The Role of Education Projects for Future Space Science and Technology

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From an Educators view

Overview

- Morehead State University?
- To this audience
- Where are we now?
- The role of TinySats & PocketLabs
- The STEM Initiative
- Where can we go now?

Morehead State University?

Space Gem

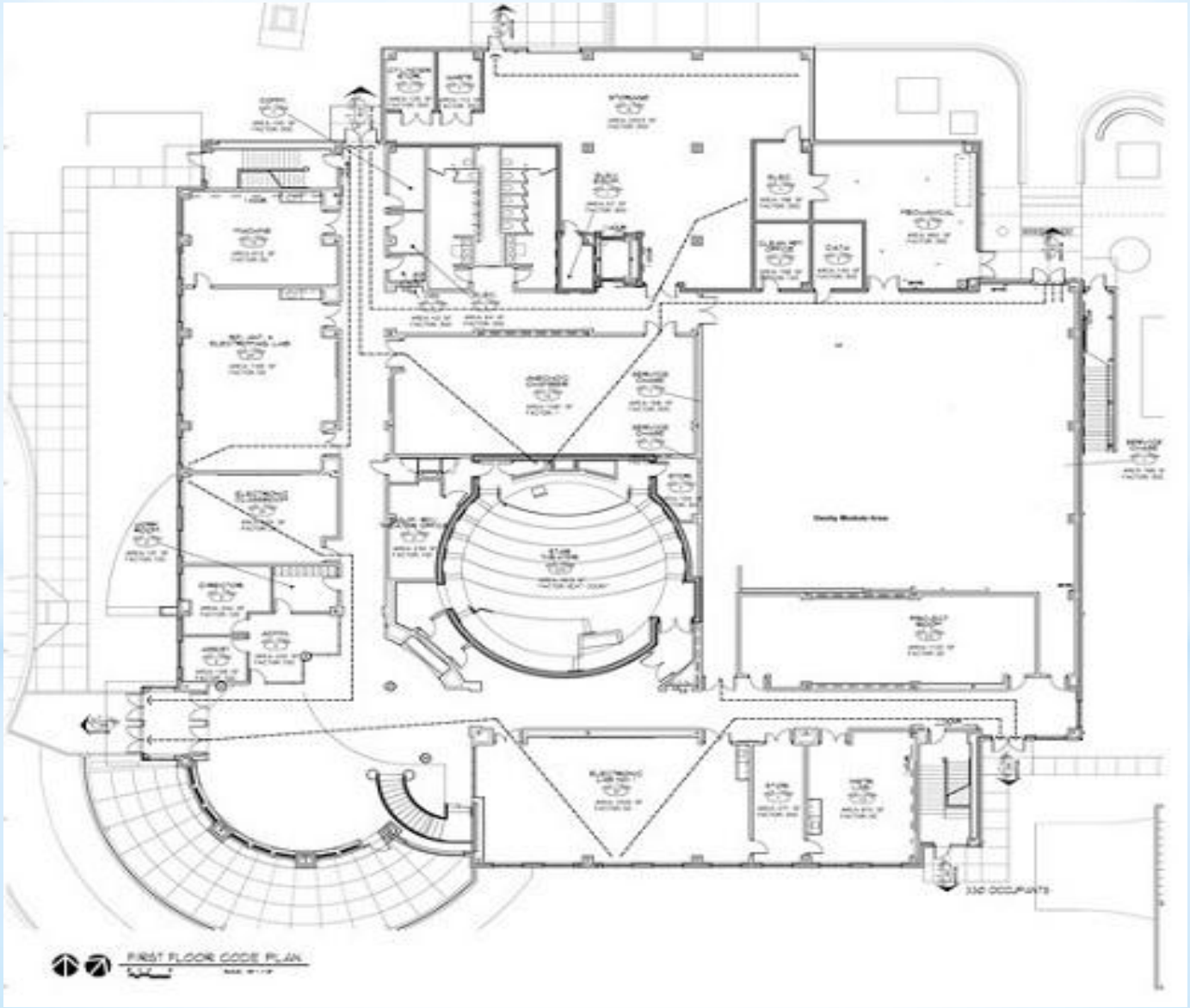
- In the hollows of East Kentucky
- Small town – 7,000
- Low cost housing
- World class Muskie fishing 15 minutes from campus
- Everyday morning we have a rush – minute with traffic

Morehead State University?

Morehead State University?

Morehead State University?

Morehead State University?



Morehead State University?

Space Innovation & Realization Center of Eastern Kentucky

To this audience

To this audience

Who is here today?

Look around, who do you see?

Eight Years Ago

- Students
- Faculty

Five Years Ago

- Students
- Faculty
- Aerospace Industry

Today

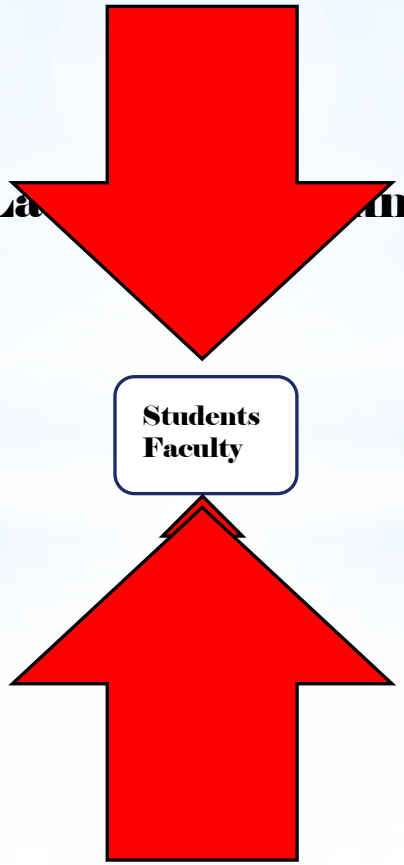
- Students
- Faculty
- Aerospace Industry
- **Government**
  - DARPA
  - NRO
  - NSF
  - Air Force
  - Navy
  - Army

Future

- Students
- Faculty
- **Aerospace Industry**
- ?

Future

Launch Opportunities



Cost

Where are we now?

Where are we now?

Aerospace Industry

DARPA
NRO
NSF
Air Force
Navy
Army

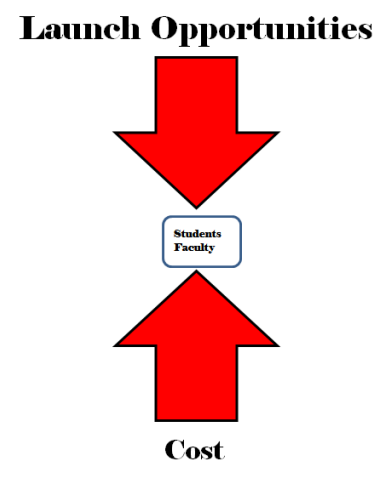
Students
Faculty

CubeSats
MicroSats
MiniSats

CubeSats

Where are we now?

Is this the Education Community's lot in life?



Students
Faculty

→ CubeSats

Advice:

Fight back!

Go for value rather than volume!

