LunarCube: Mission Modes and the AML Mass Driver

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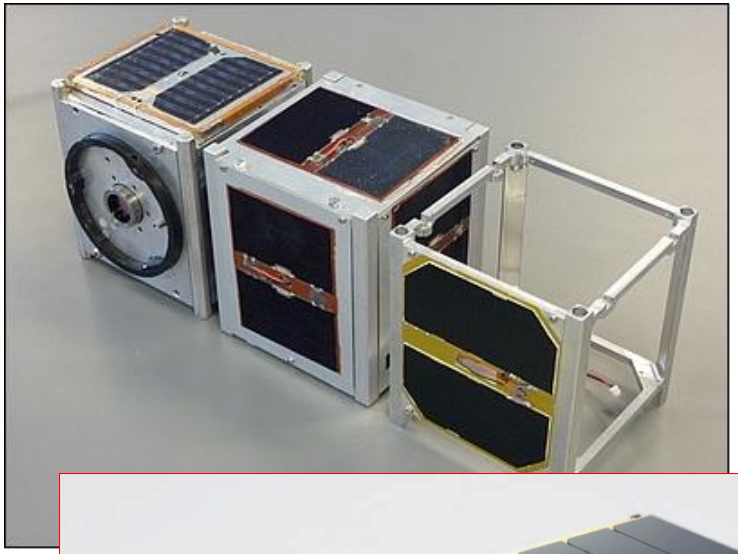
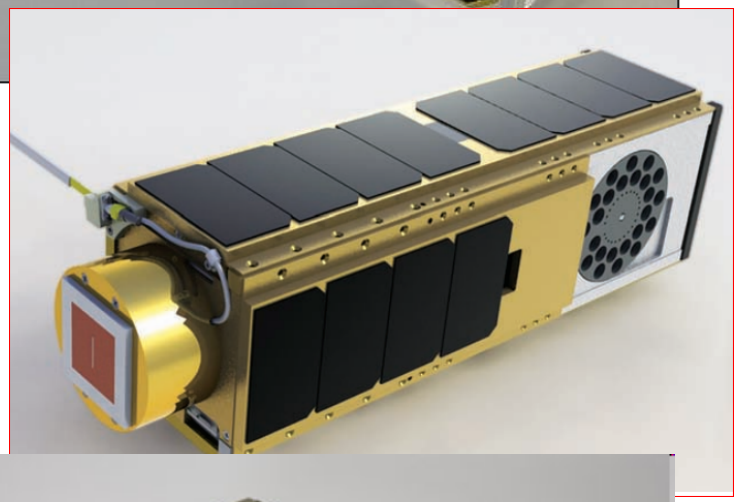
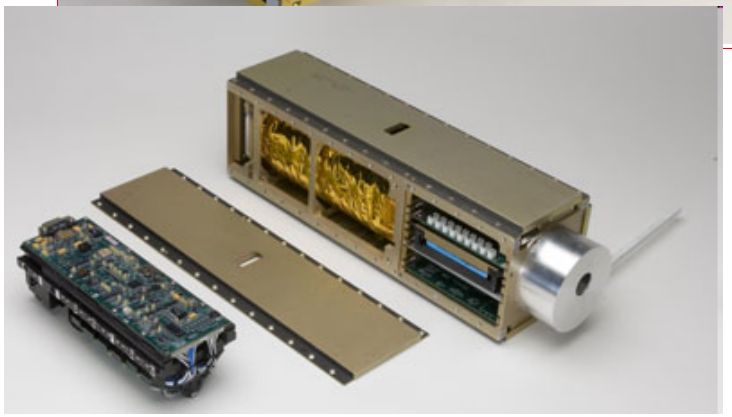
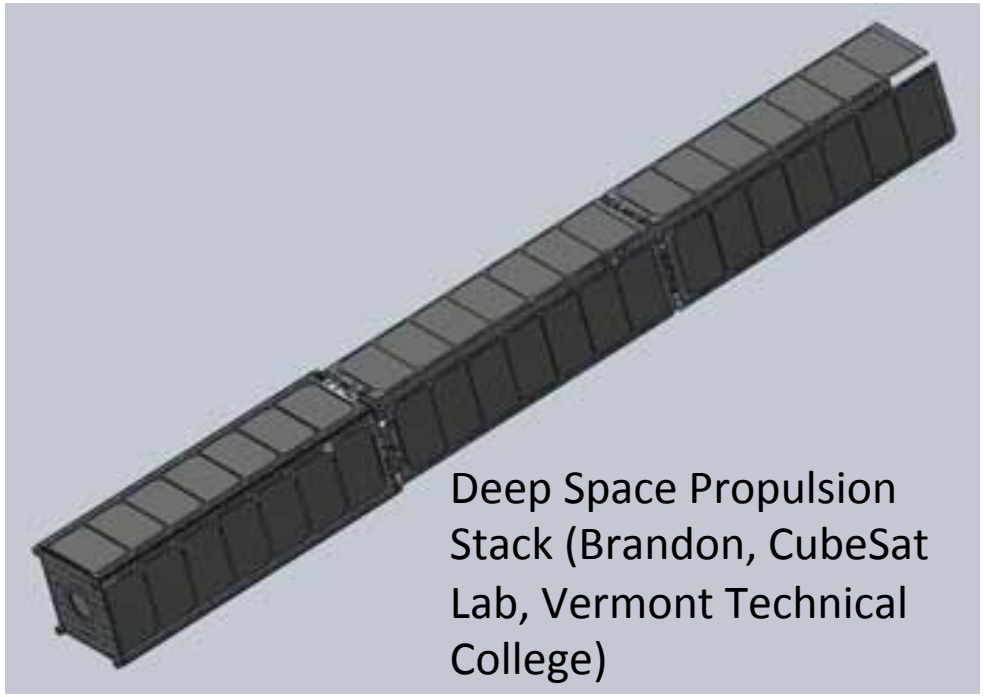


