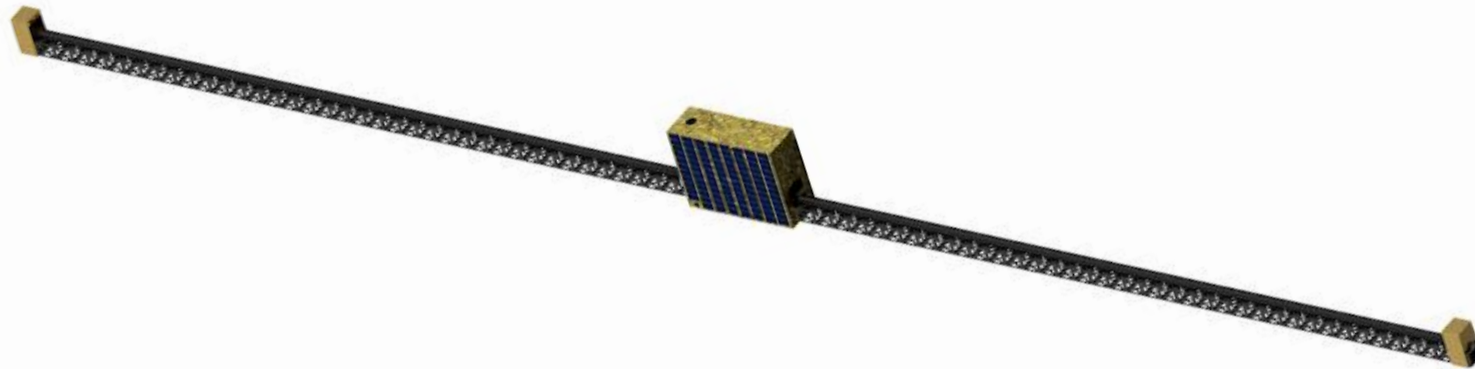


Precision In-Space Manufacturing for Structurally- Connected Space Interferometry Aka “Optimast”



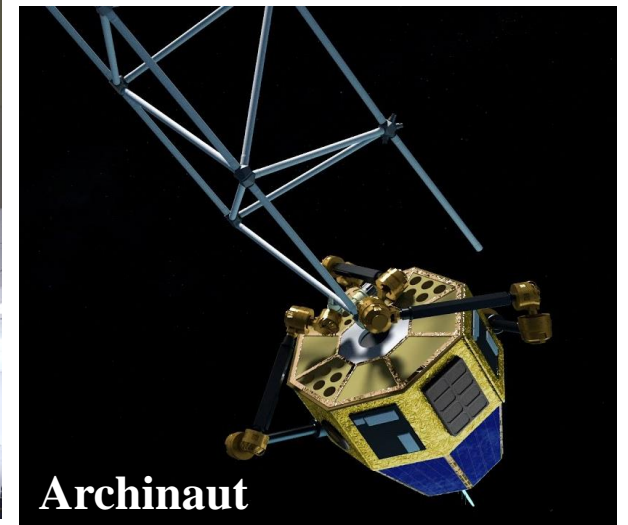
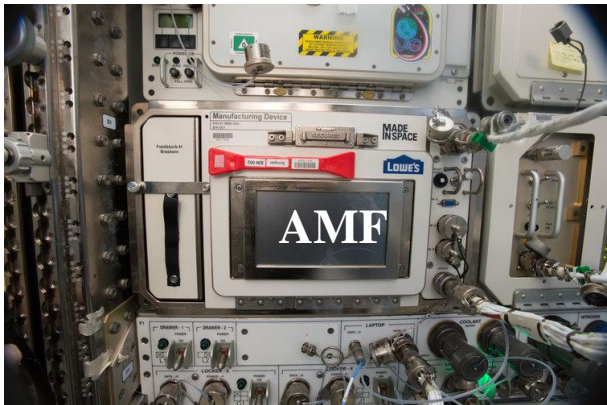
Max Fagin
Mirror Tech/SBIR/STTR Workshop 2018
Monday Nov 5

