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RST Optical Telescope Integration Status and Test Preparation

SPIE Mirror Tech Days

L3Harris Technologies

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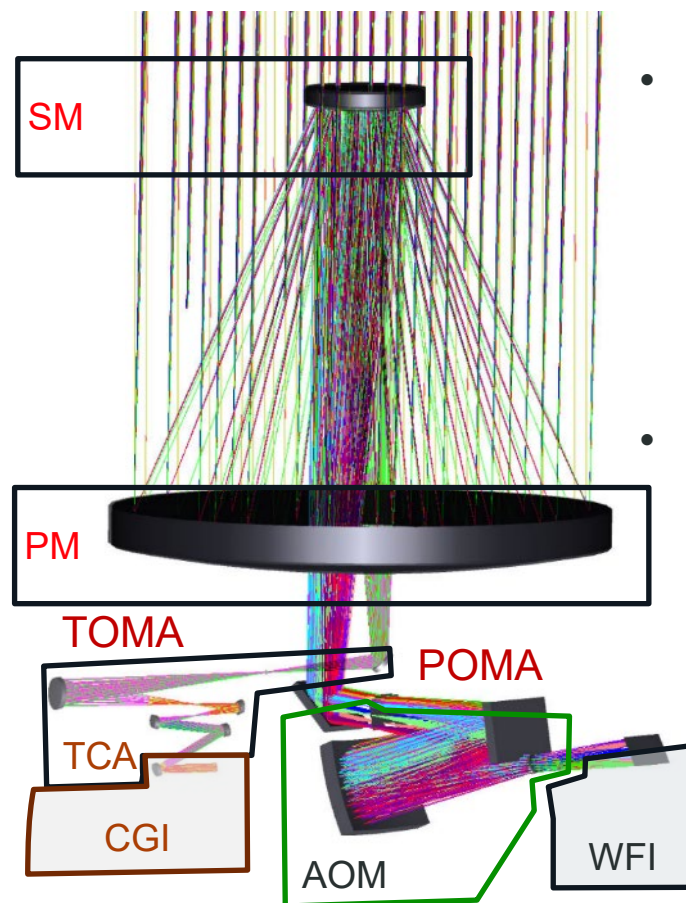
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L3HARRIS

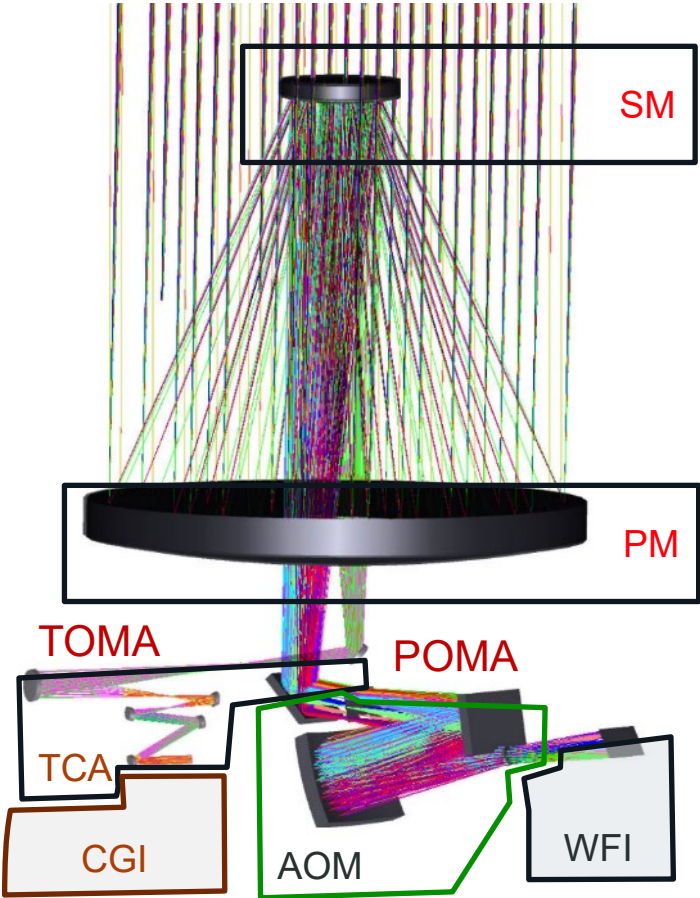
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Optical telescope taking shape