Multi-Cube Concepts: Racks, Complex Payloads



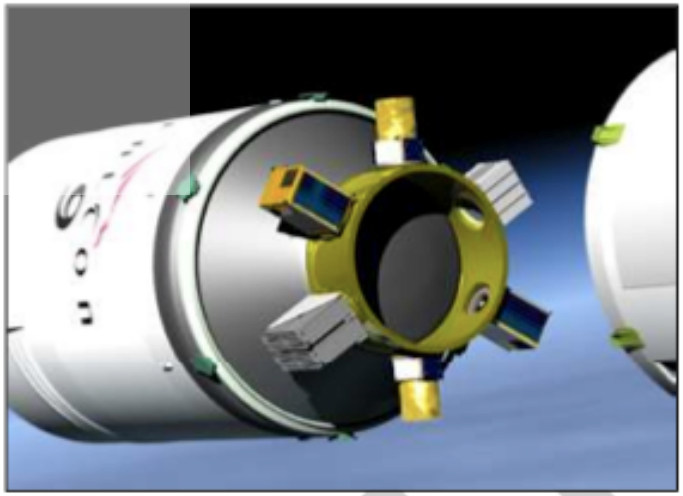




Deep Space Propulsion Stack (Brandon, CubeSat Lab, Vermont Technical College)

