The X-ray Surveyor Mission Concept

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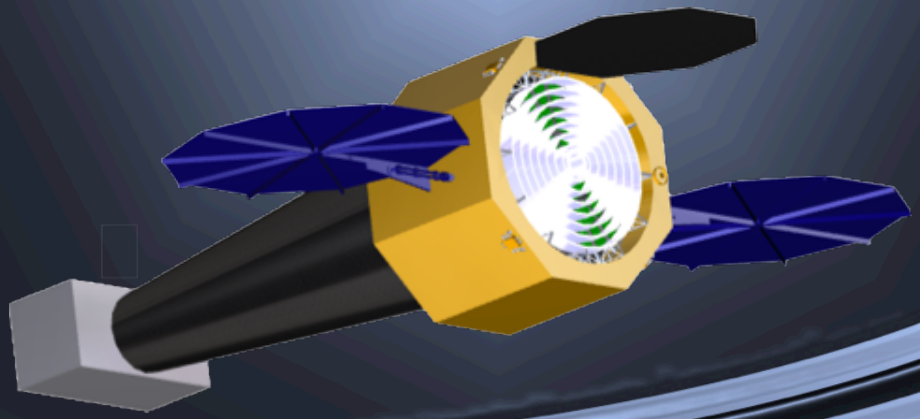
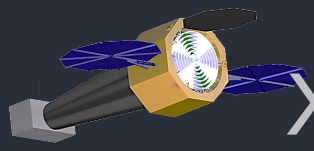




X-ray Surveyor Mission Overview

- **Enduring Quests Daring Visions**– Notional Missions in the Formative Era
  - Large gains in collecting area over Chandra and XMM
  - Angular resolution under 1 arcsecond
  - High-throughput spectroscopy
  - Large field of view

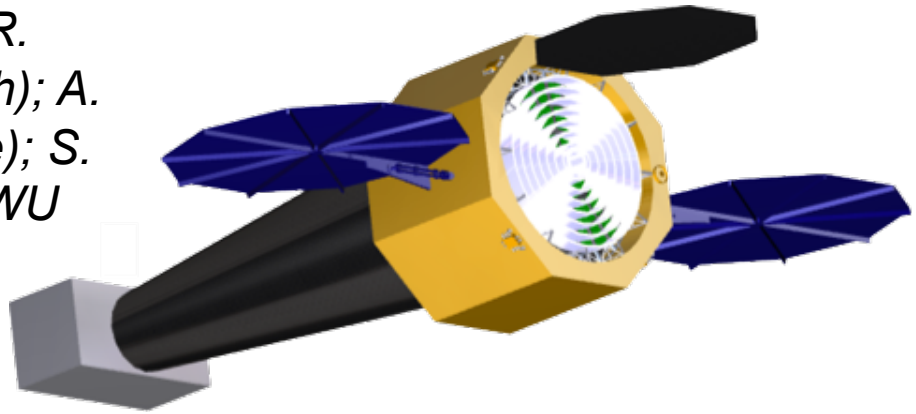
X-Ray Surveyor:

- **Leaps in Capability** – *large area with high spatial and spectral resolution for 1–2 orders of magnitude gains in sensitivity*
- **Scientifically compelling** – *Frontier science from first accretion light in the Universe to feedback and growth of cosmic structure coupled with high-resolution spectroscopy for understanding the plasma physics in astronomical sources*
- **Feasible** – *Chandra-like mission with regards to cost and complexity with the new technology for optics and instruments at TRL3, proceeding to TRL6 by Phase B*

X-ray Surveyor Strawman Mission

- Developed through MSFC's Advanced Concepts Office
- Informal mission concept definition team:

M. Weisskopf, J. Gaskin, B. Ramsey, S. O'Dell (MSFC); A. Vikhlinin, H. Tananbaum, P. Reid, D. Schwartz, R. Kraft (SAO); D. Burrows, A. Falcone, L. Townsley (PSU); M. Bautz, R. Heilmann (MIT); S. Bandler, A. Ptak, R. Petre, C. Kilbourne (GSFC); R. McEntaffer (Iowa); F. Harrison (Caltech); A. Kravtsov (Chicago); P. Natarajan (Yale); S. Heinz (Wisconsin); C. Kouveliotou (GWU