MADE IN SPACE

Made In Space Technologies Overview

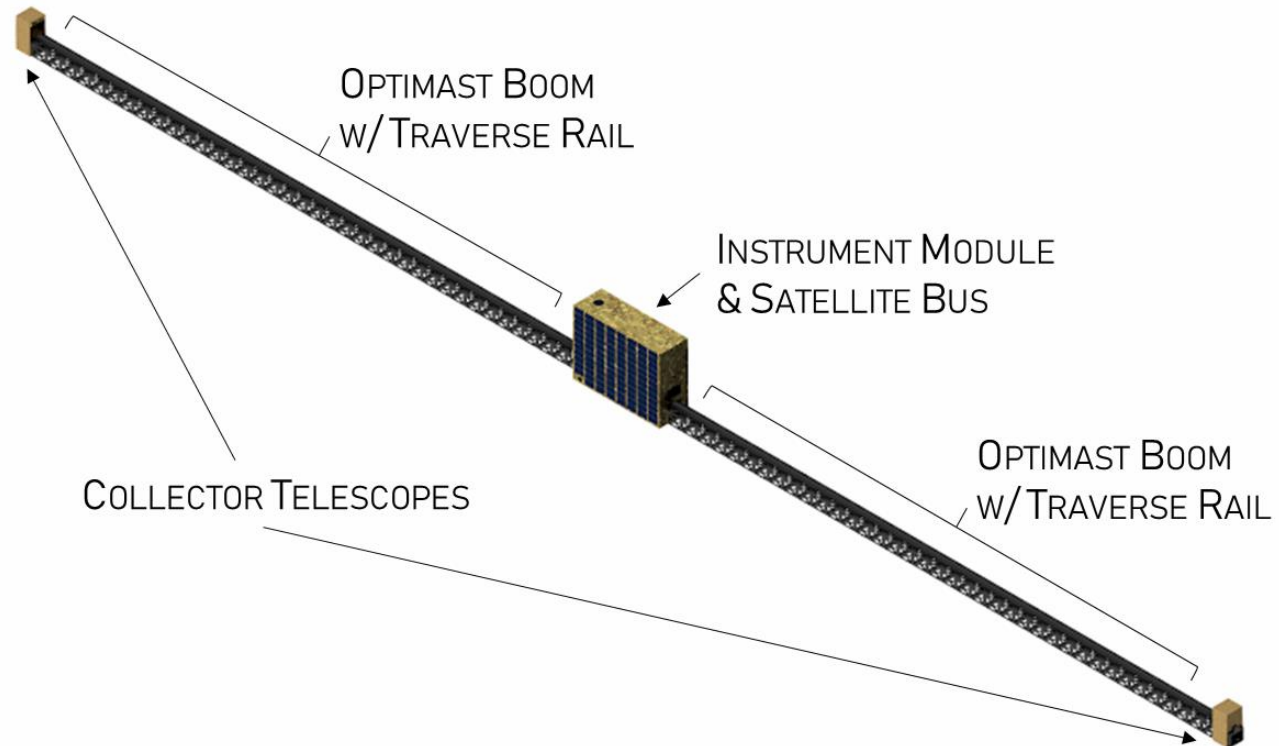
Made In Space technologies

- Additive Manufacturing Facility (AMF): First 3D printer on the International Space Station
- Extended Structure Additive Manufacturing Mechanism (ESAMM): For 3D printing beams of indefinite length space
- 6 DOF Robotic Manipulators: For assembling 3D printed truss structures
- Archinaut: Completed Phase I SBIR combining all MIS technologies to manufacture large structures in orbit