Spaceflight / SpaceX

Concepts: Racks, Complex Payloads



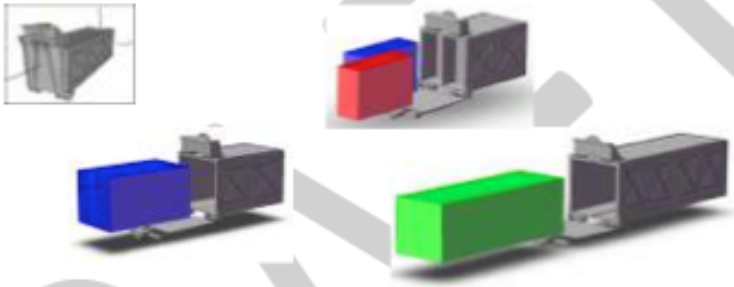


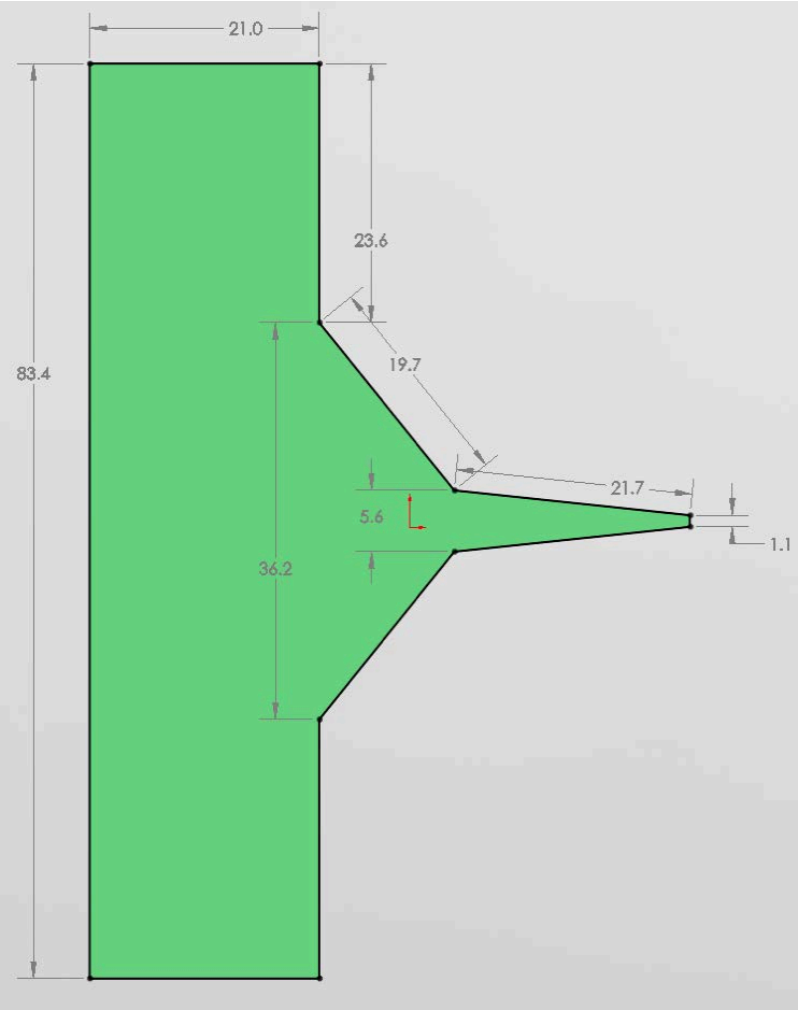
Figure 1-3 Secondary Payload Accommodations

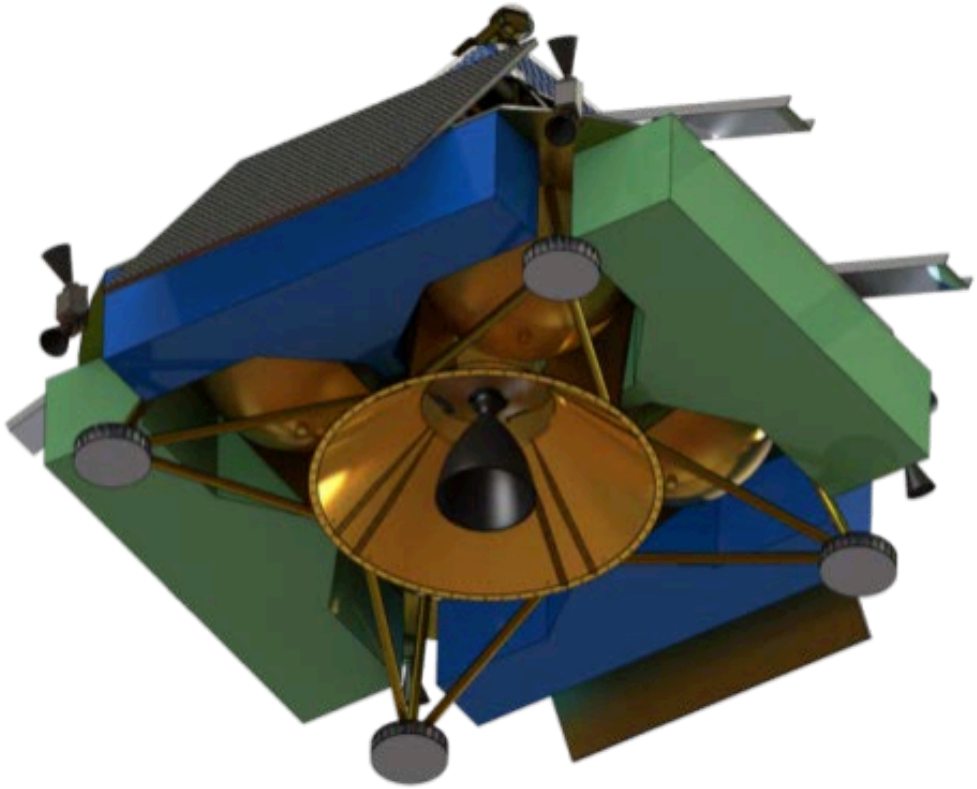
Table 1-1 Secondary Payload Capabilities

