Advanced UVOIR Mirror Technology Development for Very Large Space Telescopes

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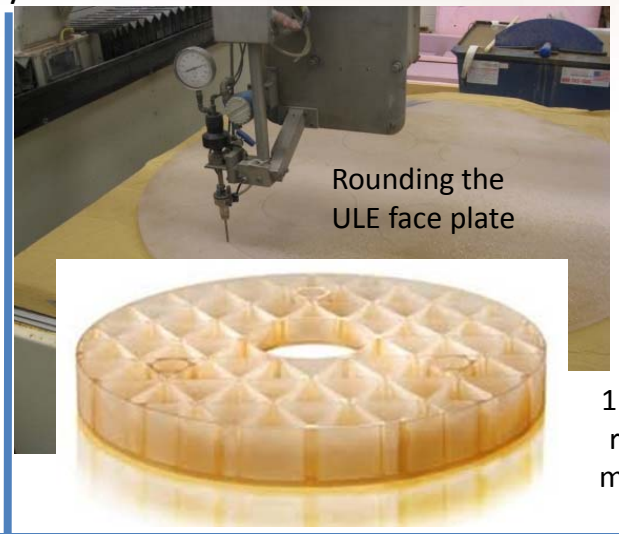

1.2m Schott mirror ready for polish & mounting structure

Objectives and Key Challenges:

- Advance TRL of key technology challenges for the primary mirror of future large-aperture Cosmic Origins UVOIR space telescopes
- Include monolithic and segmented optics design paths
- Conduct prototype development, testing, and modeling
- Trace metrics to science mission error budget

Significance of Work:

- Deep-core manufacturing method enables 4-m class mirrors with a 20-30% lower cost and risk
- Design tools increase speed and reduce cost of trade studies
- Integrated modeling tools enable better definition of system and component engineering specifications

Approach:

- Science-driven systems engineering
- Mature technologies required to enable highest priority science and result in high-performance, low-cost, low-risk system
- Provide options to science community by developing technology enabling both monolithic- and segmented-aperture telescopes
- Mature technology in support of 2020 Decadal process

Key Collaborators:

- Dr. Scott Smith, Ron Eng, and Mike Effinger (MSFC)
- Bill Arnold (AI Solutions)
- Gary Mosier (GSFC)
- Dr. Marc Postman (STScI)
- Olivier Guyon (U of Arizona)
- Stuart Shaklan and John Krist (JPL)
- Al Ferland, Gary Matthews, and Rob Egerman (Harris)

Current Funded Period of Performance:

Sep 2011 – Dec 2016

Recent Accomplishments:

- ✓ Finalized 1.5-m design, traceable to 4 m, using A-Basis strength data
- ✓ Fabrication of ULE & Zerodur mirrors & support structure in-process
- ✓ Characterized 40-cm deep core with X-ray computed tomography
- ✓ Received approval for Arnold Mirror Modeler code distribution
- ✓ Developed thermal MTF modeling methodology
- ✓ TRL Board Assessment
- ✓ Published at SPIE O&P and Tech Days 2015

Next Milestones:

- Publish results
- Fabricate and assemble 1.5-m mirror substrate

Applications:

- Flagship optical missions; Explorer-type optical missions
- Department of Defense and commercial observations

TRL_{In} = 3 - 5+ $TRL_{Current}$ = 3 - 5+ TRL_{Target} = 3+ - 6
(values depend on specific technology)