

In-Space Modular Assembly: An Approach for Reliable, Affordable, Precision Space Apertures

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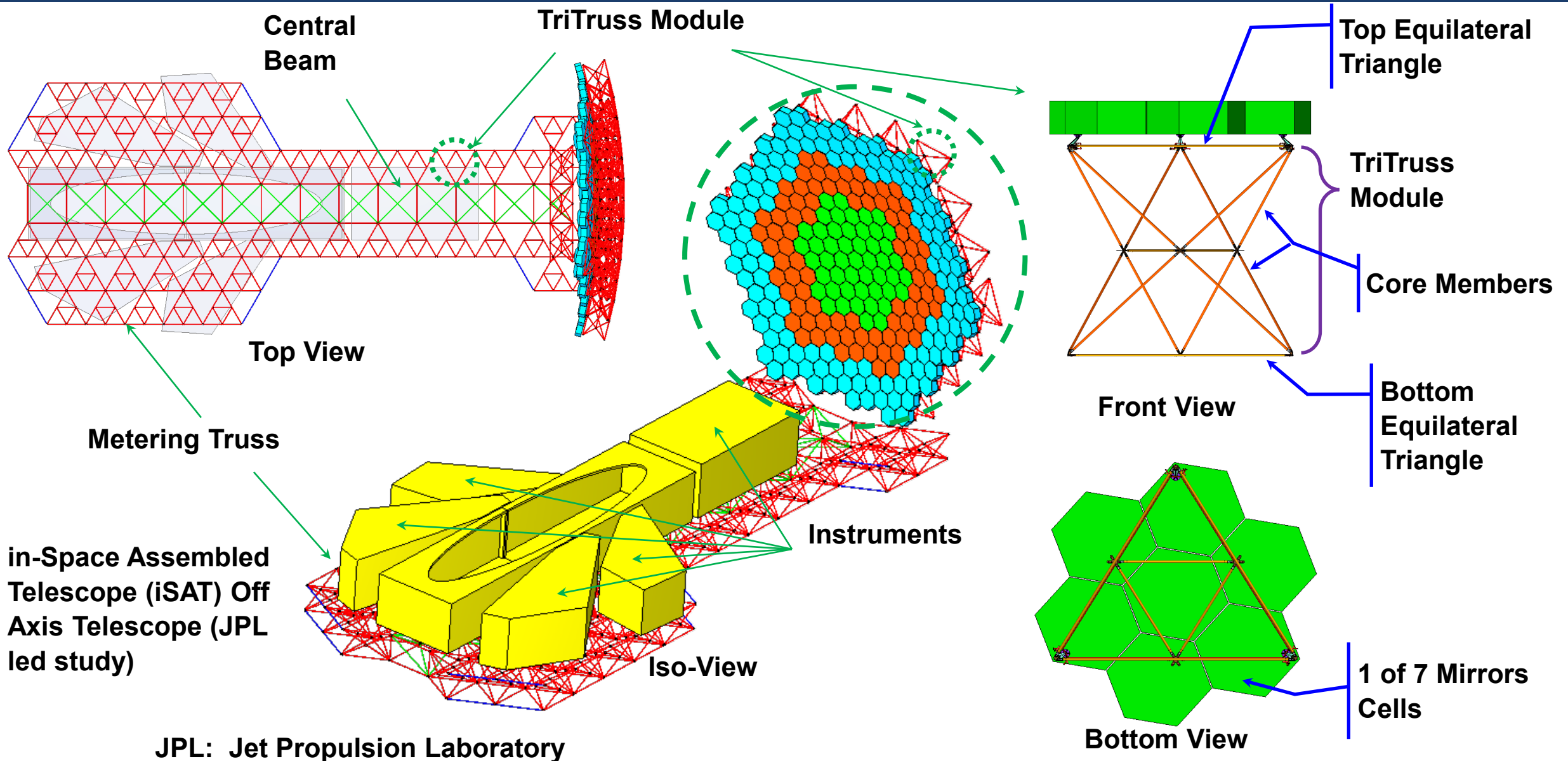
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