Students
Faculty

Microgravity Experiments

CubeSats
FemtoSats
AttoSats

The role of TinySats & PocketLabs

Barnacle Labs - Microgravity

- CubeLabs
- PocketLabs

Orbital - Sats

- CubeSats
- PocketQubs
- FemtoSats
- AttoSats

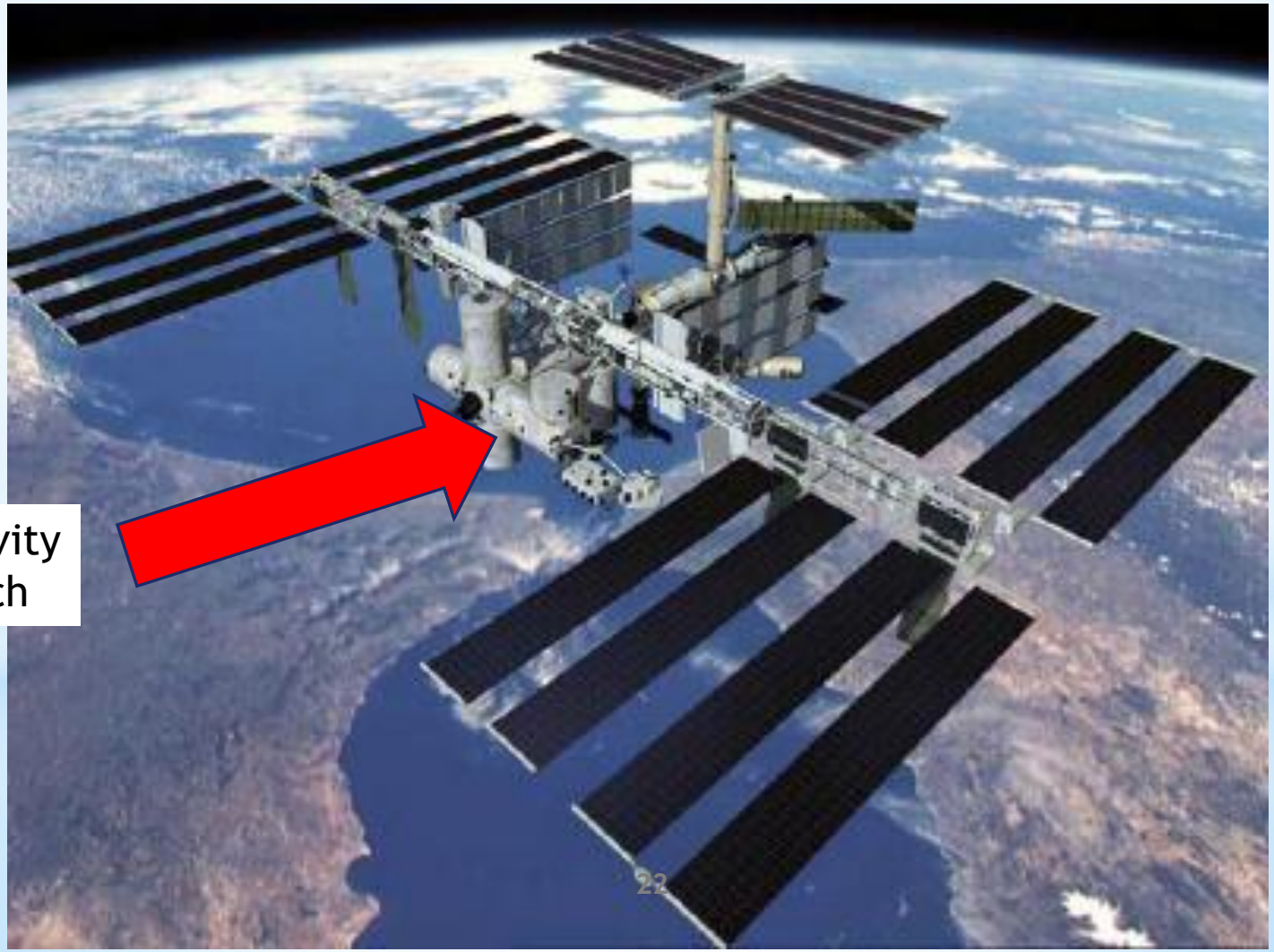
Barnacle Labs - Microgravity

CubeLabs

PocketLabs

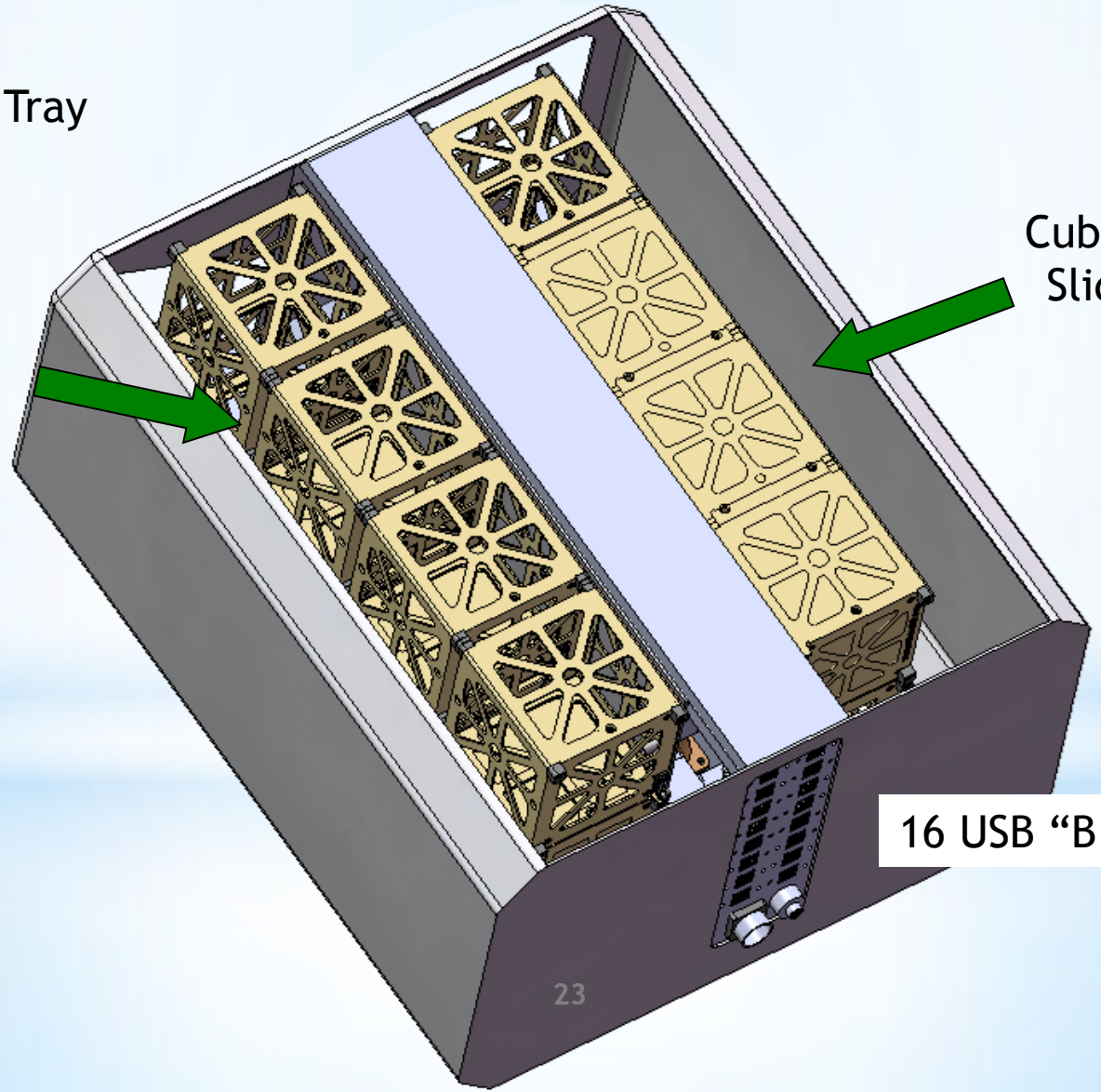
Microgravity Research
With
CubeLabs