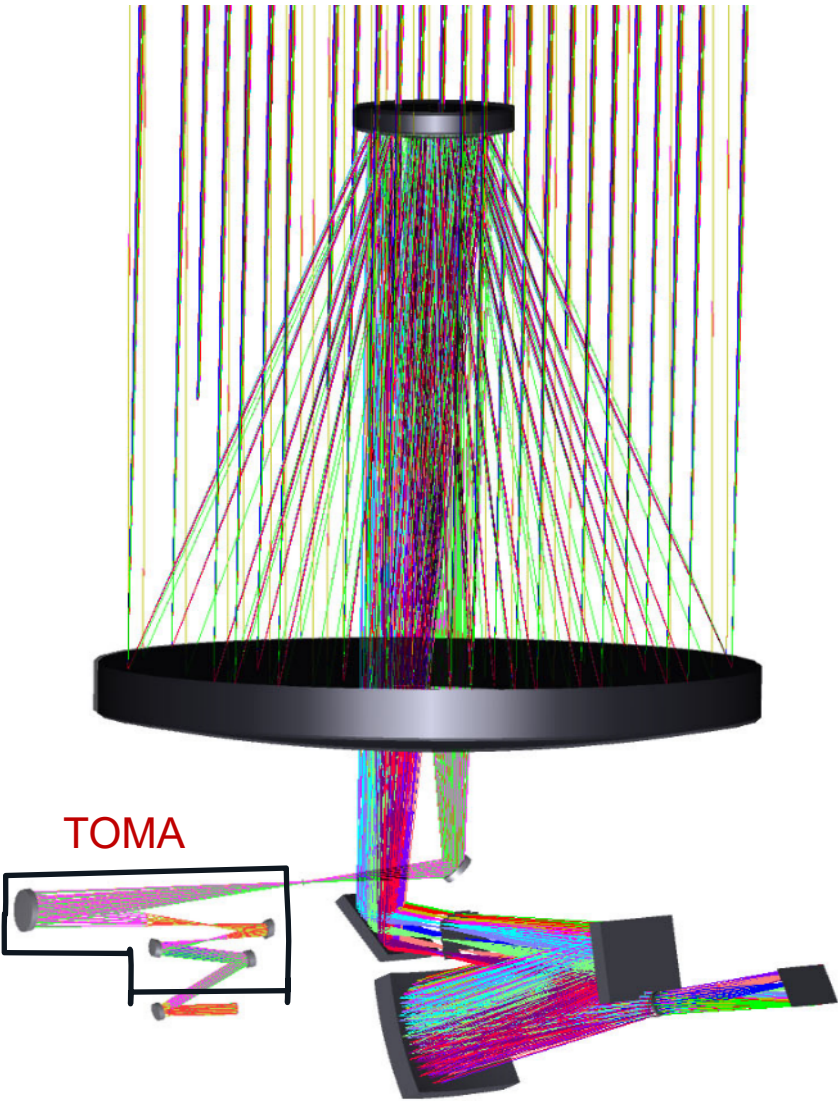
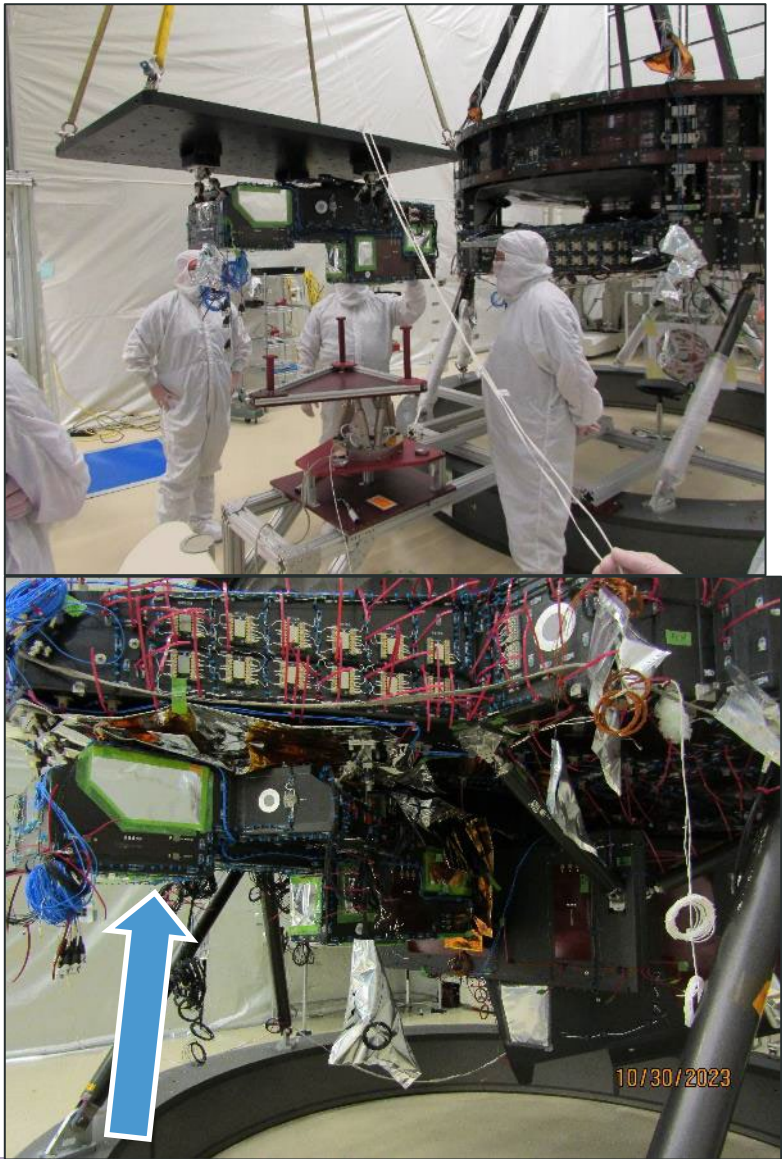


