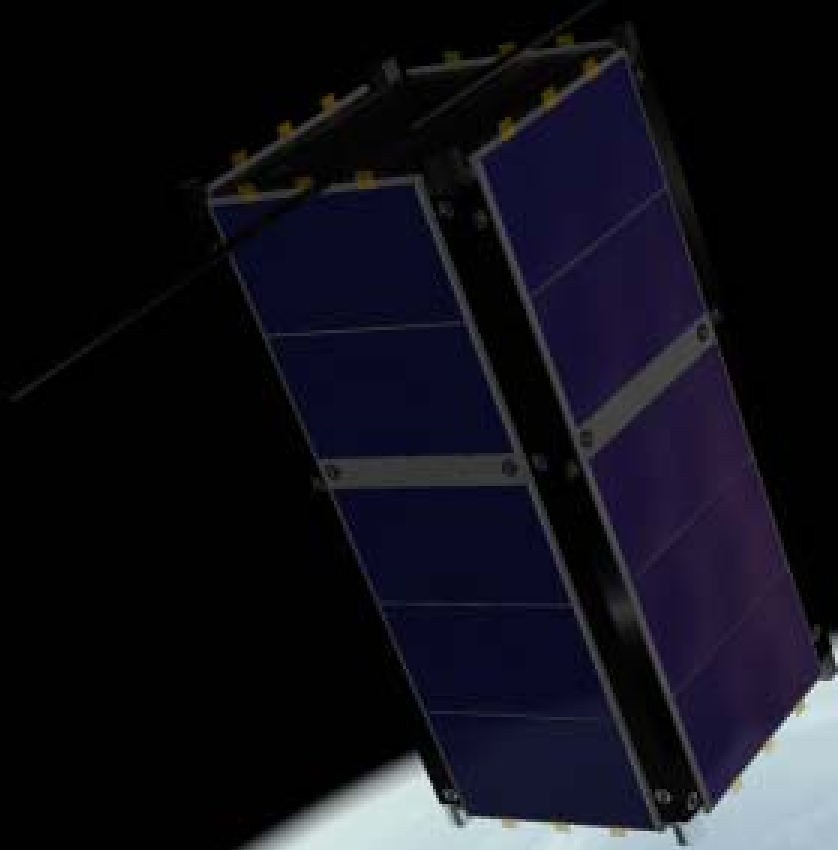

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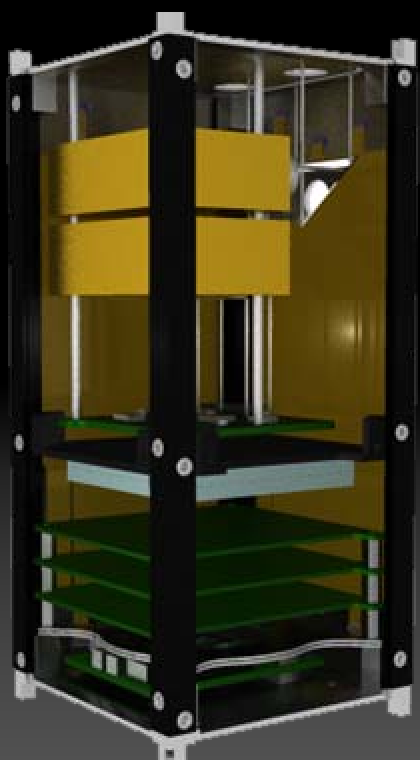