Spacecraft Overview

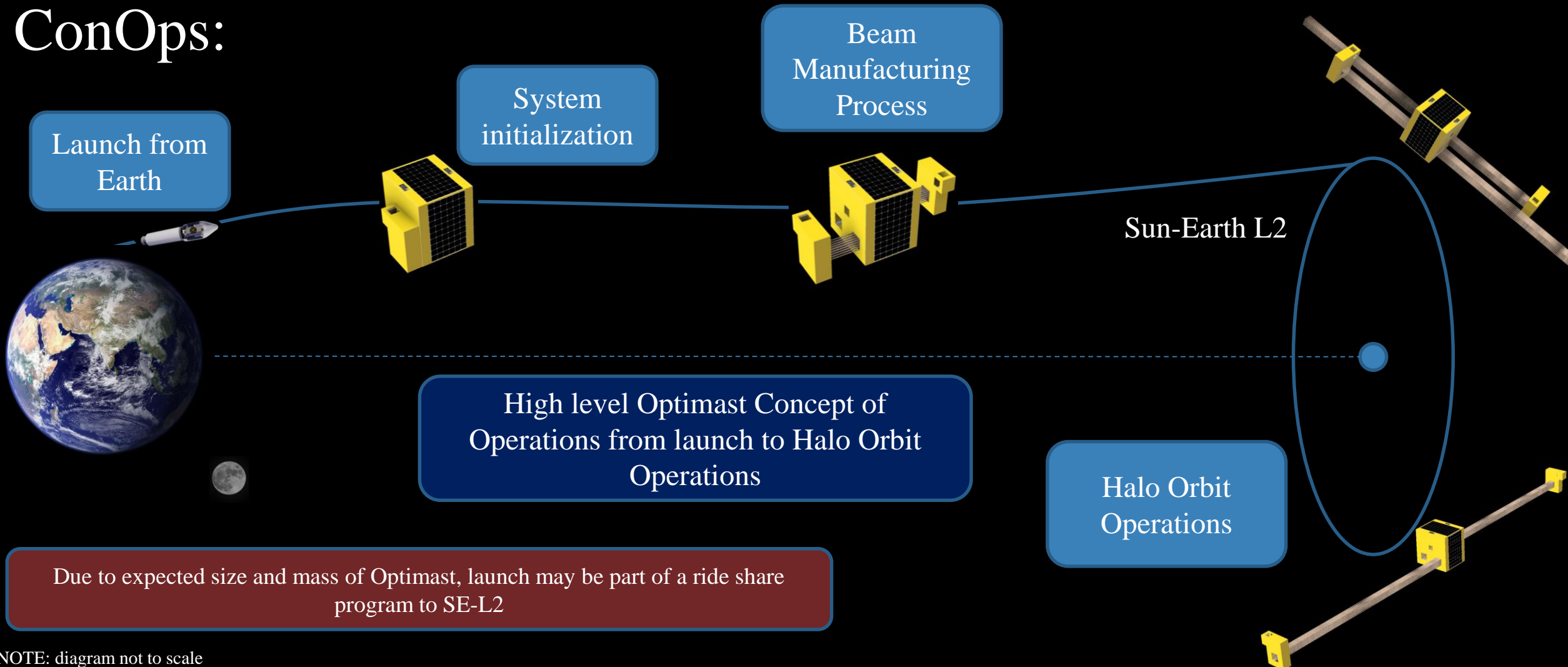
- 20m Baseline IR/Optical interferometer at Sun-Earth L2
- Central Spacecraft Bus with two additively manufactured beams, supporting two Outboard Mirror Units (OMUs)



