S2.02-1106 - Precision In-Space Manufacturing for Structurally-Connected Space Interferometry

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NON-PROPRIETARY DATA

IDENTIFICATION AND SIGNIFICANCE OF INNOVATION

Made In Space, Inc. (MIS) proposes the construction of large baseline structures, 10-50 meters on their long axis, for infrared space interferometry missions by autonomous in-space manufacturing and assembly. This enables the deployment of large primary trusses unconstrained by launch load or volume restrictions that meet science requirements for the high angular resolutions (less than 0.3 arcseconds) necessary to detect planets near bright stars and measure individual objects in star clusters. In this Phase II effort, MIS manufactures two 10-meter beams for structurally-connected interferometers (SCI) and demonstrates non-cryogenic mirror alignment and tracking to 30 nanometers of precision to satisfy anticipated structural performance requirements for near-infrared space astronomy.

TECHNICAL OBJECTIVES AND WORK PLAN

The Optimast-SCI Phase II effort is focused on the manufacture, test, and verification of the 25-meter optical interferometry boom as the most critical element for demonstrating the scalability of this architecture and the demonstration of mirror positioning alignment to 30-nanometers as proof of performance for space astronomy structural precision requirements.

The expected results for this effort are:

- Completed Optimast-SCI Engineering Development Unit
- Successful Testing
  - Optimast-SCI manufacturing of full-scale beams for interferometry
  - Mirror alignment & tracking testing as major risk reduction
  - Demonstration of functionality between spacecraft elements with only structural attachment

TRL

Estimated

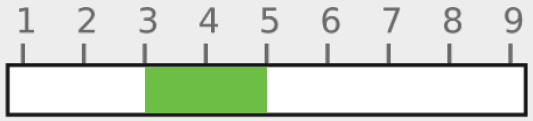


IMAGE TITLE: Optimast-SCI Scale Mockup



NASA APPLICATIONS

Future missions for detecting and characterizing new worlds and faint distant objects require much larger effective apertures than the current generation of space telescopes. Terrestrial telescopes also have large amounts of distortion that blur the viewing of these objects rendering them unusable for in-depth analysis. In-space manufacturing using space-rated polymers provides mission-optimized structural baselines for infrared interferometry missions that are lower in mass and complexity than traditional hinged trusses or deployable booms.

NON-NASA APPLICATIONS

An Optimast-SCI satellite optimized for space situational awareness (SSA) and wide-field Earth surface observation is possible with a 50-meter optical baseline. This system has a limiting resolution of only 25 centimeters from a 36,000-kilometer Geosynchronous Orbit (GEO). Such a satellite is capable of both rapid response inspection of satellites and at-will observation of the facing hemisphere.

FIRM CONTACTS

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