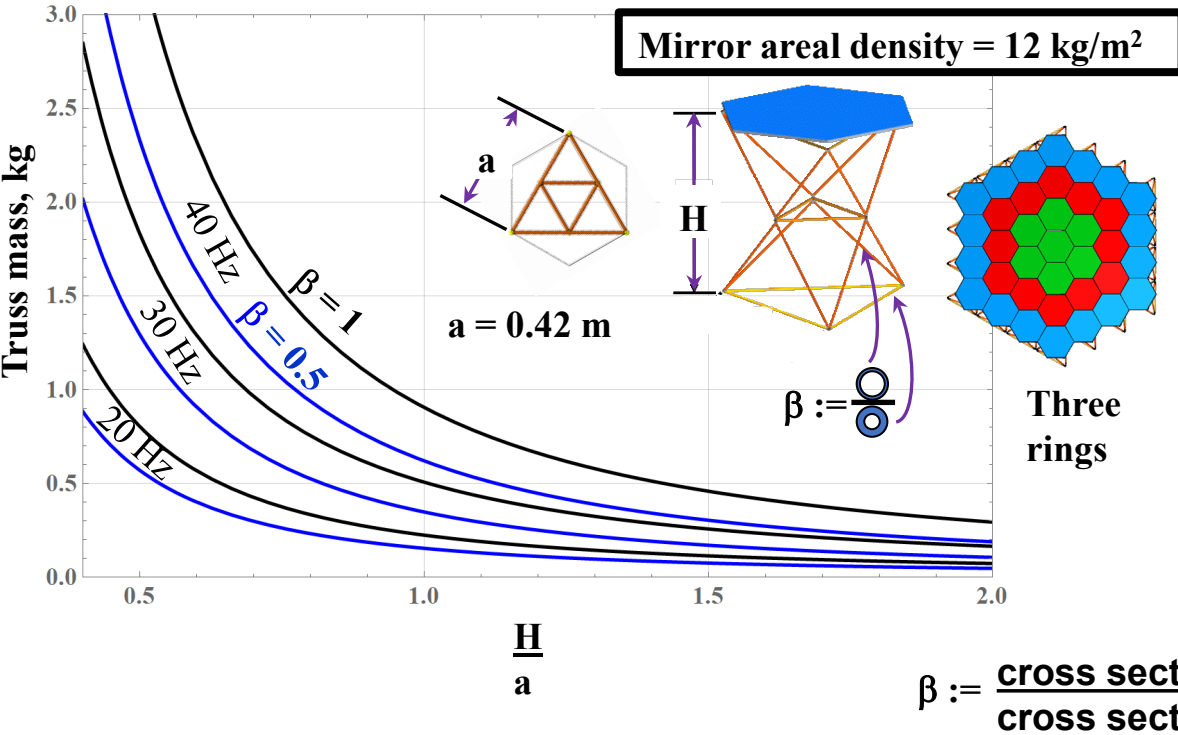
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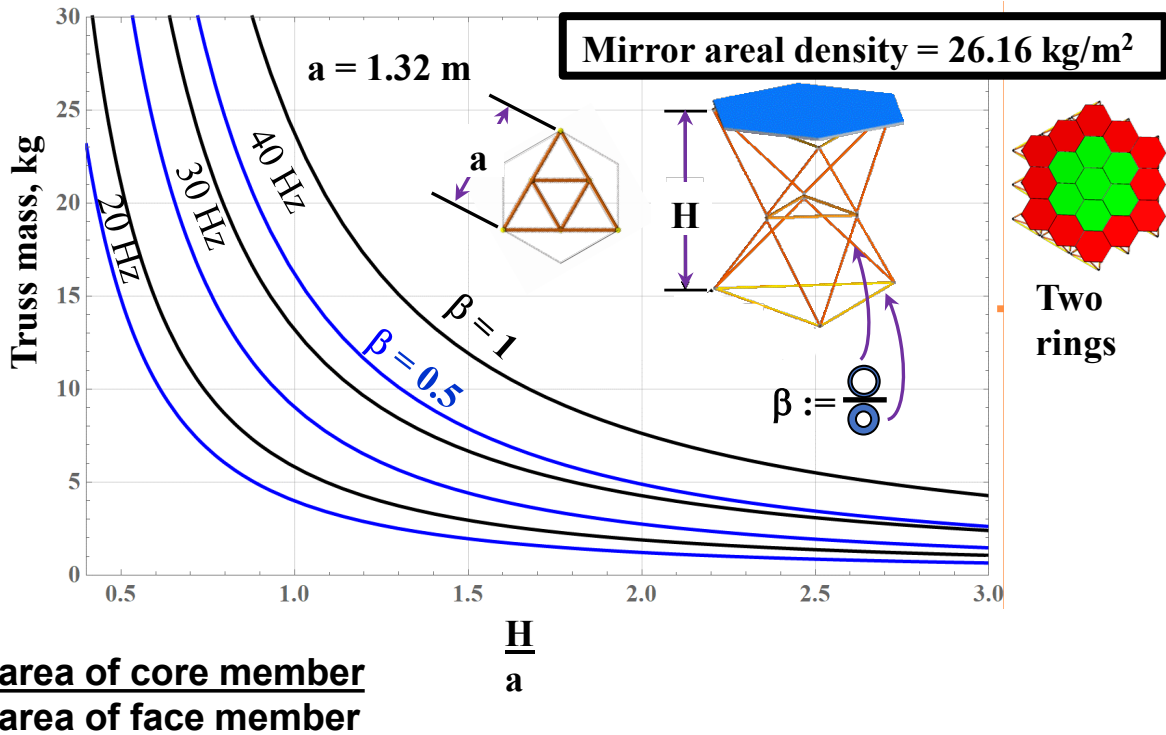
Background: modular components for telescope assembly, the TriTruss module