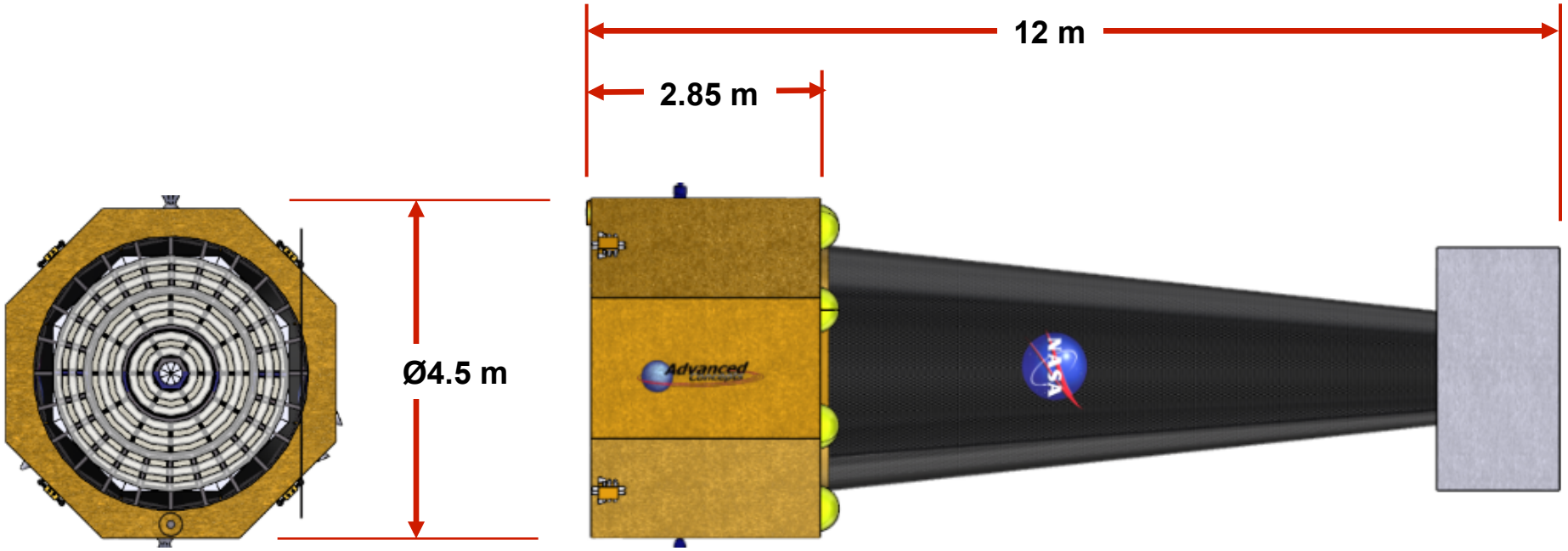
Gaskin, J. et al. 2015, SPIE 96010J

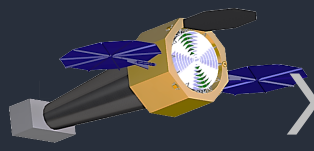
http://cxc.harvard.edu/cdo/xray_surveyor/

We Need A Successor to *Chandra*

- Sub-arcsecond angular resolution - at least as good as *Chandra*
- Much higher photon throughput than *Chandra (*observations are photon-limited)

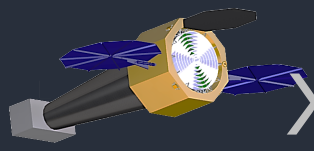
✓Incorporates relevant prior (Con-X, IXO, AXSIO) development and *Chandra* heritage → ✓ Most spacecraft requirements are *Chandra-like* → ✓ Achieves *Chandra-like* cost ($2.95B for Phase B through launch)





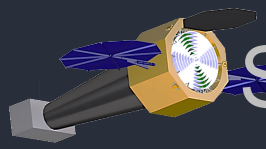
X-ray Surveyor Study Team

- Apply MSFC & SAO capabilities and resources
  - Incorporate Chandra heritage; mainly Chandra-like spacecraft requirements (with some straight-forward extensions)
  - World-class calibration facilities
  - Optics Engineering Design Support Tasks:
    - Energy-dependent angular resolution, effective area, vignetting trades
    - Stray-light baffles, pre- & post-collimators and thermal control and gradients
    - Mirror support & module mount design structural, thermal, and optical optimization
    - Mirror alignment & module assembly workflow; production mechanization
    - Metrology volume and accuracy assessments; calibration plans & requirements
  - Promote competitive exploration of multiple approaches to sub-arcsecond mirror element design; Study Team will help inform future funding prioritization



X-ray Surveyor Study Plan

- Perform STDT-directed design trades and analyses:
  - Provide design products
  - Assess & recommend trade options
  - Develop implementable DRM
- Employ MSFC/ACO engineering services to provide high-fidelity studies analyzing end-to-end mission systems including:
  - Avionics, power systems, propulsion,
  - Structural design & analysis,
  - Thermal analysis, space environment,
  - Communications, command & data handling
- Cost Assessments



Science & Technology Definition Team

- Broad and Interdisciplinary Composition
  - Science Area

    X-ray Surveyor will address a large variety of fundamental questions about cosmic astrophysics and the science team must encompass many fields
  - Technology Areas
    - Optics

      Segmented & full-shell grazing-incidence materials & fabrication, metrology, alignment, mounting & assembly, static & active figure correction
    - Instrumentation
      - Microcalorimeter Imaging Spectrometer
      - High-definition Imager
      - High resolution gratings

X-ray Surveyor Study Team

The MSFC and SAO Study Team is tremendously enthusiastic about the importance and potential of the X-ray Surveyor Concept and we pledge to do everything we possibly can to ensure a successful study.

We look forward to working with you to define the next great X-ray Astrophysics Observatory