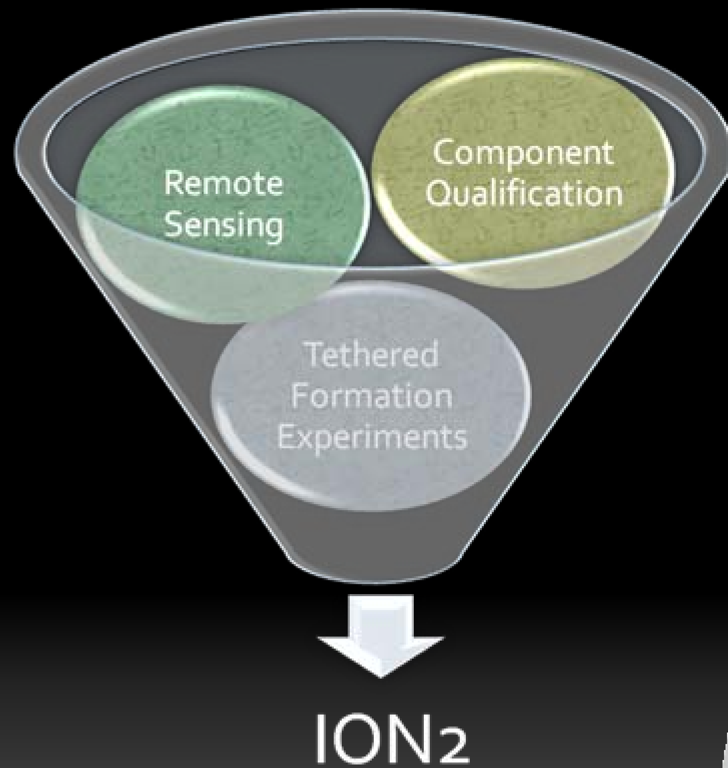
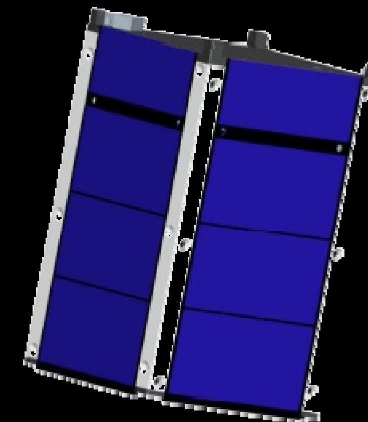
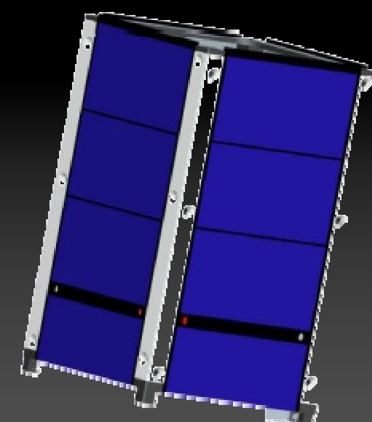
CubeSat Developers Workshop 2008