- **All assembly-level testing complete**
- **Mechanical integration nearly complete**
 - SM stacked on PM
 - All 13 actuators installed for positioning mirrors
 - All aft optics installed to laser tracker tolerances
- **Electrical integration in process**
 - Complete coverage of heaters and temperature sensors installed
 - Light scrapers on each SM tube over insulation wrap, wires, and cables for stray light control
 - Strategically placed accelerometers for later testing at inaccessible locations
 - Wires and cables installation for aft optics in process

POMA installed, wired, and blanketed



TOMA installed, ready for optical alignment



Aft Optics Structure with Fold Mirror 1 Installed



Tertiary Mirror

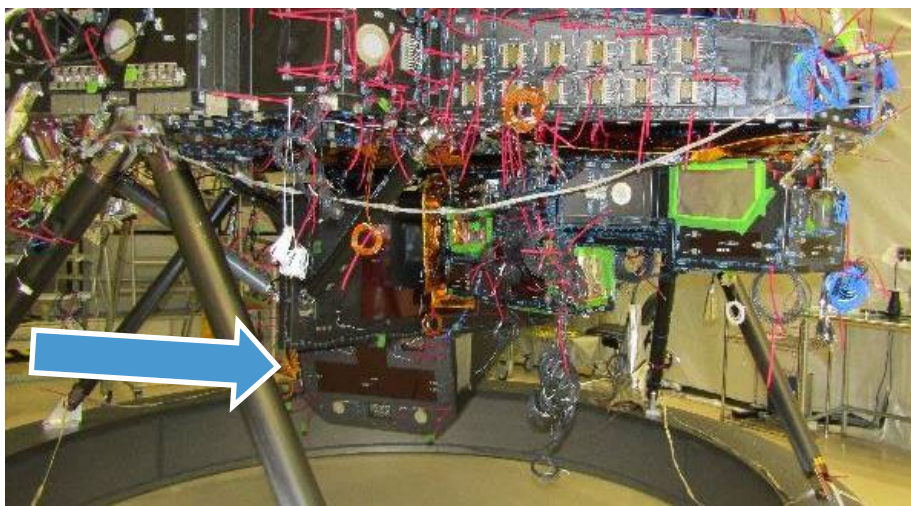


Fold Mirror 1



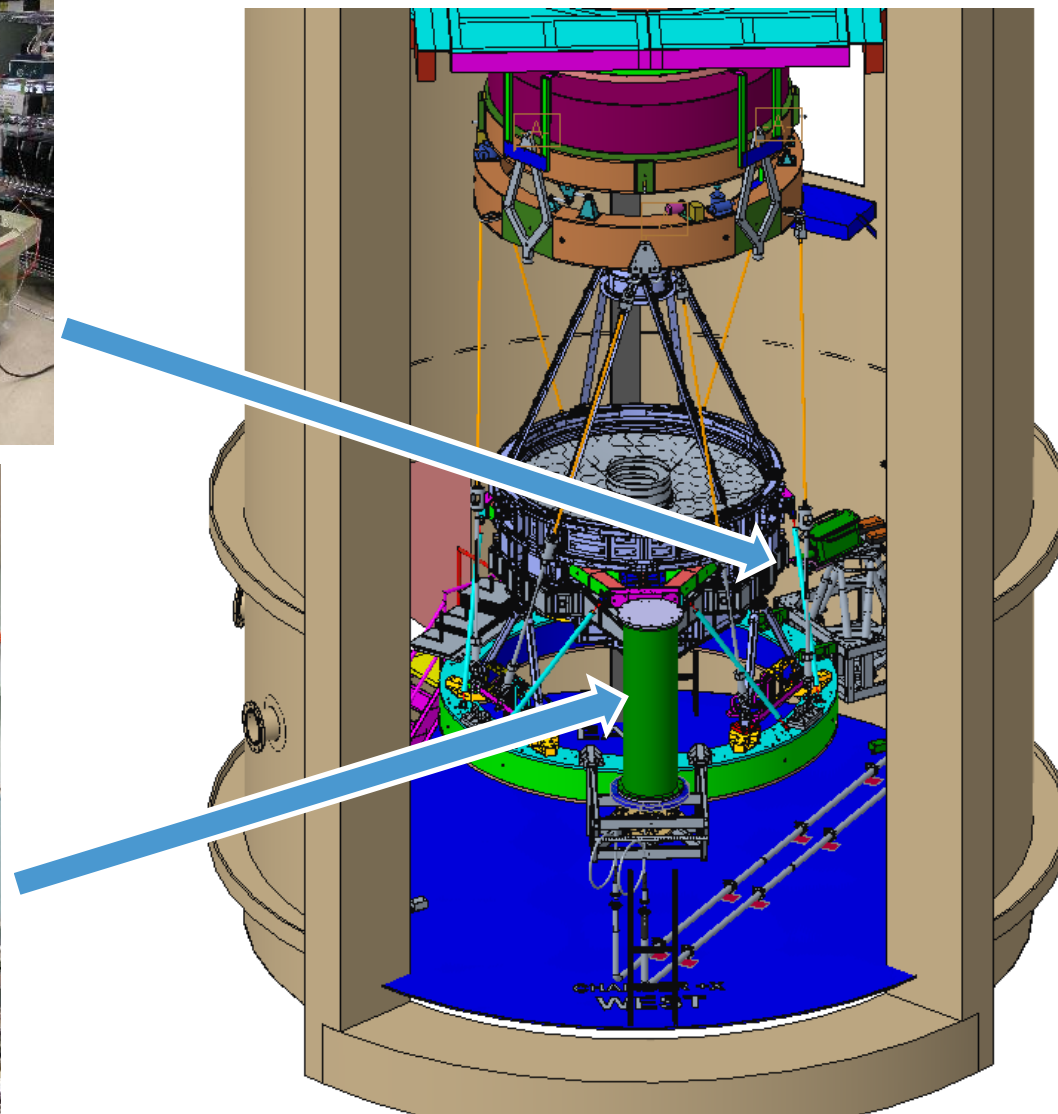
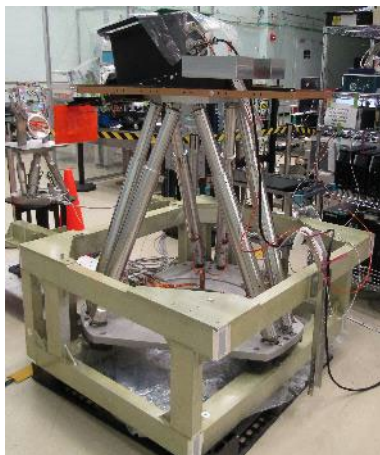
Fold Mirror 2

- Fold Mirror 1 installed into the Aft Optics Structure
- Then FM1 + AOS installed under the Aft Metering Structure with 6 struts
- With an interferometer at the Coronagraph exit beam and another interferometer at the Wide Field image, the SM, TOMA, FM2, and TM are aligned to target WFE at the set image planes