Modular assembly enables structural depth which improves efficiency and reduces mass

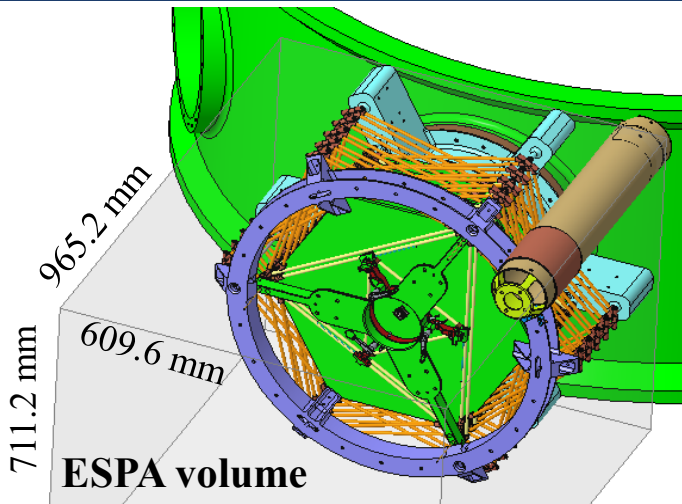


ESPA Mirror Support Mass for Thin Meniscus Mirrors

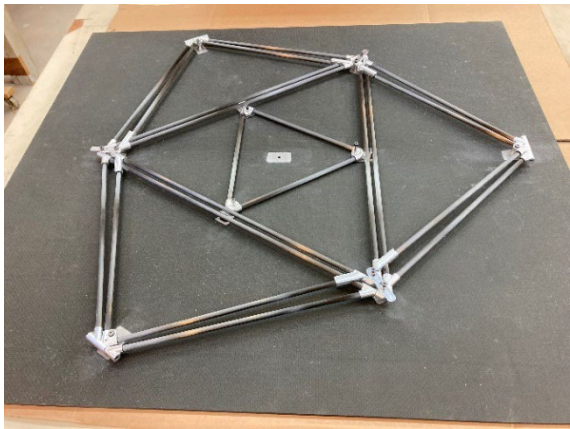


Mirror Support Mass for Areal Density similar to the James Webb Space Telescope Mirrors

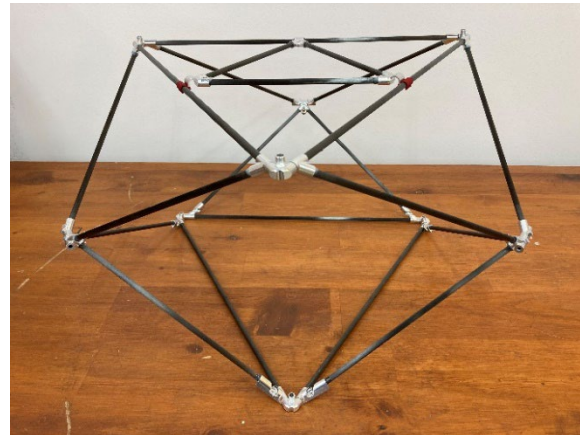
2.4-m aperture with mirror packages into 1 standard ESPA volume