Ideal Missions









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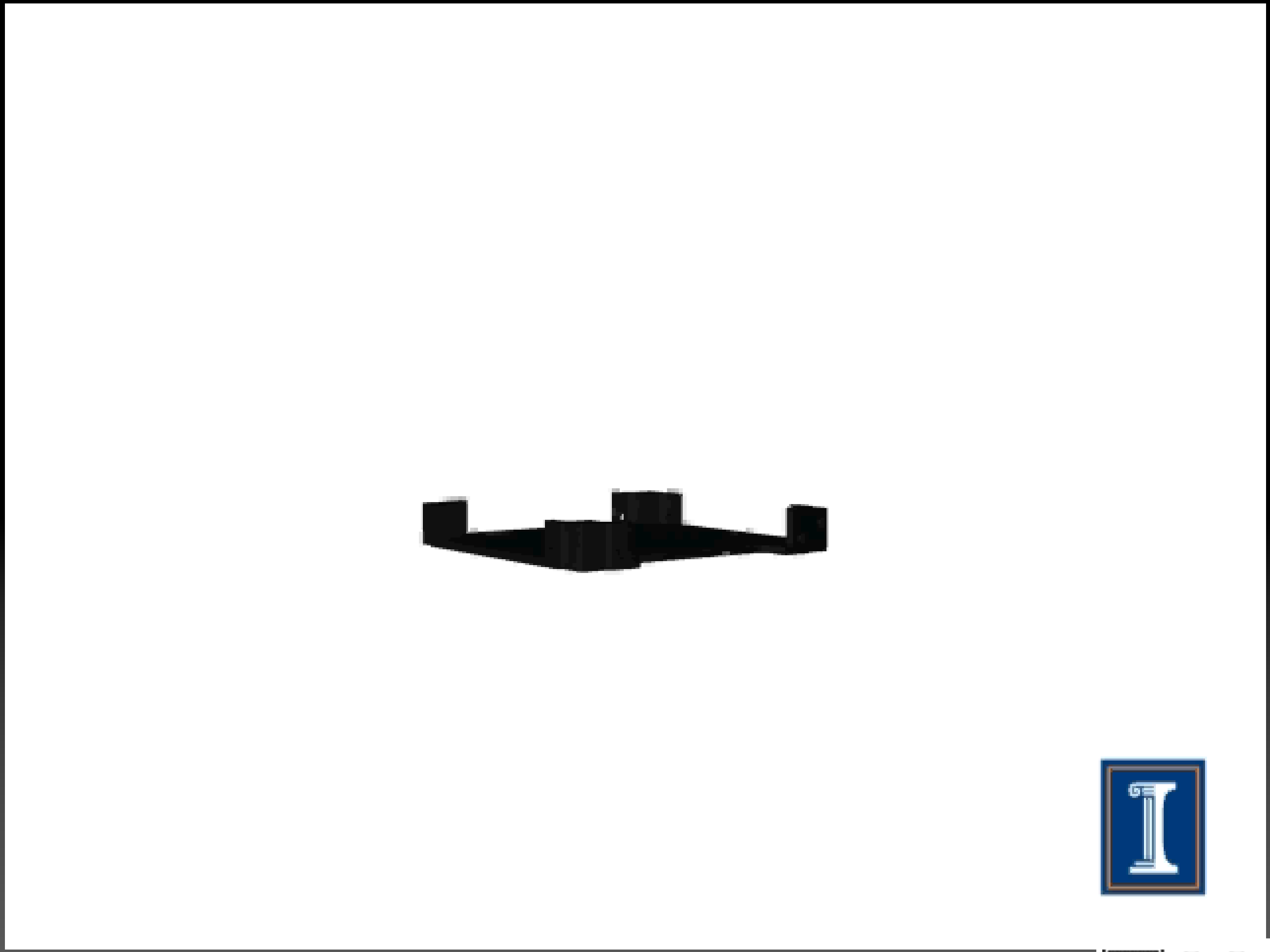
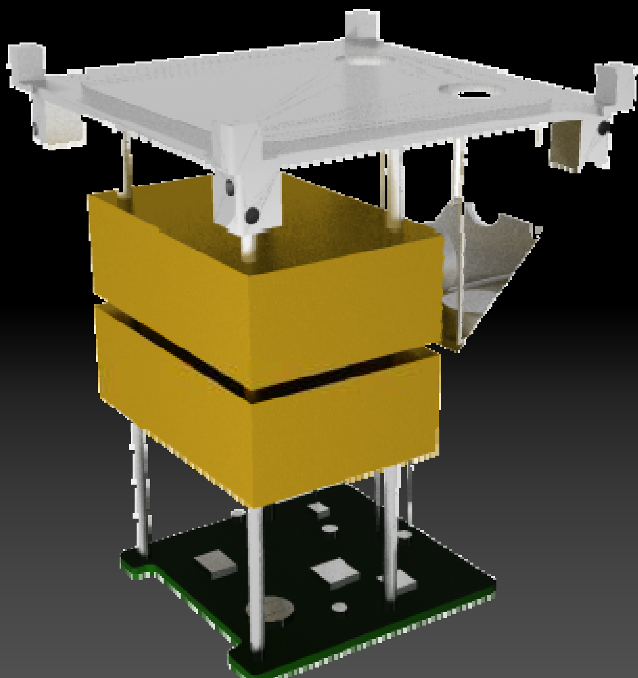
Assembly Video