Chamber in preparation for optical alignment

- Chamber used to pump down to low pressure for interferometric testing
- Decades-old auto-collimating flat mirror hangs with telescope from vibration isolators
- Interferometer sets pupil and focus position using optical mechanical references
- Shack Hartmann sensor for coronagraph channel calibrated to interferometer and wavefront sensor calibrated to interferometer while light-weighted primary mirror gravity sag off loaded



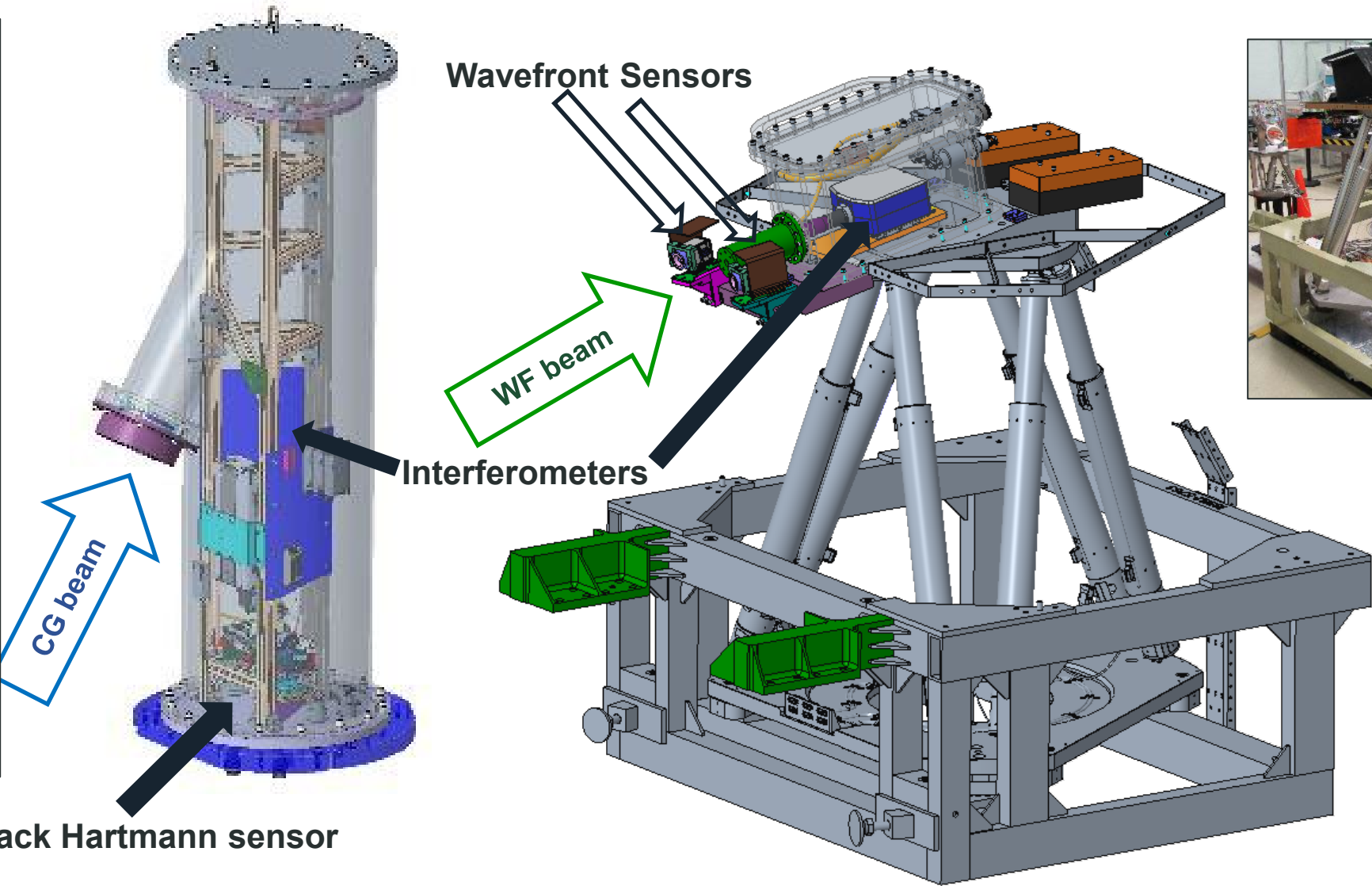
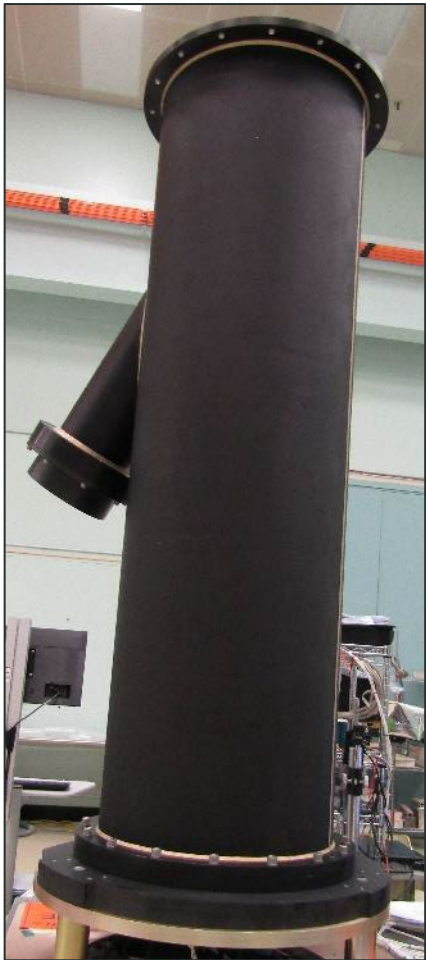
Vibration facility has started characterization testing