MADE IN SPACE

Optimast

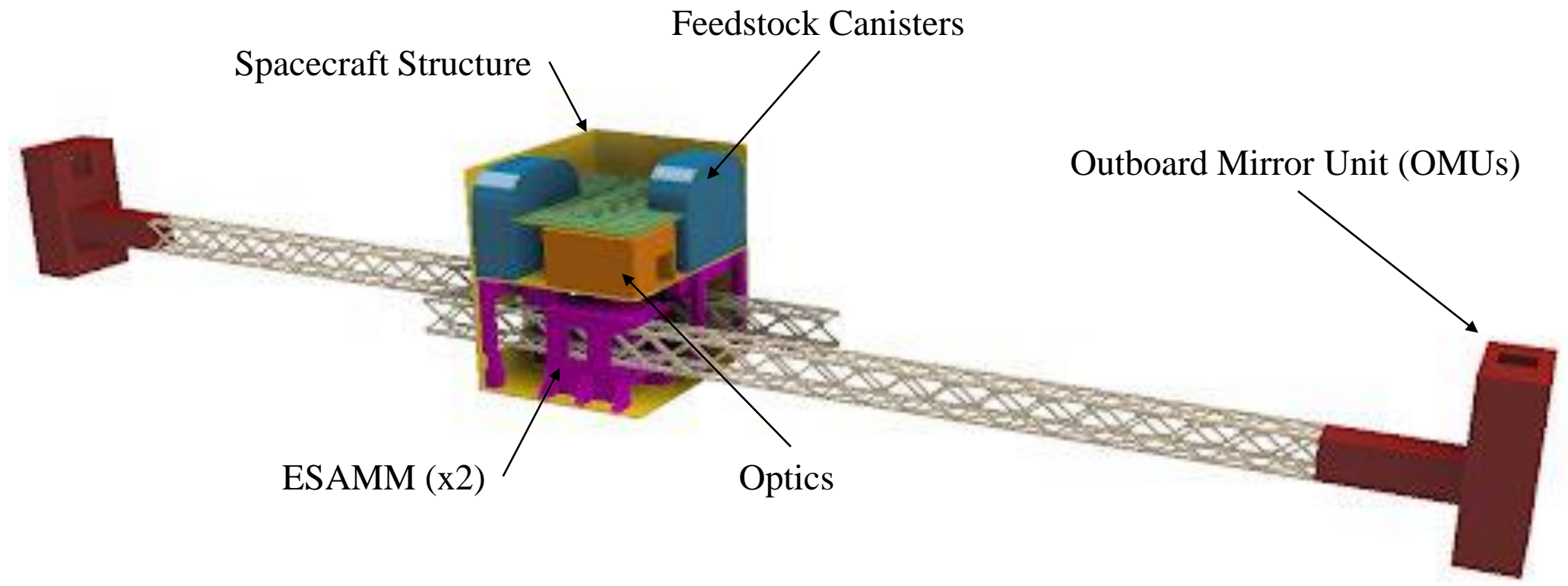
ConOps:



Due to expected size and mass of Optimast, launch may be part of a ride share program to SE-L2