International Space Station Flight Opportunity

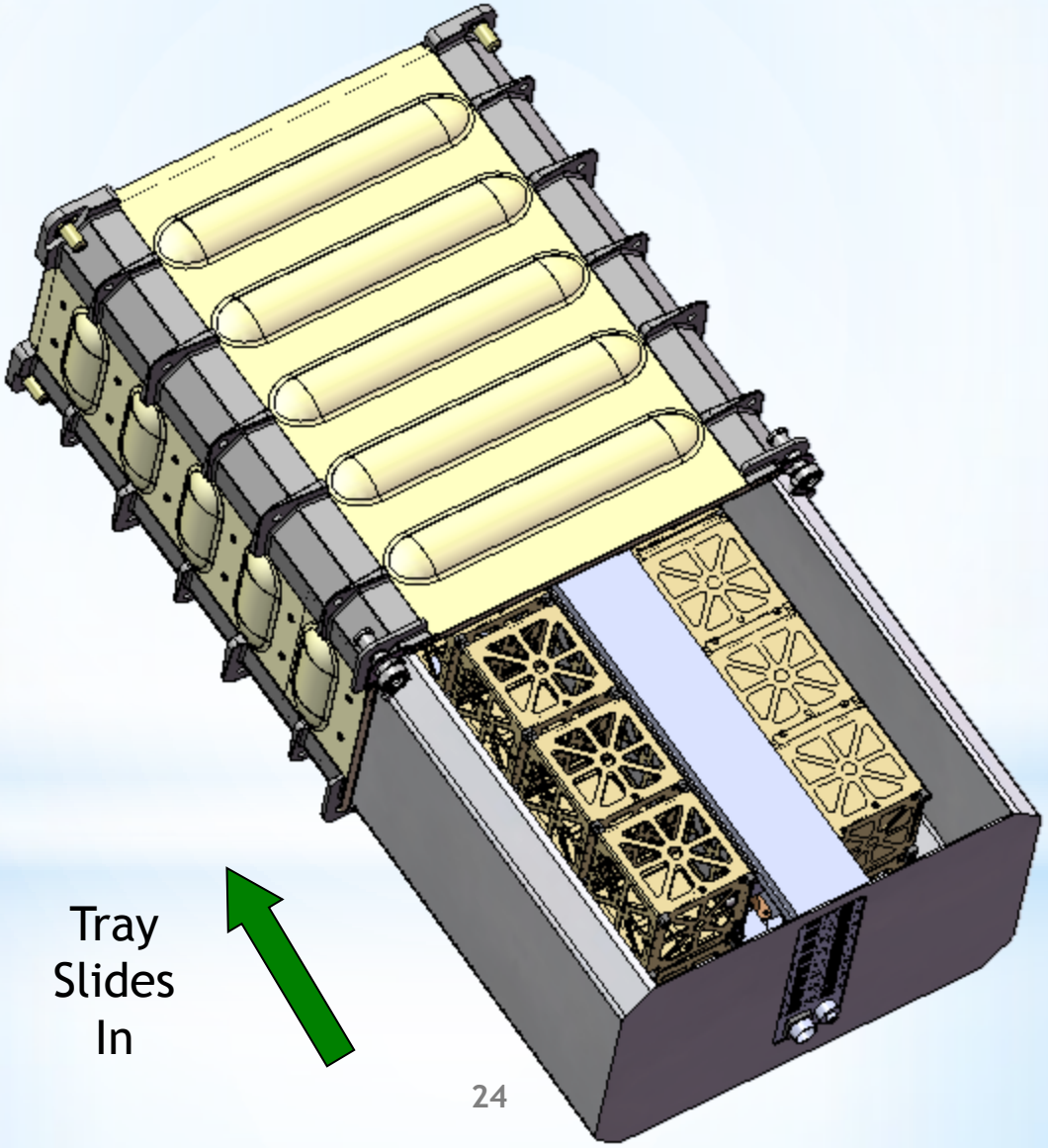


Microgravity Research

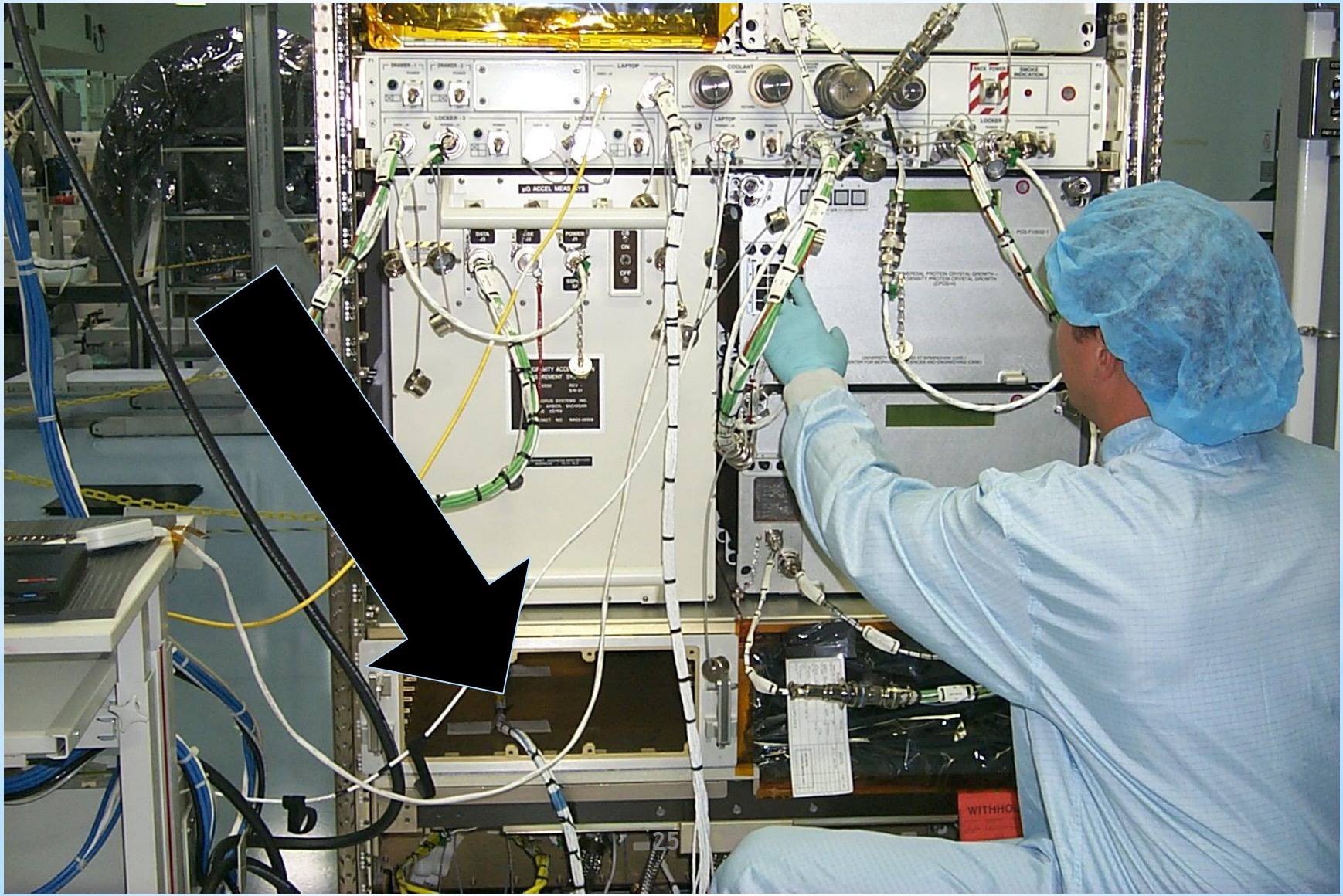
NanoRacks


NANORACKS Tray
CubeLabs Slide In
CubeLabs Slide In
16 USB “B Type” Plugs

NanoRacks



Express Rack



Microgravity Research
With
PocketLabs

Show Models

Orbital - Sats

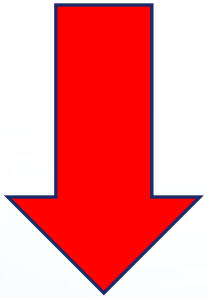
- CubeSats
- PocketQubs
- FemtoSats
- AttoSats