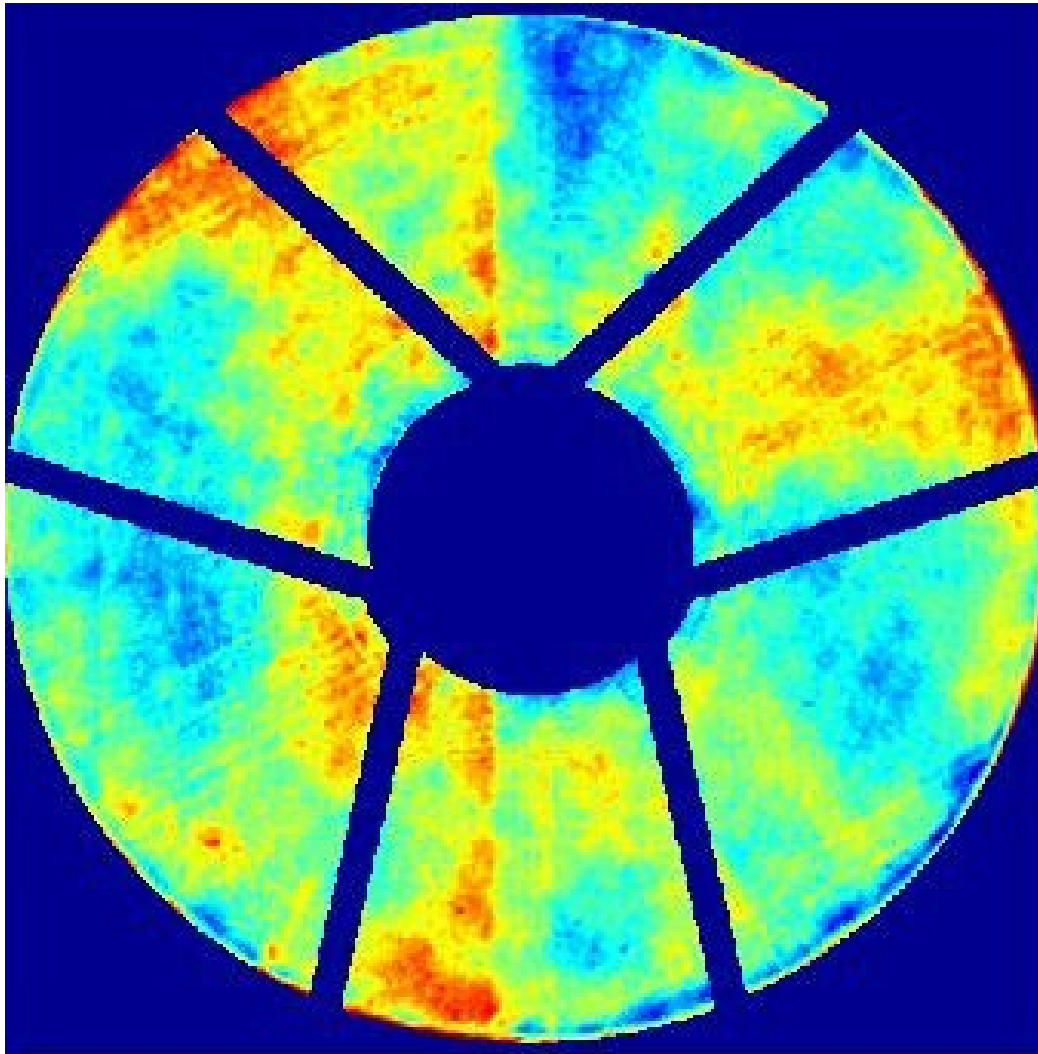
Weldment sized to Roman telescope on bearings attached to lateral shaker