	P-POD		NanoBox			Microsat	ESPA-class	Dragon-Box
	1U	3U	6U	12U	24U			
Length (max) cm	10.0	34.0	36.6	36.6	68.0	70.0	98.0	TBD
Height (max) cm	10.0	10.0	10.0	22.6	22.6	30.0	60.0	TBD
Width (max) cm	10.0	10.0	22.6	22.6	22.6	30.0	60.0	TBD
Mass (max) kg	1.0	4.0	10.0	20.0	40.0	70.0	190.0	TBD

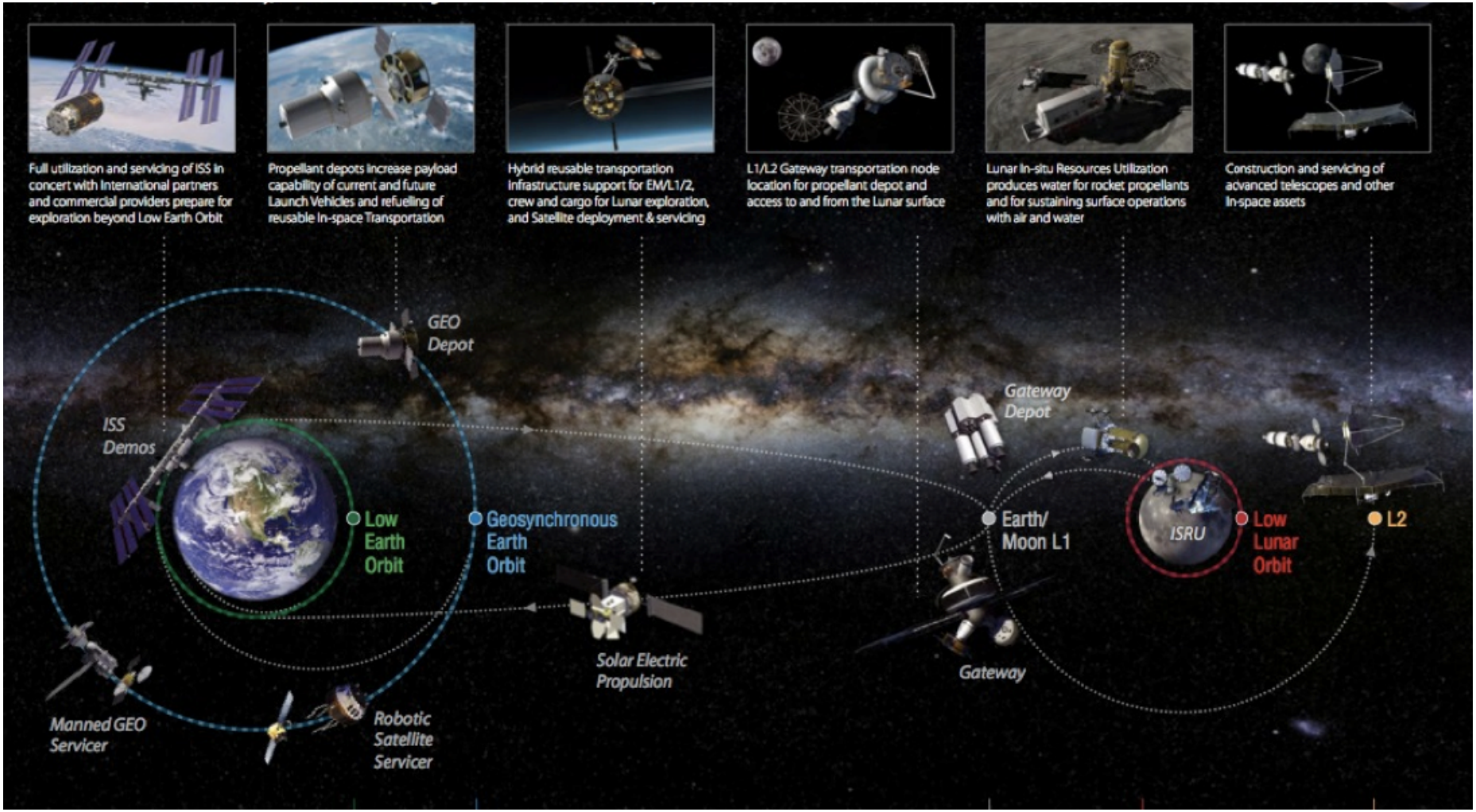
The Astrobotic Lander

- 1000 U of Volume
- 100 – 200 U Mass

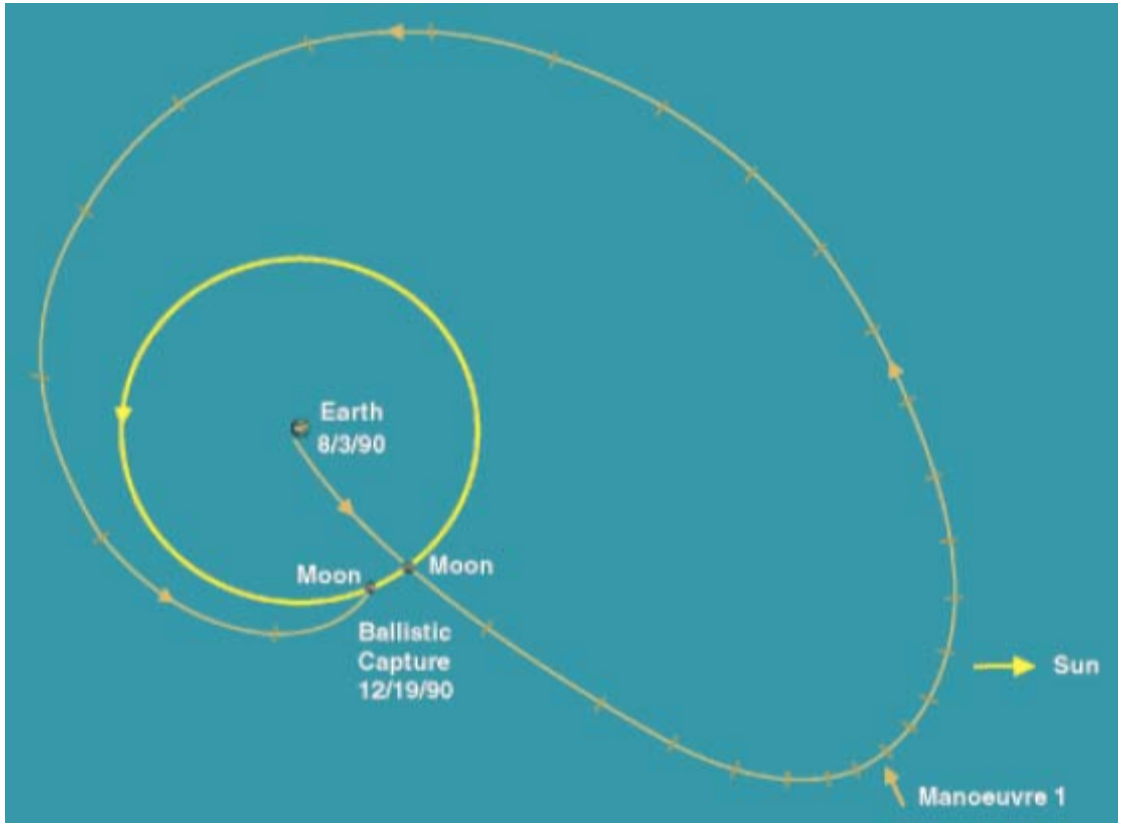




Orbital Destinations and Transfers in Cislunar Space



A Weak Stability Ballistic Transfer in Cislunar Space



Interesting Properties of Weak Stability Transfers

- GTO ride-along offers almost optimal conditions
- GTO phasing may require up to 120 Van Allan Belt Passages
- Long duration months to years

QB 50 – Fifty CubeSats for Atmospheric Research

Interest to participate in QB50 by signing a Letter of Intent (LoI) has been expressed by over 80 universities from all over the world.

This includes universities in 30 European countries and universities in Argentina, Australia, Brazil, Canada, Chile, The People's Republic of China, Ethiopia, India, Israel, Peru, Puerto Rico, Russia, Singapore, South Korea, Taiwan, Turkey, Ukraine, USA and Vietnam.

For many of these countries, the CubeSats that participate in QB50 will be their first satellite in orbit and a matter of national prestige.

QB50 will eventually involve well over 1000 people from all over the world: 50 (+5 backup) CubeSat teams of 10-20 people each; numerous atmospheric scientists; instrument, orbital dynamics and ground station experts as well as industry and space agency representatives.

Lunar 50 – Fifty LunarCubes Throughout Cislunar Space

UAL has stated that you can get one to two thousand pounds to L1 or L2 from excess capacity from GTO or as a “soft lob” from a polar Earth escape disposal trajectory.