Orbital - Sats

With PocketQubs

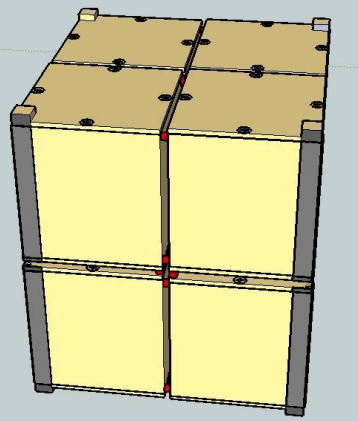
The role of TinySats & SpaceLabs

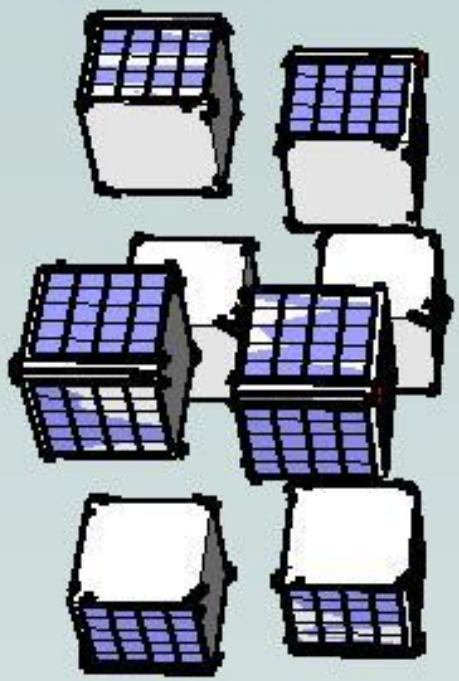
Group name	Wet Mass	
Large satellite	>1000kg	
Medium sized satellite	500-1000kg	
Mini satellite	100-500kg	
Micro satellite	10-100kg	
Nano satellite	1-10kg	Small Satellites
Pico satellite	0.1-1kg	
Femto satellite	<100g	

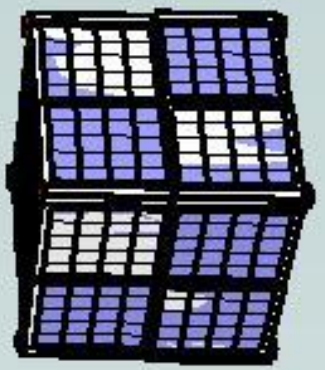


CubeSat
As
FemtoSat Launcher

Put 8 together







Use P-POD concept to launch 8

Orbital - Sats

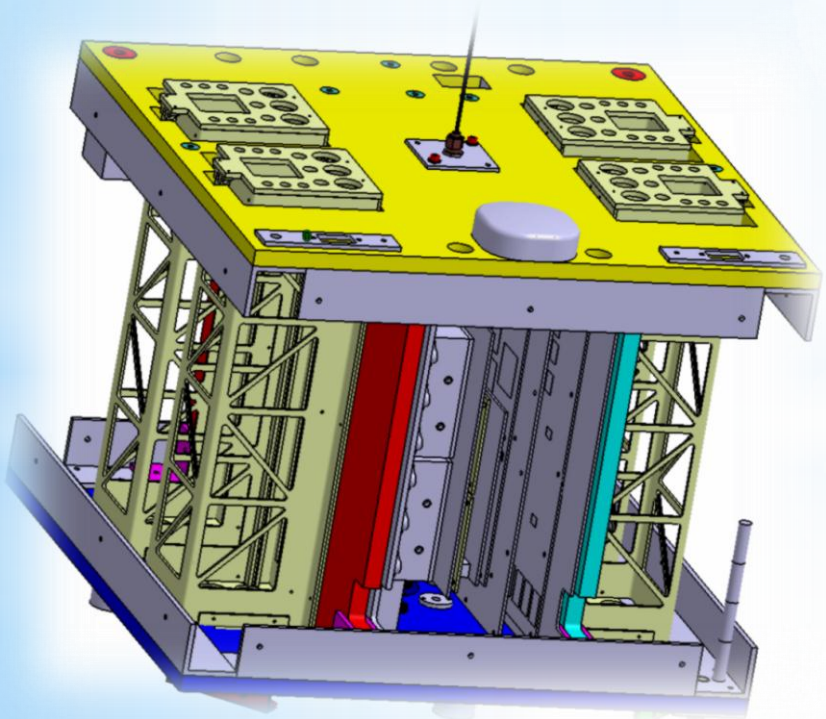
With FemtoSats

Demo of Launcher

EduSat

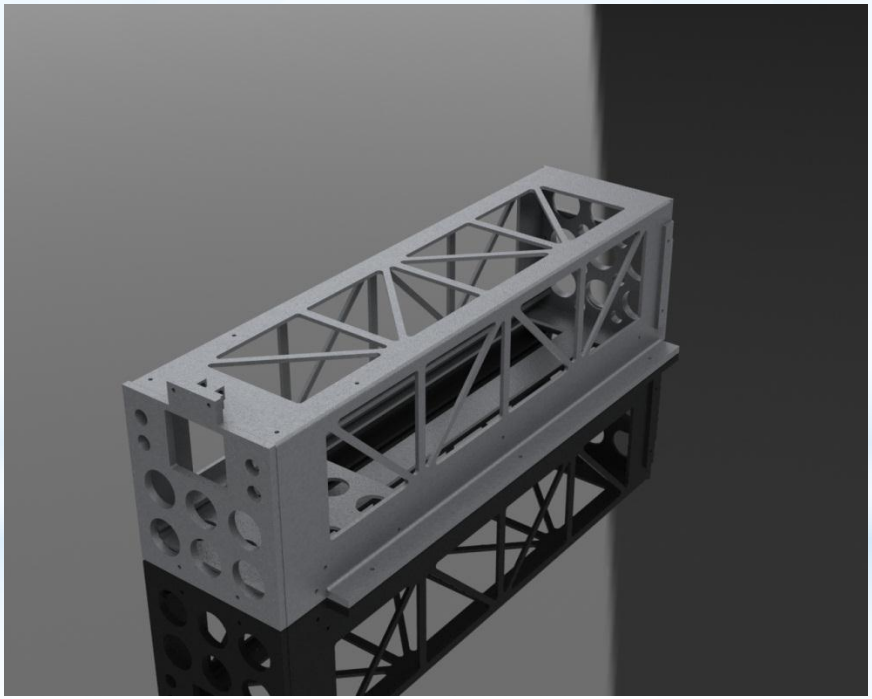
Collaboration with
The University of Rome

EduSat



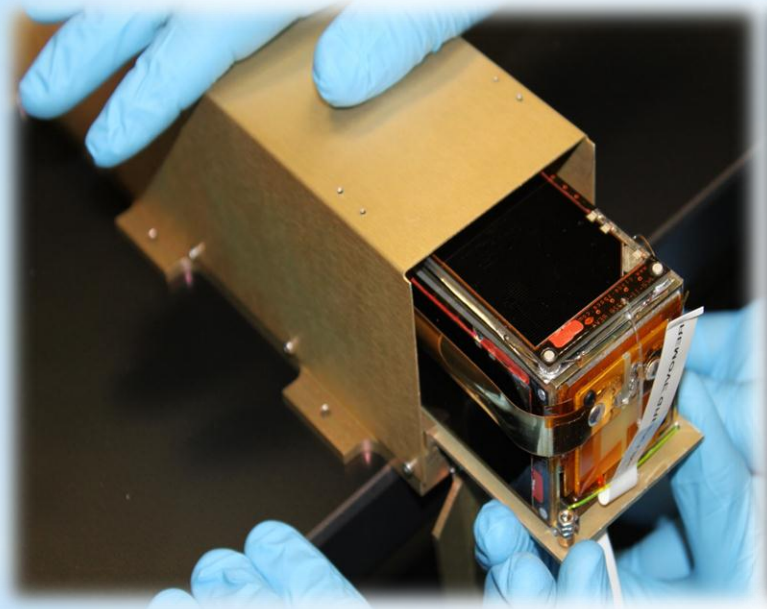
An early CAD Model of EduSat's Internals
Right: EduSat Model