Payload Interface

- Top Plate Interface
- Available Volume: 90 mm x 90 mm x 127-240 mm
- Available Payload Mass: 750-1600g



Example: Dual-PMT Experiment

- Versatile Data Interface
  - Async Serial
  - SPI / I^2C
- On Board Storage
  - Data package generation and queuing

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Documentation


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CUBESAT PROJECT
GENERIC BUS DESIGN

Solar Panel Interface Specification

Introduction

This document is intended to be a working document, outlining the interface of the Solar Panels to the main satellite. The solar panels are not structural in the generic bus design. They must bear their own weight, and only have a limited number of attachment points.

Overall Dimensions

Structural

Thermal

Electrical

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CUBESAT PROJECT
GENERIC BUS DESIGN

Payload Interface and Design Specification

Introduction

This document is intended to be a working document, outlining the interface and design limitations on the primary payload package of the satellite. The payload must be a self-contained unit. It must link using known electrical, thermal and electronic interfaces or provide its own conversion. The entire top 'cube' is dedicated to payload components, although allowance can be made for payload processor cards in the service cube. See Figure 1 for terminology used; note that a large payload is depicted in most figures, however there is no required minimum payload size, only minimum mass.

Mass Restrictions TBC

The payload must not total more than 650 g in mass for all components. This includes any wiring or interface hardware that the payload shall require, or any additional hardware needed by the payload but which will not reside in the payload cube. At 650 g the centre of mass of all payload components (even if they are in the service cube) cannot be located more than 9.0 cm above the middle plate, and must be at least 1.0 cm above the middle plate. It may not deviate more than 2.5 cm off the Z axis in either the X or Y direction. Adjust these restrictions for lighter payloads to maintain the total satellite centre of mass within 2 cm of the geometric centre of the bus (the centre of the centre plate). Note that the satellite without payload has a mass of *1.35 kg located (0.168, -0.930, -34.273) mm*. Dummy masses may be required for lighter payloads.

Overall Dimensions

The largest possible payload may occupy a space of 9.00 cm x 9.00 cm x 95.25 cm, however at this size it will require special corners to use the entire 95.25 cm height. Any payload with less volume or made from multiple, smaller components can fit within the payload cube. See Figure 2 for keep-out regions.

Interfaces

Mechanical

For the primary payload itself, there are three recommended interface methods. The top thermal plate is intended as a payload interface component. As shown on the left in Figure 2, UIUC provides a barebones top plate, and has considered its 40.3 g mass a structural component of the satellite. However, instead of the mass-saving centre hole, any amount of material can be left for use by the payload as structural attachment. This is depicted on the right; en entire surface of indicated by 'Option 2' is available for whole patterns, pass-throughs or other payload-specific mechanical interfaces. Please note however, that the total mass of a 'blank' top plate is 83.2 g, and any difference from the 40.3 g basic model is considered part of the 'payload' mass, as listed above under *Mass Restrictions*.