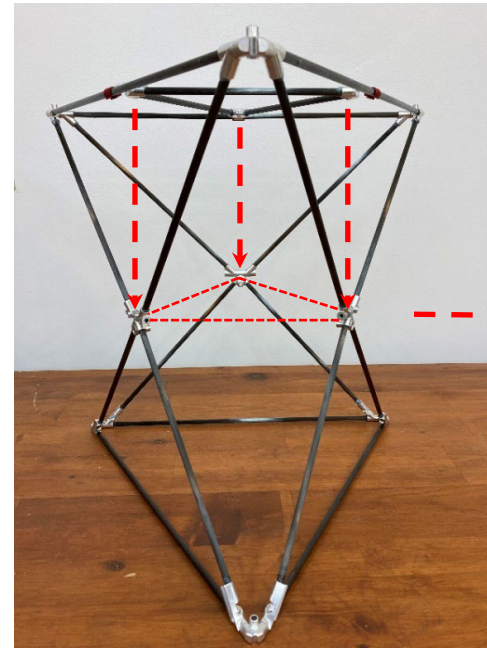
Description	Units						
Number of Rings	#	1	2	3	4	5	6
Aperture Diameter (equivalent)	mm	1167	1922	2683	3445	4207	4970
Aperture, flat to flat	mm	1260	2100	2940	3780	4620	5460
Aperture, point to point	mm	1283	2114	2950	3788	4626	5465
Number of Modules	#	7	19	37	61	91	127
Structure Stack Height	mm	192.5	282.5	417.5	597.5	822.5	1093
With Mirror Stack Height	mm	273	501	843	1299	1869	2553