Head expander for Roman telescope on vertical shaker

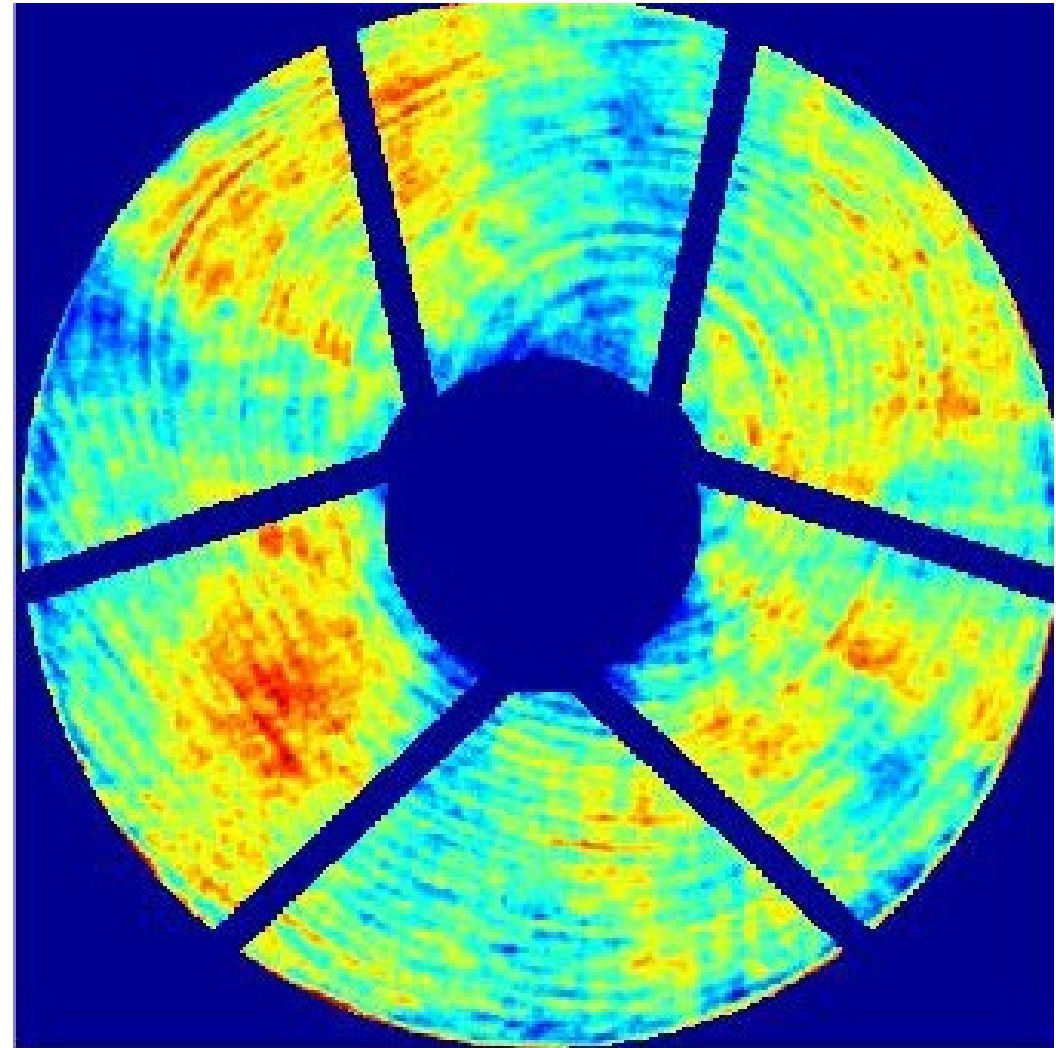
Optical test equipment ready for alignment configuration