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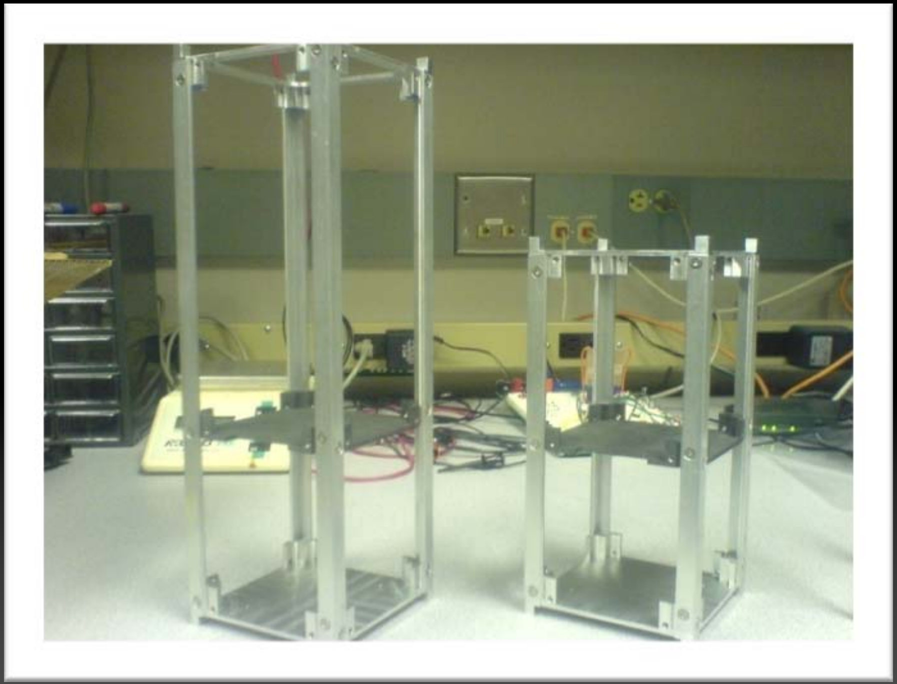
GENERIC BUS DESIGN

Scalable



- Single Component Update
- PPT scales with larger array
- Additional volume available for:
  - Payloads
  - Reaction ADCS
  - Stationkeeping Thruster

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Service Module

Batteries

Circuit Stack

- Integrated power and data backplane
- Expandable and reconfigurable

Trench for system cabling

Common thermal path to radiator

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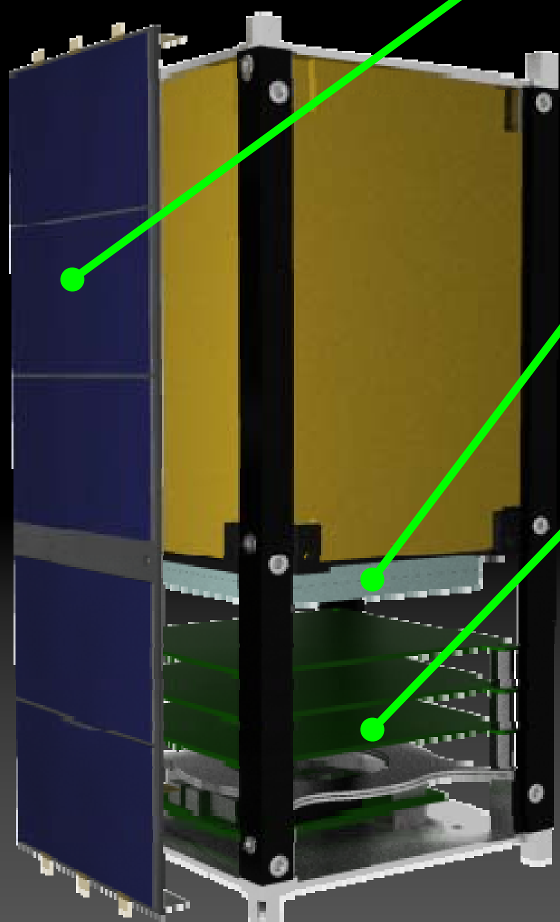
Power



Spectrolab Triple Junction Solar Cells

- 27% efficiency

Lithium Polymer Batteries

- 7.4V – 2200mAh
- Integrated cell balancer

Power Board

- Supervisor µC with beaconing capability
- Power Point Tracker / Battery Charger
- 3.3V @ 5A
- 5V @ 5A
- 12V @ 1A