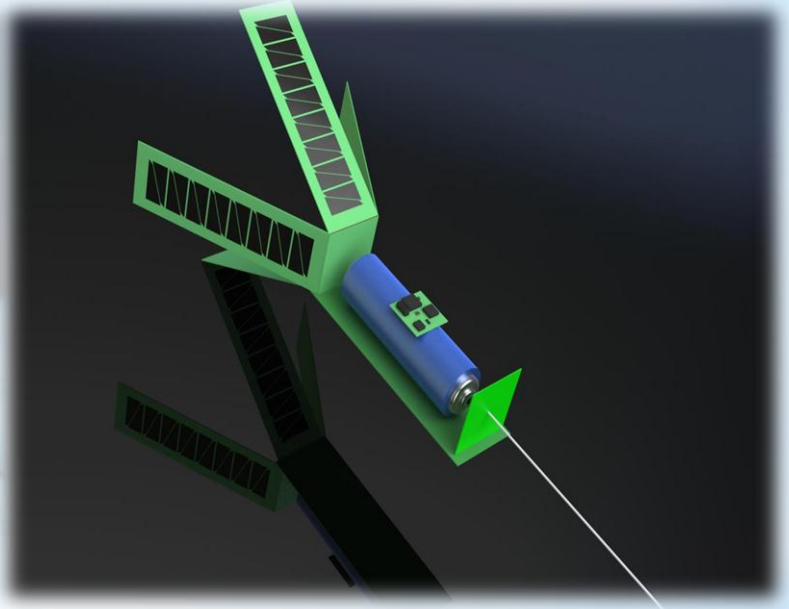
MR-FOD



3D Plastic Printed Model

The role of TinySats & SpaceLabs





Orbital - Sats

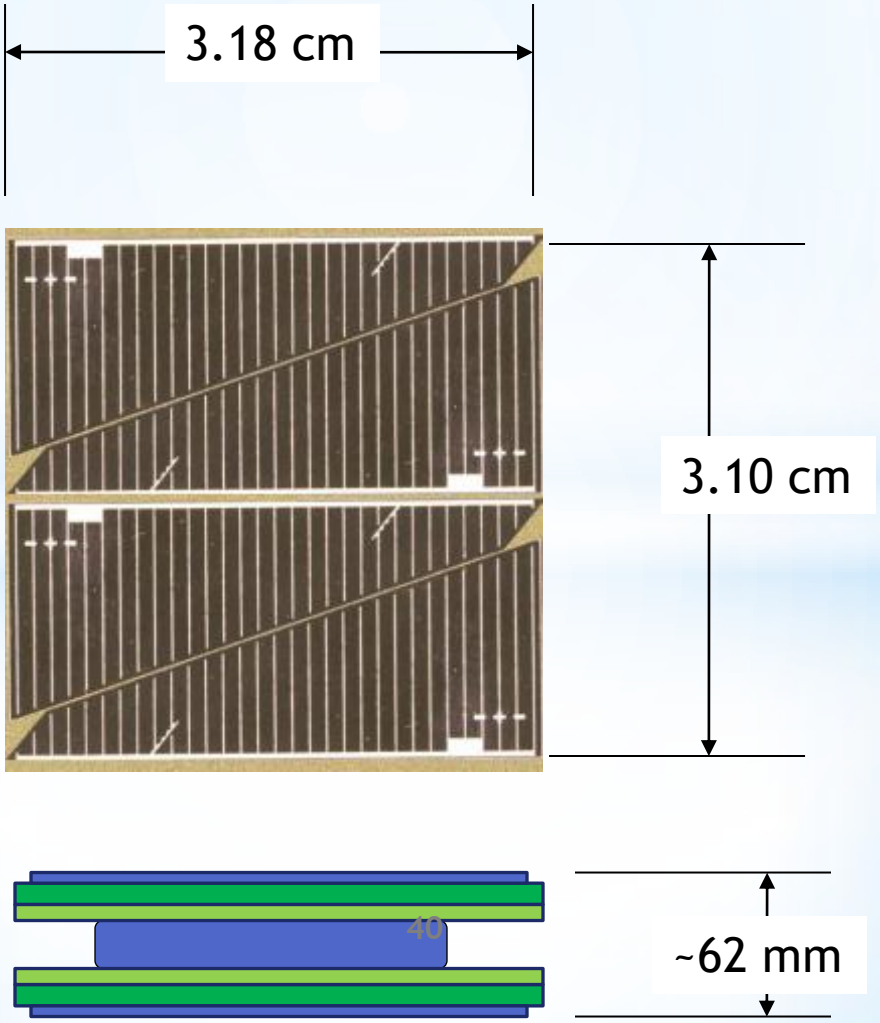
as
AttoSats

Earth Odyssey Moonbeams

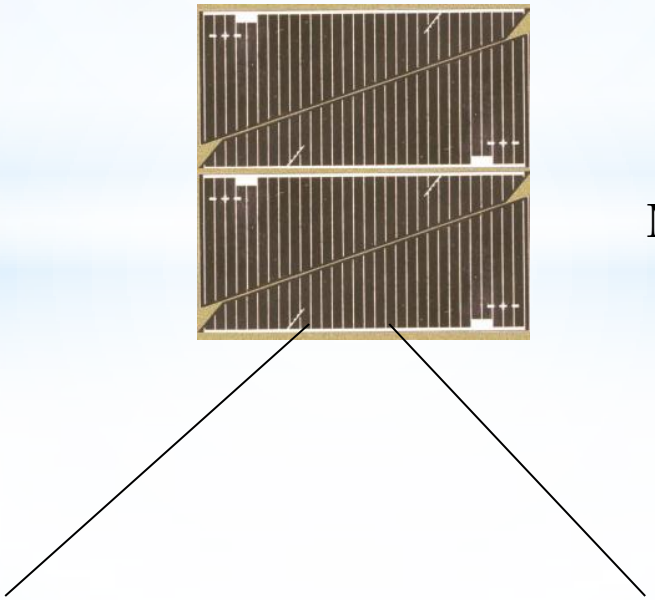
MSU
Earth Odyssey Moonbeams

Earth Odyssey Moonbeams

8.8v Panel

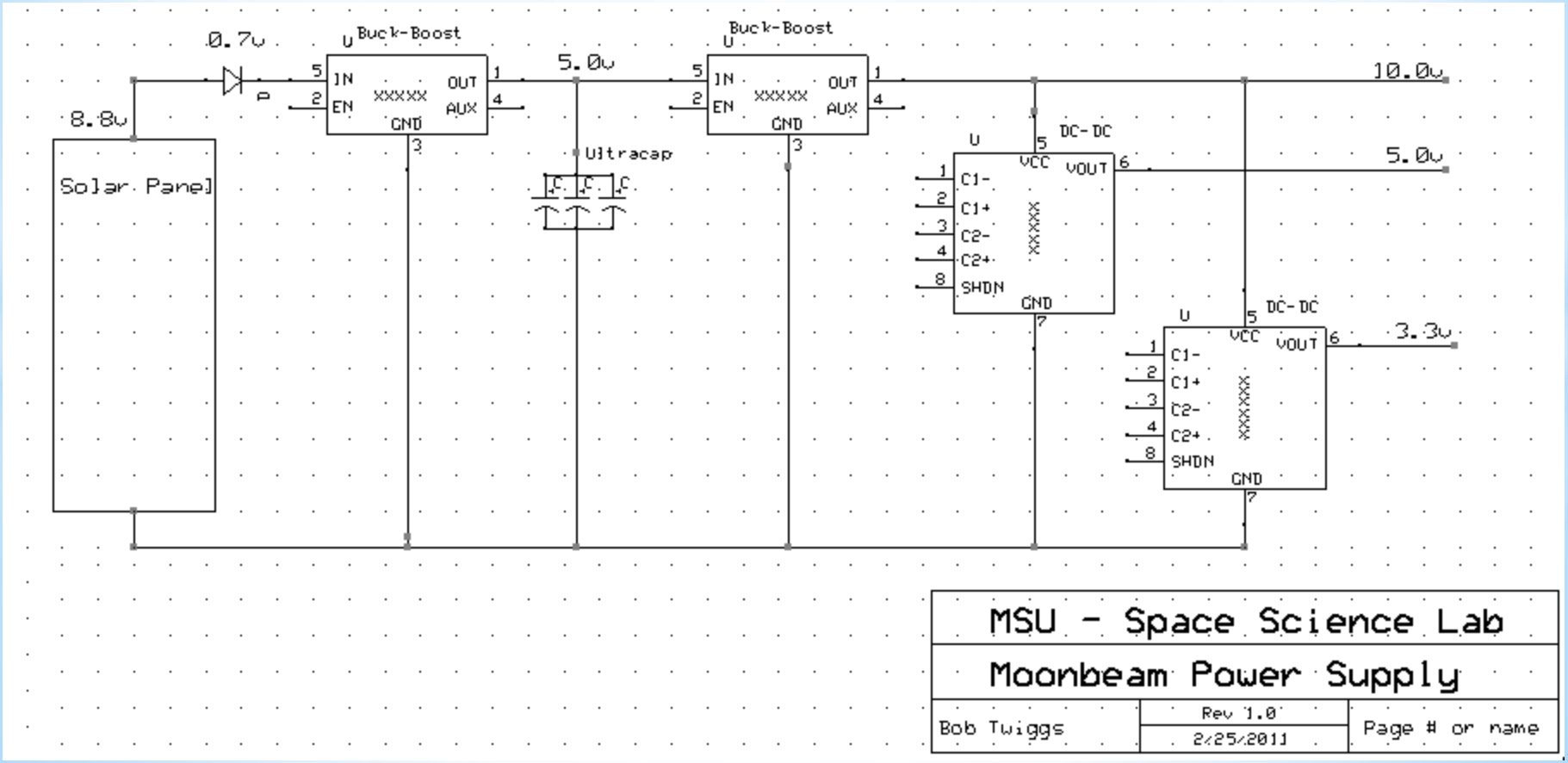


Earth Odyssey Moonbeams

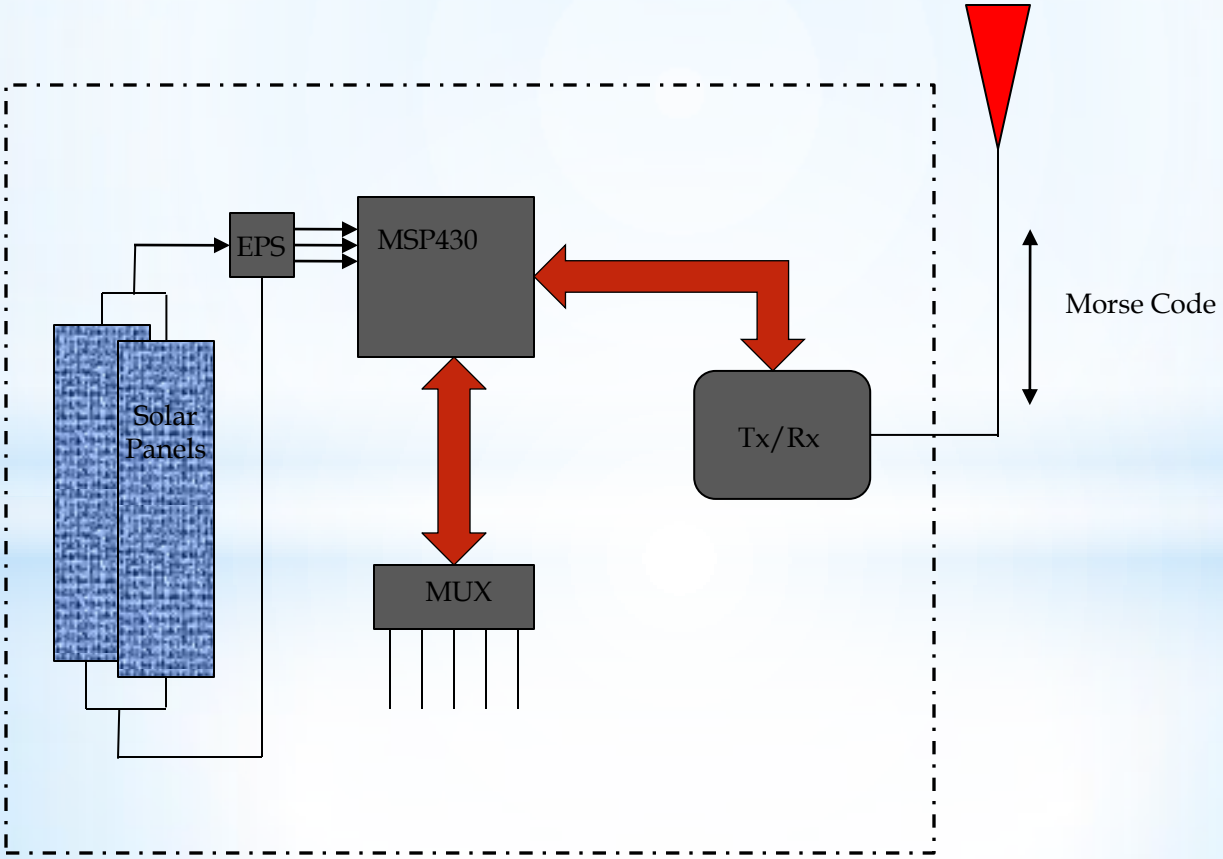


Moonbeam
Using TX433 Tx,
MSP430 Microcontroller

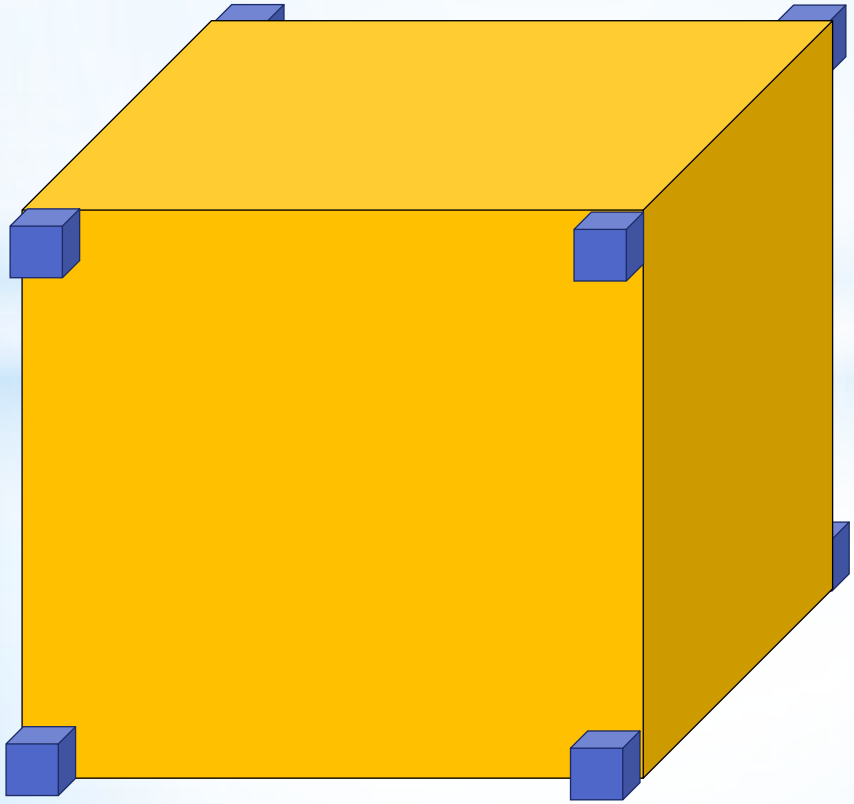
Earth Odyssey Moonbeams



Earth Odyssey Moonbeams

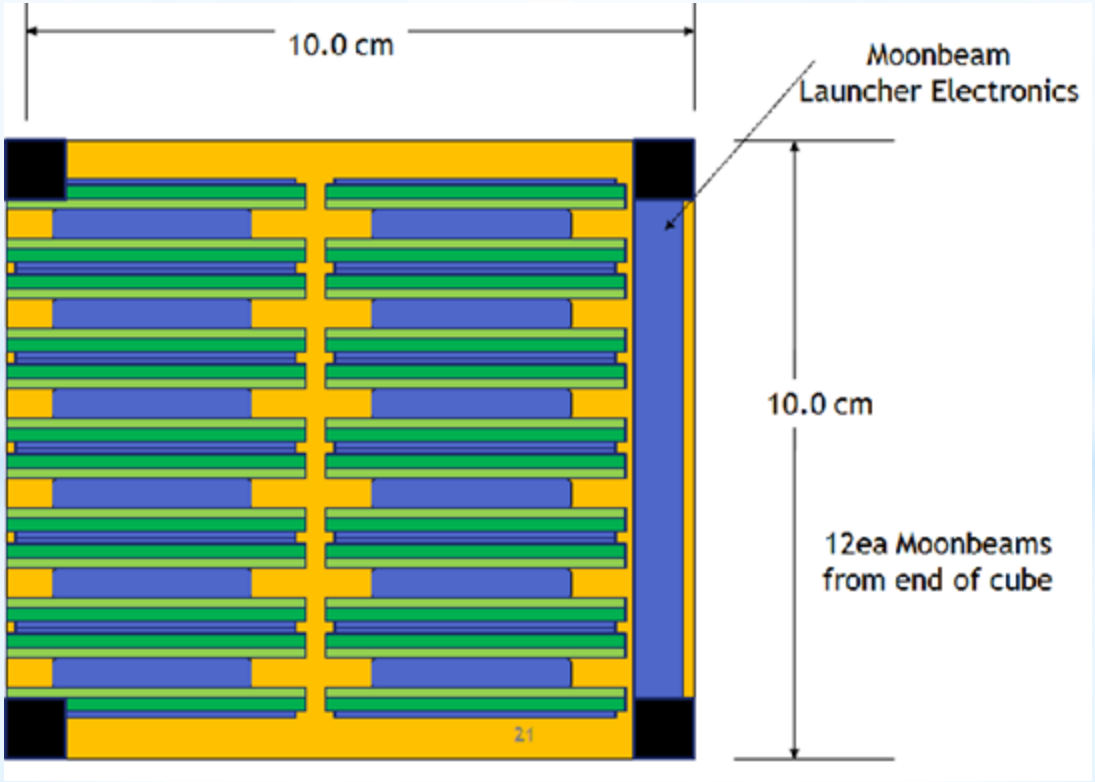


Earth Odyssey Moonbeams



