Flight Programs and X-ray Optics Development at MSFC

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ABSTRACT

The X-ray astronomy group at the Marshall Space Flight Center is developing electroformed nickel/cobalt x-ray optics for suborbital and orbital experiments. Suborbital instruments include the Focusing X-ray Solar Imager (FOKSI) and Micro-X sounding rocket experiments and the HERO balloon payload. Our current orbital program is the fabrication of a series of mirror modules for the Astronomical Roentgen Telescope (ART) to be launched on board the Russian-German Spectrum Roentgen Gamma Mission (SXRGM). The details and status of these various programs are presented. A second component of our work is the development of fabrication techniques and optical metrology to improve the angular resolution of thin-shell optics to the arcsecond level. The status of these x-ray optics technology developments is also presented.

Flight Programs

High Energy Replicated Optics (HERO)

HERO, for High Energy Replicated Optics, is a balloon program designed to demonstrate MSFC optics and perform science. Utilizes in-house-fabricated hard-x-ray mirrors plus supporting x-ray detectors, gondola, and pointing system.

Payload Description:

- FOKSI is a sounding rocket based payload led by the University of California, Berkeley and consisting of x-ray optics provided by MSFC and focal plane detectors provided by Japan.

**Astronomical Roentgen Telescope ART**

MSFC has designed and is fabricating four ART x-ray optics modules under an International Reimbursable Agreement between NASA and IKI. The modules have to be delivered to the IKI in June 2013.

Deliverables: 1 engineering unit (6 shells + mass simulators) and 4 flight units (28 shells/unit)

Test was performed at the MSFC’s Stray Flight facility.

Shell M02-S06 has been tested, the angular resolution is found to be 30 arc seconds HPD, which would correspond to the module performance of ~35 arc seconds.

The effective area of the shell exceeds requirements.