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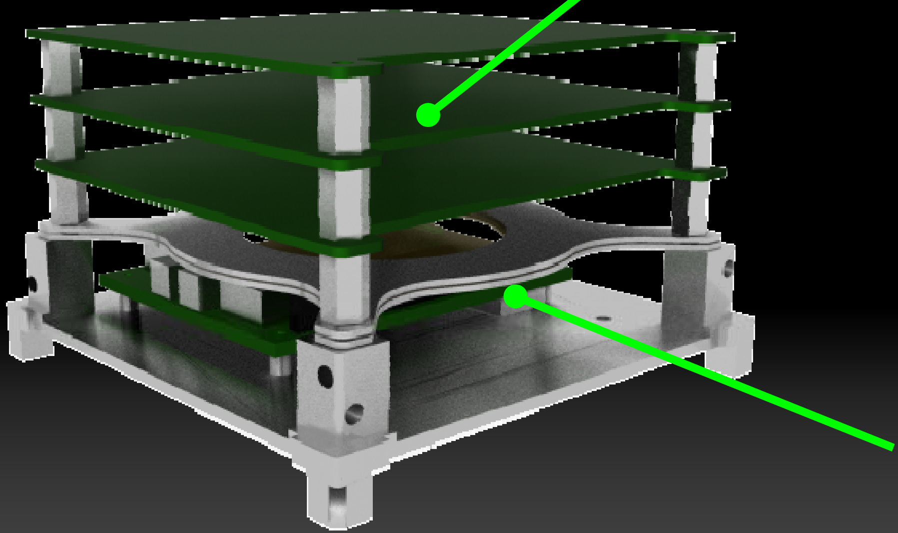
C&DH & Communications



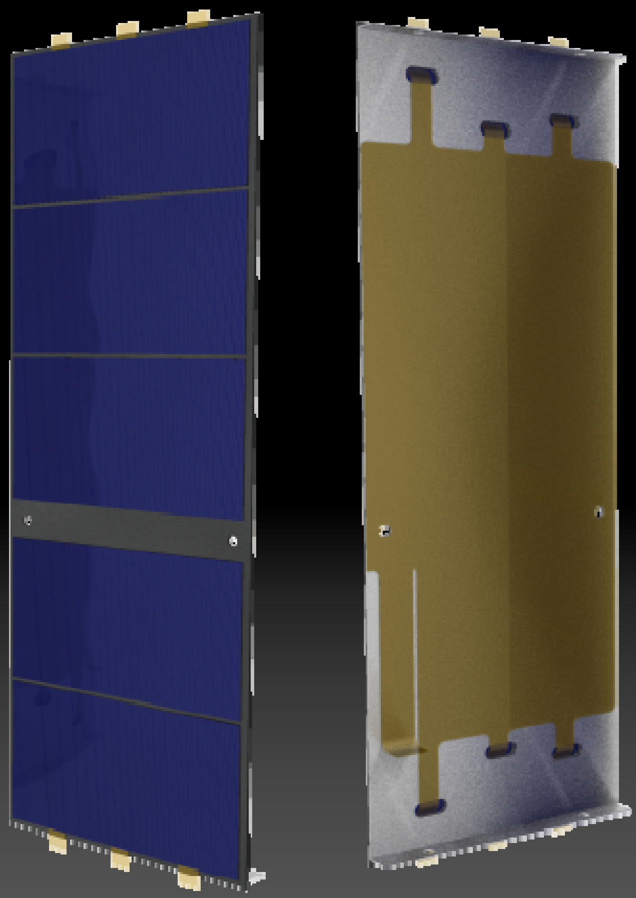
CPU (Ti OMAP 5912)

- Dual Core ARM9 / C55x DSP
- 192 MHz
- Linux 2.6 kernel
- C&DH daemon - iond
- DSP accelerated TNC

Radio (Dataradio DM-3475)

- 70cm Amateur Band
- .5W – 2W variable Tx Power

ADCS



- 3 axis magnetometer and accelerometer
- Sun Sensor
- On board processing and control logic
- 3 axis variable magnetic torque coils (0-±0.106Am^2)
- Estimated 2 hour de-tumbling time