Predicted wavefront error maps ~ 70 nm RMS

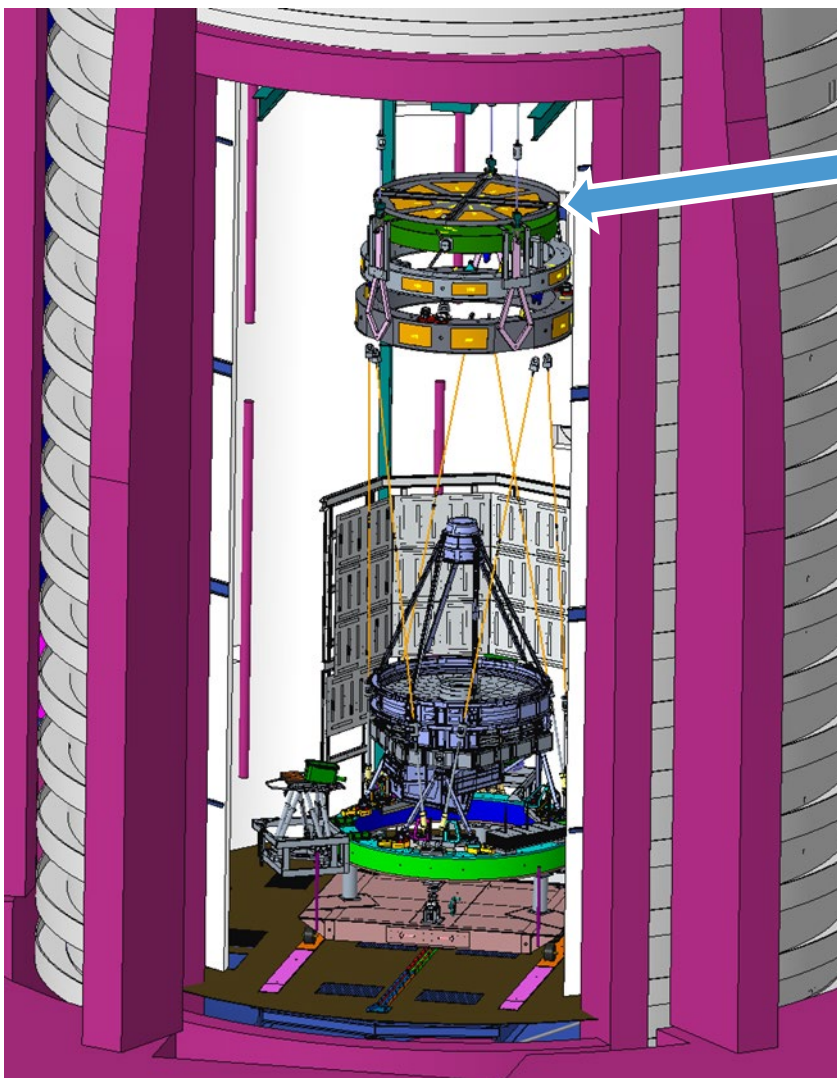


Wide field map



Coronagraph field map

Thermal vacuum chamber in preparation for test



- The optical telescope will be tested at operating temperature, at survival temperature and in vacuum using a heater shroud inside an LN₂ shroud inside a vacuum chamber
- A new auto-collimating flat mirror is complete and ready for integration in the chamber
- Renovation of the chamber for vibration isolated optical testing is complete
- Thermal shroud assembly is in process



- The electronics include 96 channels of proportional – integral heater control and motor control of 13 mirror position actuators
- The initial electrical performance test with electrical loads and similar actuators completed in room temperature
- EMI testing is complete
- The box is currently undergoing post-vibration electrical testing
- Next test
 - Thermal vacuum performance test

- The optical telescope for the Roman Space Telescope is more than halfway assembled
- The control electronics box is assembled and stepping through environmental testing
- The system optical alignment configuration is process to be installed in chamber
- The vibration test configuration has started characterization testing
- The thermal vacuum test configuration is under construction