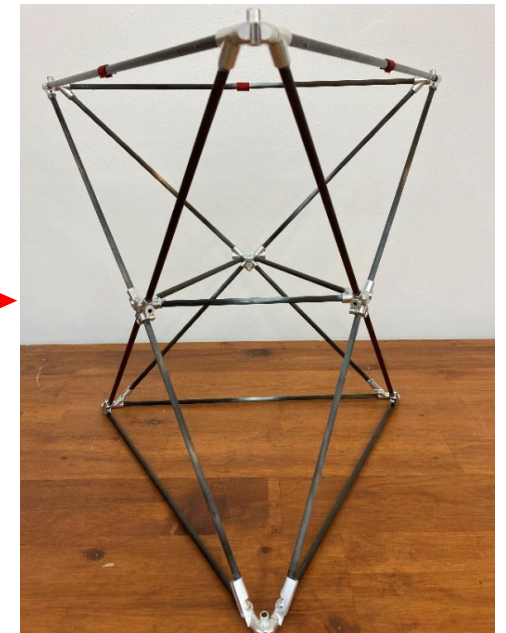
Stowed on Assembly Fixture



Partially Deployed



Fully Extended

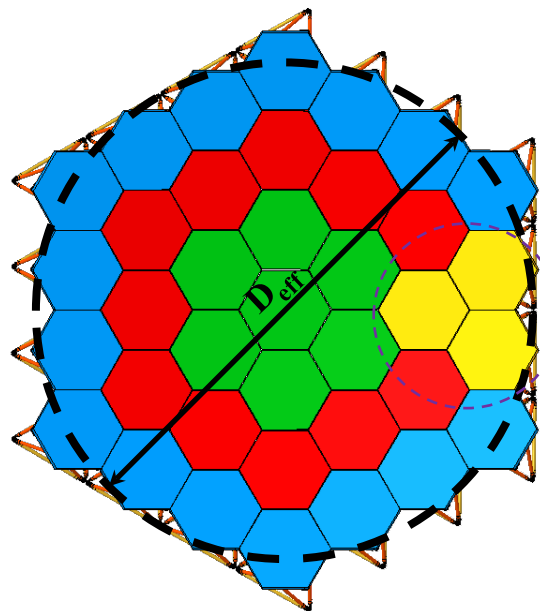


Fully Deployed

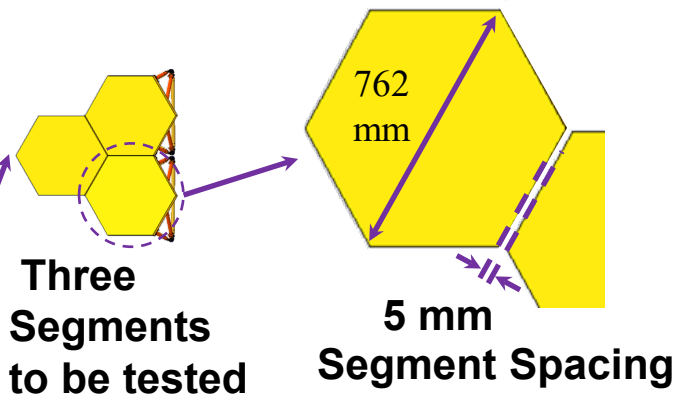
ESPA : EELV Secondary Payload Adapter
 EELV : Evolved Expendable Launch Vehicle

In collaboration with the College of Optical Sciences at University of Arizona portion of three ring structure progressing toward detraction limited optical tests