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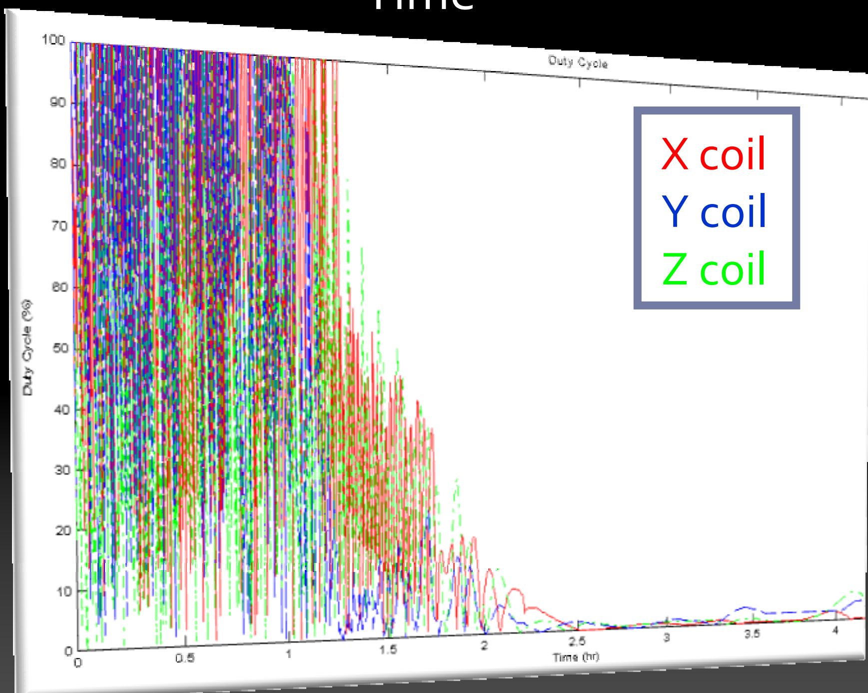
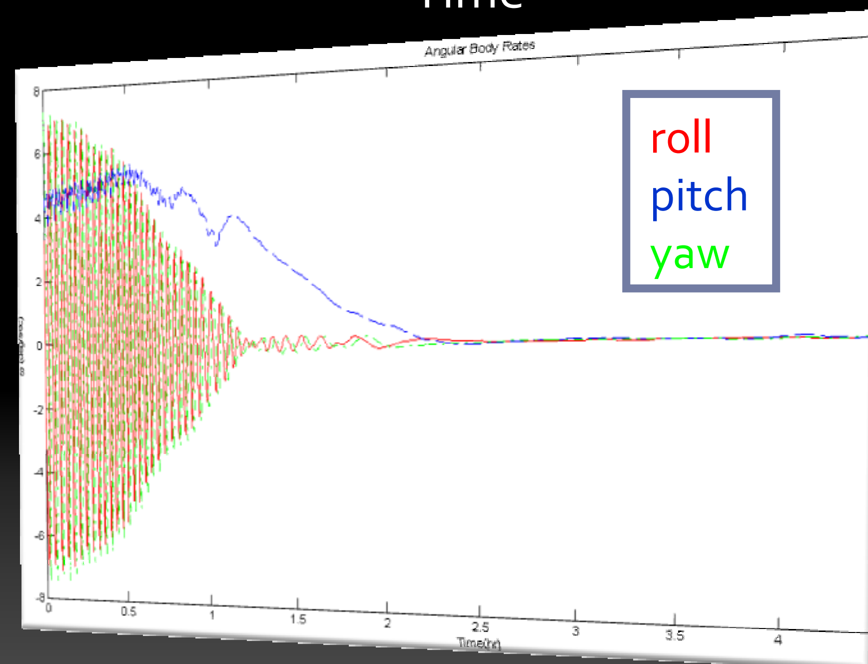
De-Tumbling