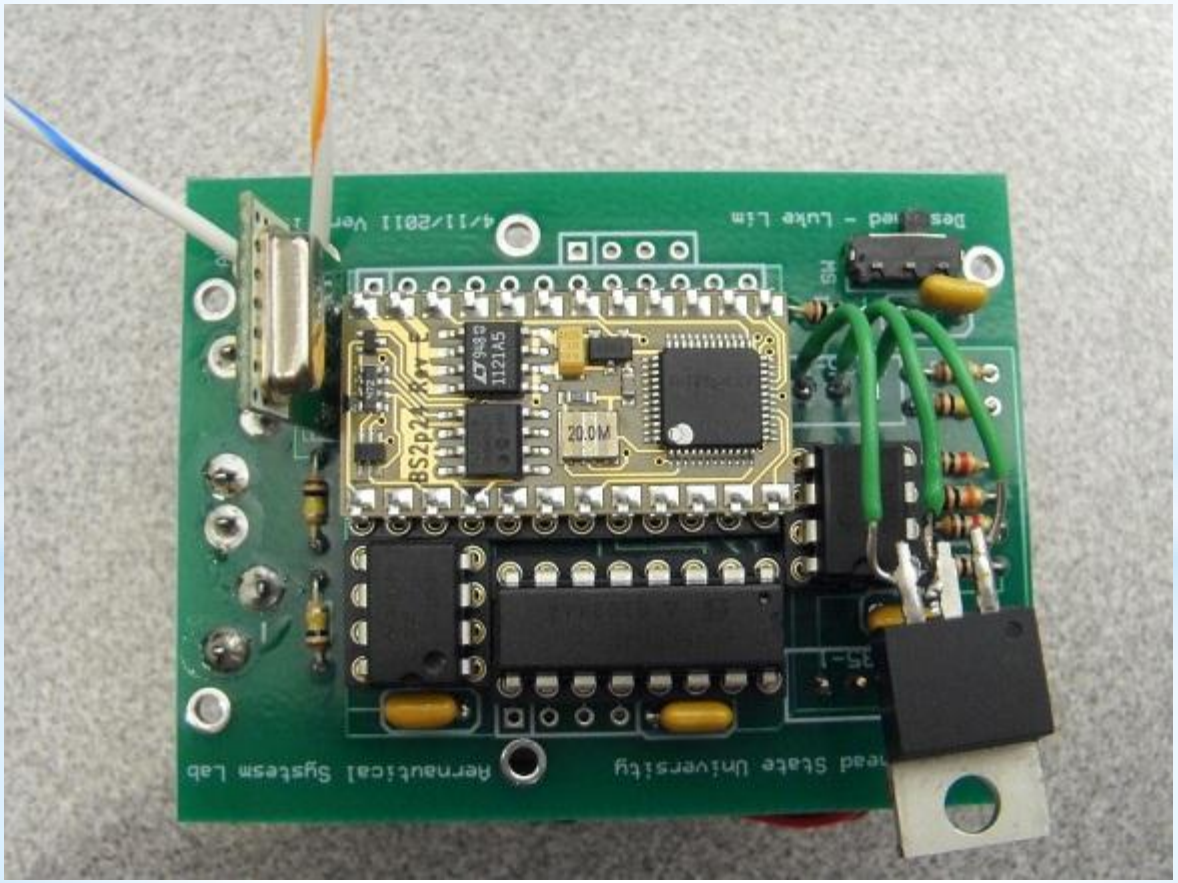
Using a Standard
1 U CubeSat

Earth Odyssey Moonbeams



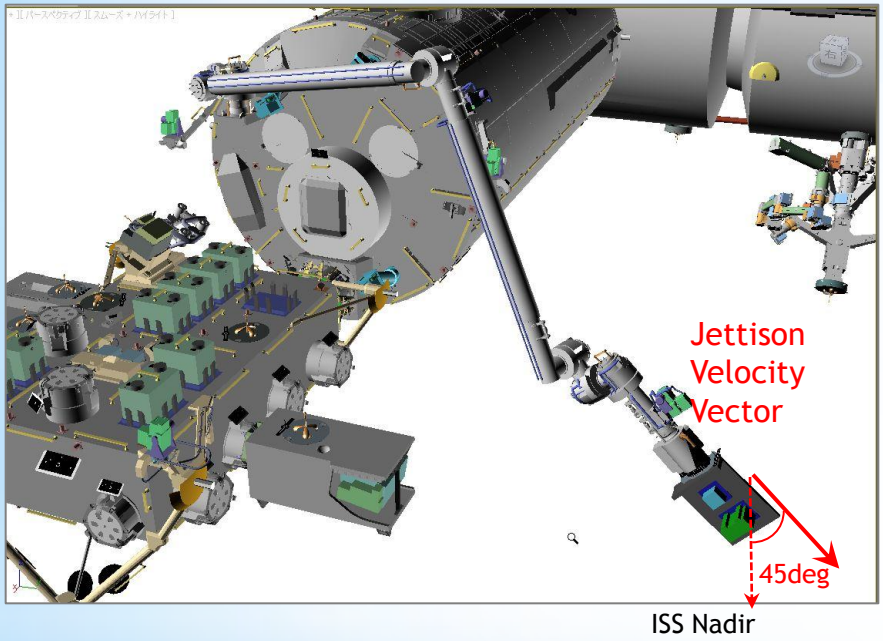
Holds 24 EOMs

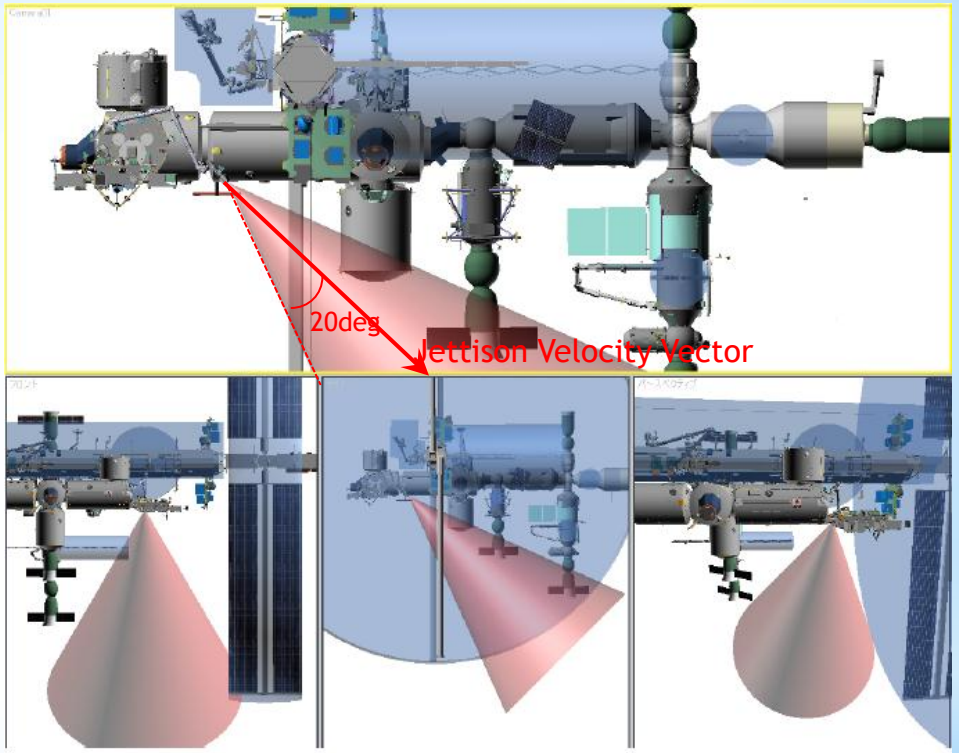
Earth Odyssey Moonbeams



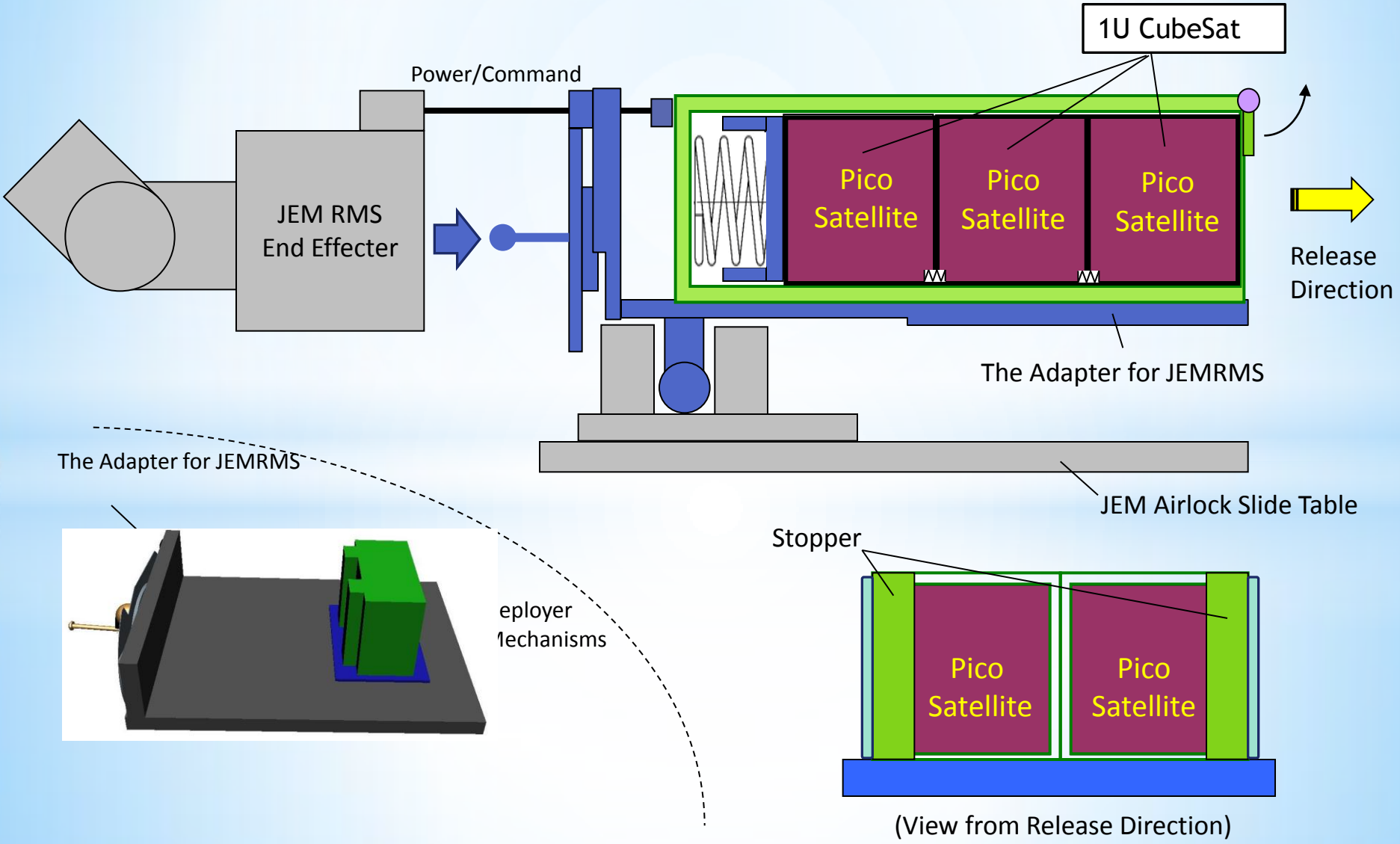
First Moonbeam Prototype

ISS Japanese Experiment Module





Overview of Deployer System



Earth Odyssey Moonbeams

Specifications

- Short life – 1-2 months
- Transmit Morse Code
- Only operate during daylight
- No battery – launch hazard
- Use Super Capacitor?
- Useful science instrument?

The STEM Initiative

Is there a better future for Education?

To: Students, Faculty

Question:

Fact: CubeSats did not get here with lots outside help.

How interested are they in helping Educations?

Answer:

Haven't seen much so far. We know it will have strings attached and it will take a long time.

The STEM Initiative

Another Problem:

Not getting today's students interested in Science and Math.
Need these students to help build the future workforce.

The STEM Initiative

Get students interested in Science, Technology, Engineering and Math.

How?

Beat the "H _____" out of them until they like it.

Give them all new Mustangs if they take these courses.

Or

Tell them – ***"You get to build something of your own that goes into space sometime before you have grandchildren"***

What can we really do to attract student to STEM?

Starting Fall 2011 – 3 Kentucky High Schools

- Academic class
- Start with sophomores - Mechatronics
- Junior – Space Systems
- Senior – ISS Space Microgravity Experiment

Where can we go now?

- Push the tiny limits
- High value return
- Get more bang for the buck
- Do more for less – space, cost
- Give away more than you get.
- Pay back with STEM help – you owe.

Where can we go now?

- Challenge the old ways
- How about a data truck? More at Utah.
- Exomedicine Institute
- How about a data truck?
- Space education is:

Innovation & learning without barriers

Questions?