Larger than ESPA scale



Three-ring segmented primary mirror



Three Segments to be tested

762 mm
5 mm Segment Spacing



TriTruss supporting thin meniscus mirror



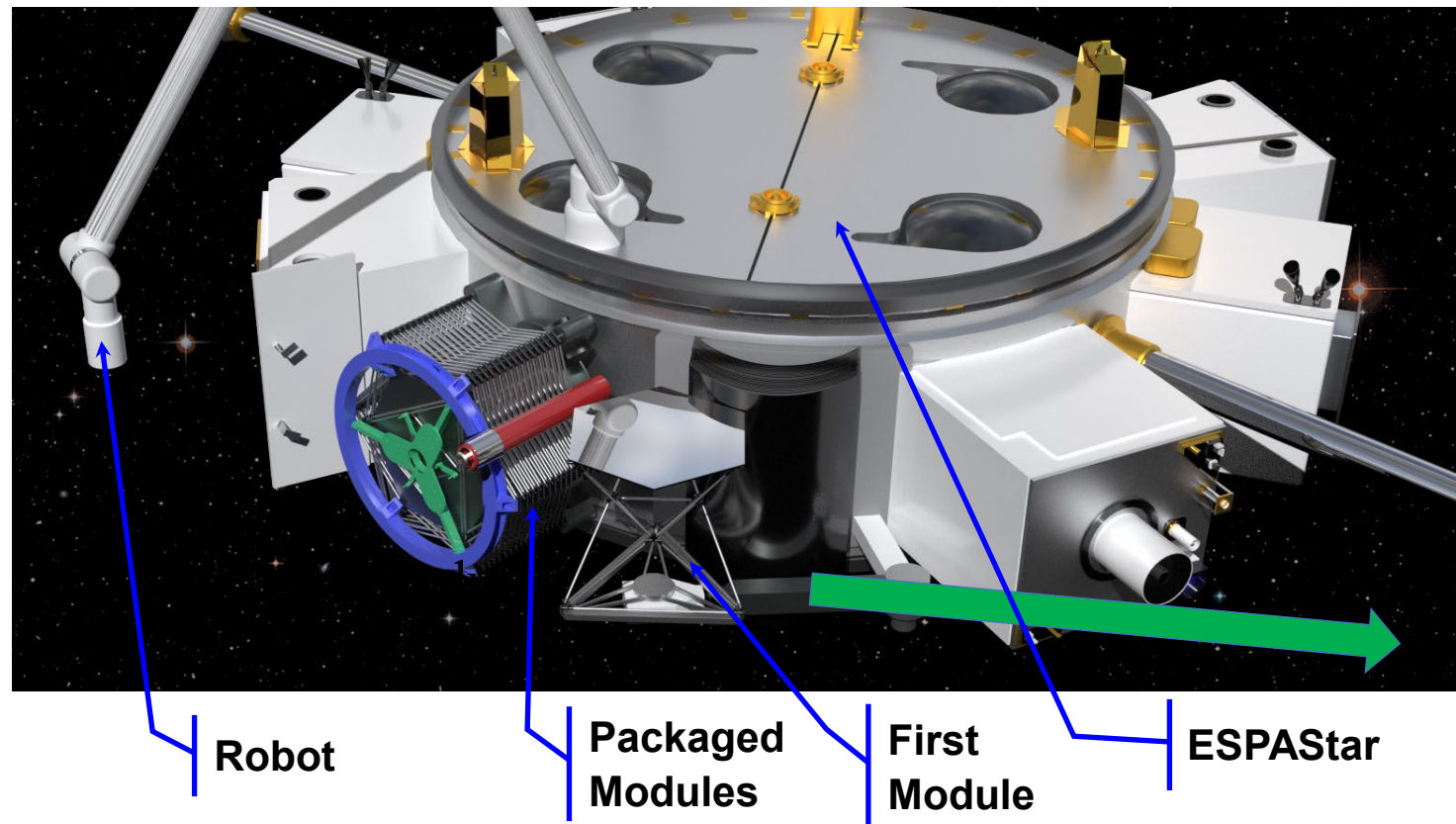
Mirror being Polished



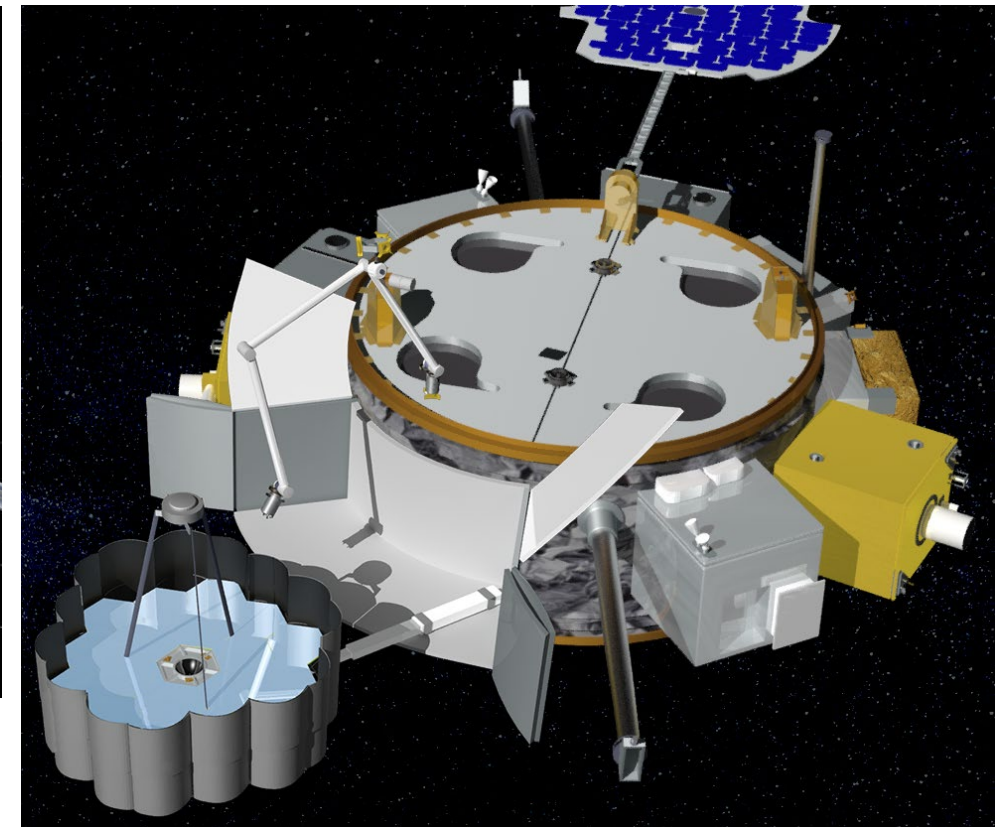
Mirror in Preparation for Cutting to Hexagon

Closing remark: modest flight experiment needed to validate supervised assembly

Assembly Experiment: Not an Instrument



**Packaged Modules which Deploy
Prior to On-Orbit Assembly**



**Reflector Formed from
Assembly of Deployed Modules**