Duty cycle of Torque Coils Vs. Time



Angular Body Rates Vs. Time



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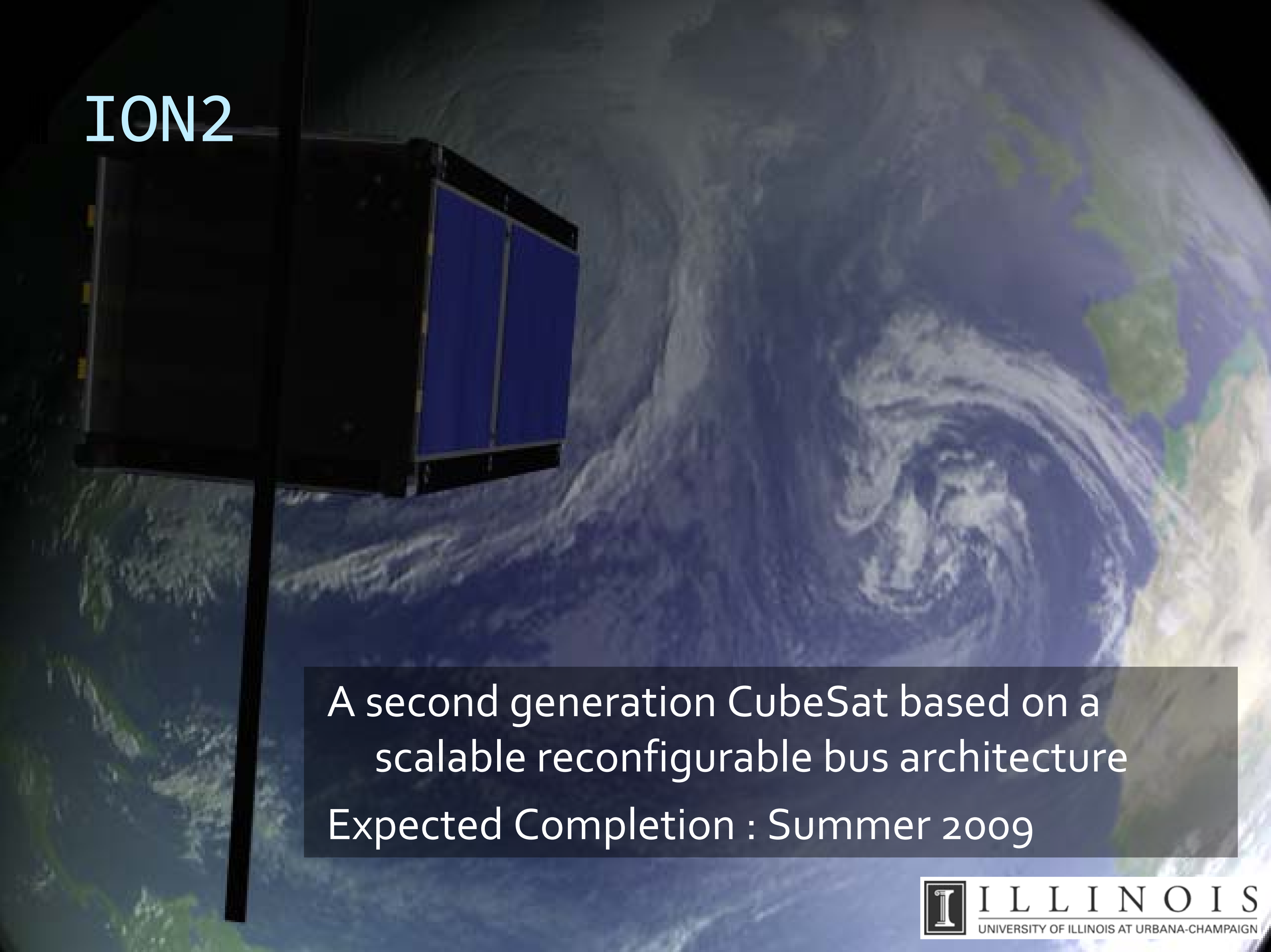
ION2
A second generation CubeSat based on a scalable reconfigurable bus architecture
Expected Completion : Summer 2009
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