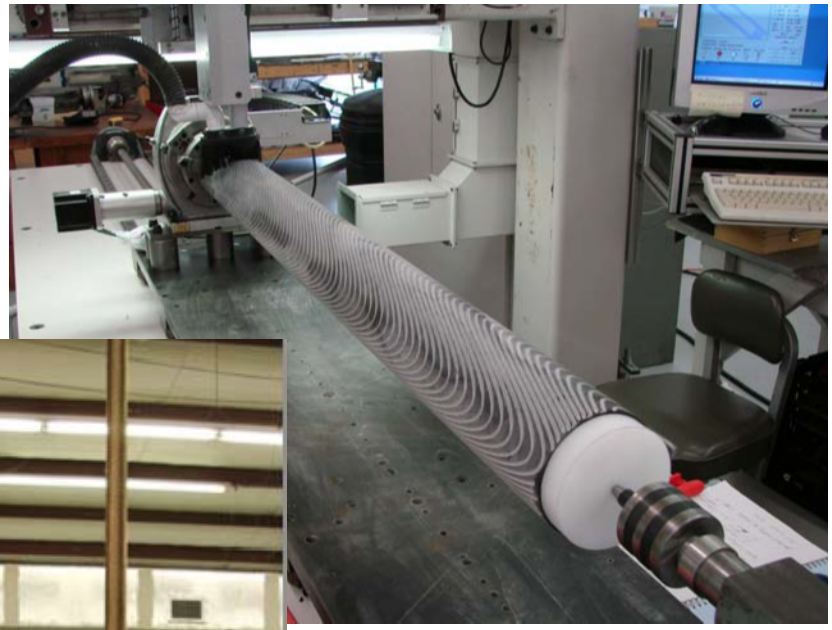
Lunar 50 : Assume

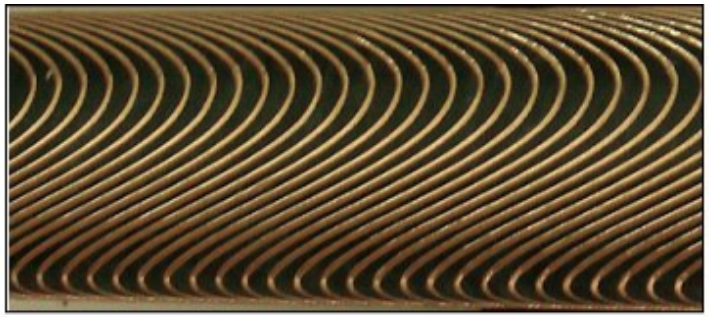
- 1,000 Kg at L1
- 50 10 Kg LunarCubes
- Using 2x2x2 or 2x2x3 U form factors
- AML Mass driver to deliver up to 100 m/s Delta V

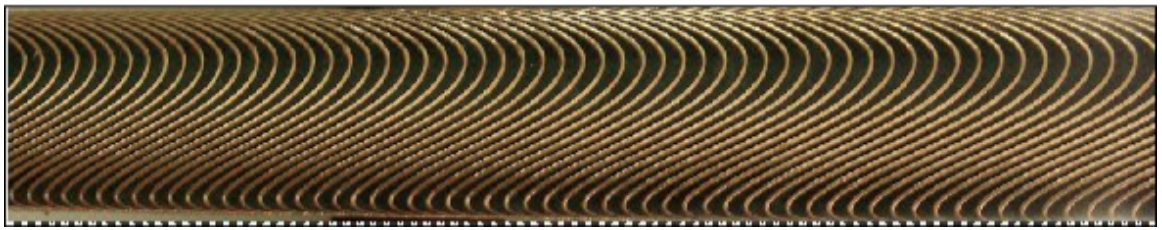
Destinations :

- L1 and L2 halo orbits
- Non-deterministic ballistic Lunar orbits
- Deterministic ballistic Lunar orbits
- Lunar ground skimming and Impact trajectories

The Advanced Magnet Lab's Mass Driver







1st International Workshop on

LunarCubes

LUNARCUBES: The Next Frontier

LunarCube One Day Briefings

The Event	The Schedule *
- Engineering Intro and Briefing - Science Intro and Briefing - Keynote Lunch Banquete - LunarCube Mission Briefings - Design Challenge	- DPS Reno - Oct 2012 - NASA Ames - Nov 2012 - NASA KSC - April 2013 * - Exact dates TBD * - NASA participation not finalized

1st International LunarCube Workshop

November 2013 - Mountain View California

Thursday	Friday	Saturday
Software	Electronics	Mechanical
Orbiters	Landers	Funding
Posters	Keynote Banquet	Dance