Toward large-area sub-arcsecond x-ray telescopes

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Abstract

The future of x-ray astronomy depends upon development of x-ray telescopes with larger aperture areas (> 1 m^2) and finer angular resolution (< 1″). Combined with the special requirements of nested grazing-incidence optics, the mass and envelope constraints of space-borne telescopes render such advances technologically challenging. Achieving this goal will require precision fabrication, alignment, mounting, and assembly of large areas (>100 m^2) of lightweight (≈ 1 kg m^{-2} areal density) high-quality mirrors—possibly entailing active (in-space adjustable) alignment and figure correction. This paper discusses relevant programmatic and technological issues and summarizes progress toward large-area sub-arcsecond x-ray telescopes.

Key words: X-ray telescopes, x-ray optics, active optics, electro-active devices, silicon mirrors, differential deposition, ion implantation

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