NOTE: diagram not to scale

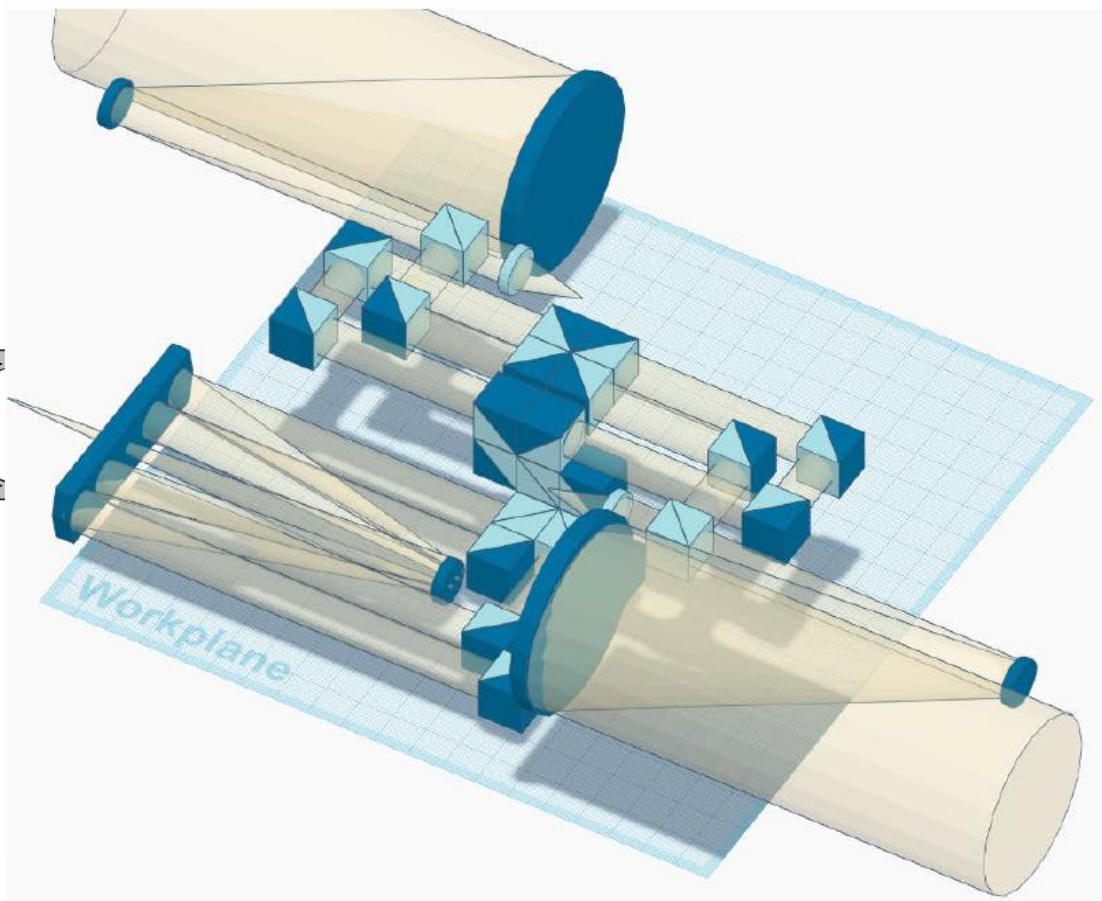
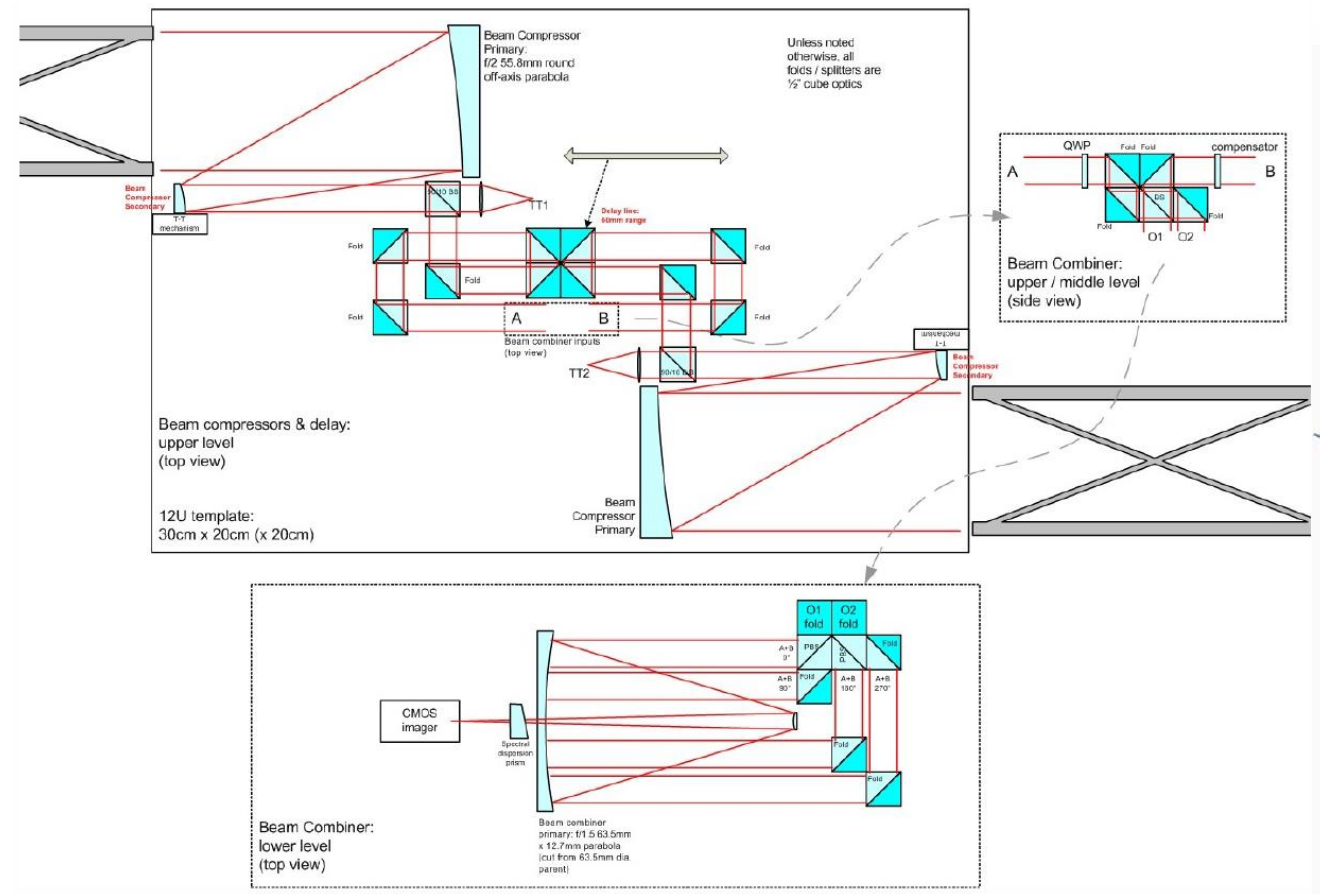
Spacecraft Layout:



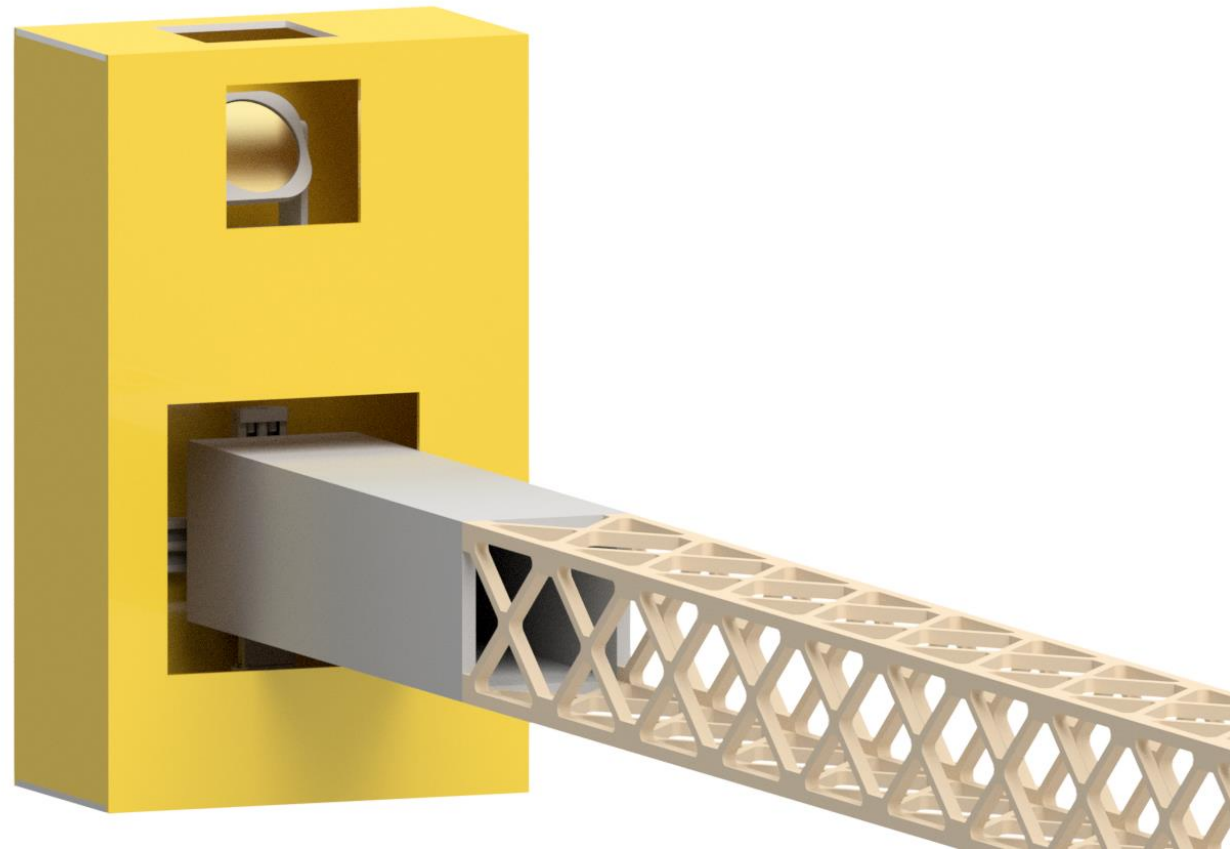
MADE IN SPACE

OPTIMAST

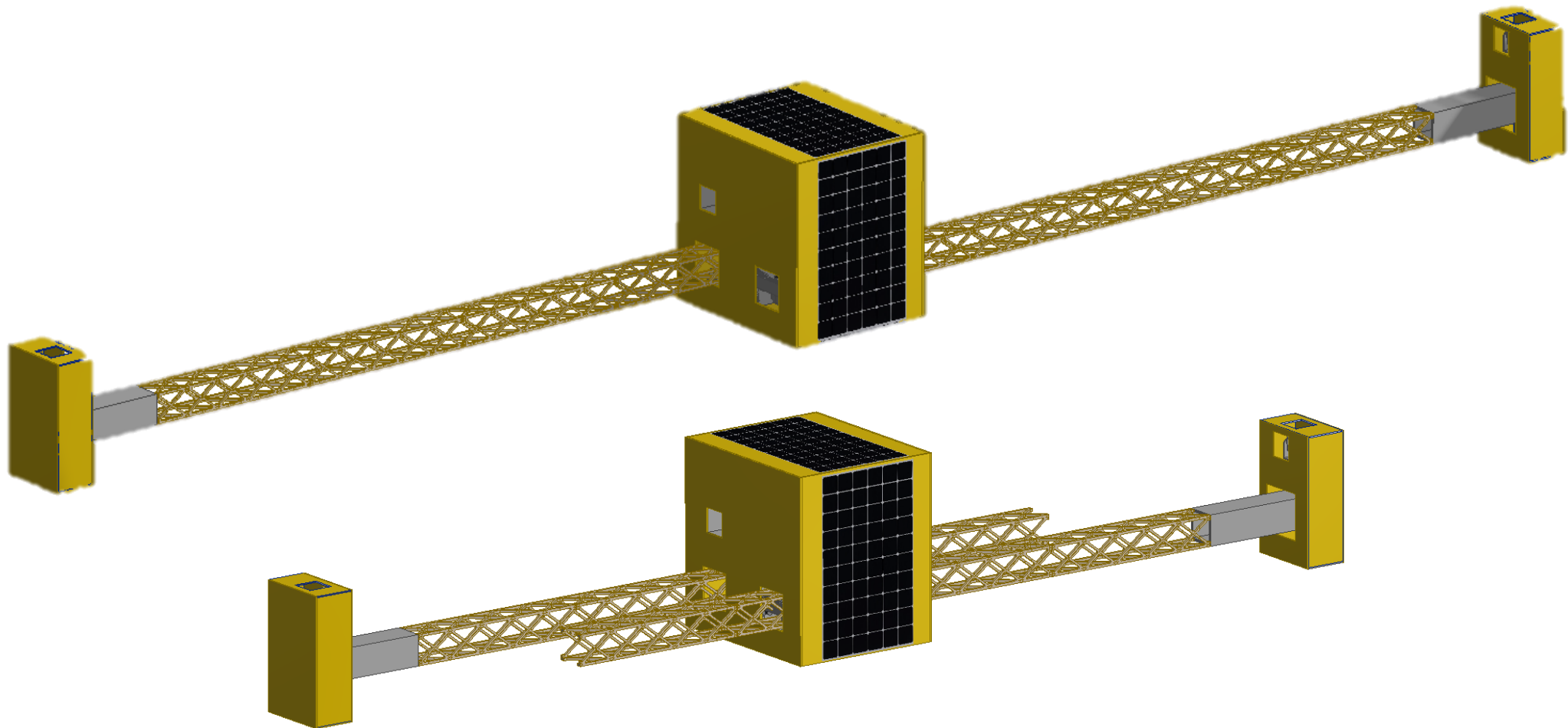
Optical Payload: Designed by Dr. Gerard Van Belle, Lowell Observatory



Outboard Mirror Units: Micro-actuated to control for beam oscillations and thermal warping.

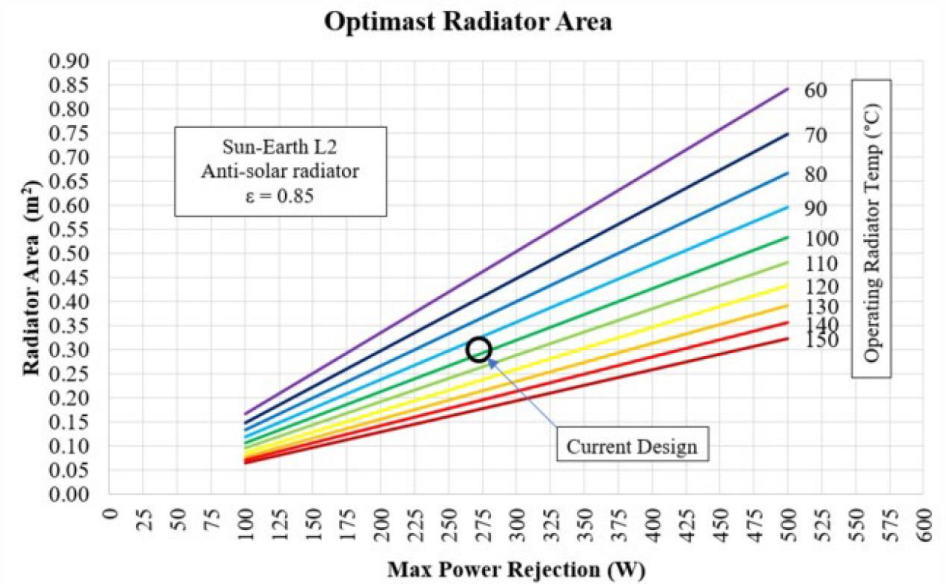
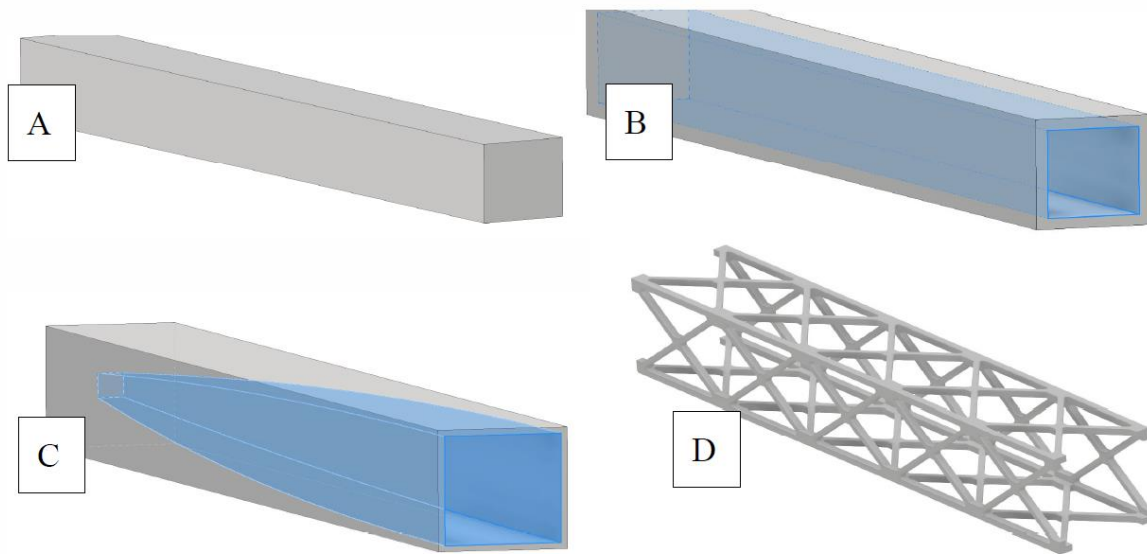


After manufacturing, the baseline/resolution can be changed by retracting the beams



Major tradeoffs under study:

- Beam Cross Section: Achieve maximum rigidity without exceeding ADCS moment limits of feedstock canister limits.
- Spacecraft temperature: Precise temperature control required over characteristic observation time to maintain optical tolerances.



MADE IN SPACE

Optimast

