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Adaptive X-Ray Optics II

**Ali M. Khounsary
Stephen L. O'Dell
Thomas G. Bifano**
Editors

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Contents

vii	Conference Committee
ix	Introduction

SESSION 1 LIGHT-SOURCE APPLICATIONS

- 8503 02 **An active optics system for EUV/soft x-ray beam shaping** [8503-1]
C. Svetina, Synchrotron Trieste S.C.p.A. (Italy); D. Cocco, SLAC National Accelerator Lab. (United States); A. Di Cicco, Univ. degli Studi di Camerino (Italy) and IMPMC, CNRS, Univ. Paris 6 (France); C. Fava, S. Gerusina, R. Gobessi, N. Mahne, C. Masciovecchio, E. Principi, L. Raimondi, L. Rumiz, R. Sergo, G. Sostero, Synchrotron Trieste S.C.p.A. (Italy); D. Spiga, INAF - Osservatorio Astronomico di Brera (Italy); M. Zangrando, Synchrotron Trieste S.C.p.A. (Italy) and Lab. Nazionale TASC (Italy)
- 8503 03 **Development of piezoelectric deformable mirror for hard x-ray nanofocusing** [8503-2]
S. Matsuyama, Osaka Univ. (Japan); T. Kimura, Hokkaido Univ. (Japan); H. Nakamori, S. Imai, Y. Sano, Osaka Univ. (Japan); Y. Kohmura, K. Tamasaku, M. Yabashi, T. Ishikawa, RIKEN (Japan); K. Yamauchi, Osaka Univ. (Japan) and CREST, JST (Japan)
- 8503 04 **Conceptual design of a grazing incidence x-ray deformable mirror using voice-coil actuators** [8503-3]
M. Hart, J. Codona, R. Codona, The Univ. of Arizona (United States); S. M. Ammons, B. A. Macintosh, T. McCarville, T. Pardini, M. Pivovarov, L. Poyneer, Lawrence Livermore National Lab. (United States)

SESSION 2 ASTRONOMICAL APPLICATIONS

- 8503 07 **Toward active x-ray telescopes II** [8503-7]
S. L. O'Dell, NASA Marshall Space Flight Ctr. (United States); T. L. Aldcroft, Harvard-Smithsonian Ctr. for Astrophysics (United States); C. Atkins, Univ. of Alabama in Huntsville (United States); T. W. Button, The Univ. of Birmingham (United Kingdom); V. Cotroneo, W. N. Davis, Harvard-Smithsonian Ctr. for Astrophysics (United States); P. Doel, Univ. College London (United Kingdom); C. H. Feldman, Univ. of Leicester (United Kingdom); M. D. Freeman, Harvard-Smithsonian Ctr. for Astrophysics (United States); M. V. Gubarev, NASA Marshall Space Flight Ctr. (United States); R. L. Johnson-Wilke, The Pennsylvania State Univ. (United States); J. J. Kolodziejczak, NASA Marshall Space Flight Ctr. (United States); C. F. Lillie, Lillie Consulting (United States); A. G. Michette, King's College London (United Kingdom); B. D. Ramsey, NASA Marshall Space Flight Ctr. (United States); P. B. Reid, Univ. of Alabama in Huntsville (United States); D. Rodriguez Sanmartin, Univ. of Brighton (United Kingdom); T. T. Saha, NASA Goddard Space Flight Ctr. (United States); D. A. Schwartz, Harvard-Smithsonian Ctr. for Astrophysics (United States); S. E. Troler-McKinstry, The Pennsylvania State Univ. (United States); M. P. Ulmer, Northwestern Univ. (United States); R. H. T. Wilke, The Pennsylvania State Univ. (United States); R. Willingale, Univ. of Leicester (United Kingdom); W. W. Zhang, NASA Goddard Space Flight Ctr. (United States)

- 8503 08 **The square meter arcsecond resolution x-ray telescope: SMART-X** [8503-8]
D. A. Schwartz, T. L. Aldcroft, J. A. Bookbinder, V. Cotroneo, W. N. Davis, W. R. Forman, M. D. Freeman, S. McMudroch, P. Reid, H. Tananbaum, A. Vikhlinin, Smithsonian Astrophysical Observatory (United States); S. Troler-McKinstry, D. Wilke, R. Johnson-Wilke, The Pennsylvania State Univ. (United States)

SESSION 3 DEVICE DEVELOPMENT

- 8503 09 **Adjustable grazing incidence x-ray optics based on thin PZT films** [8503-9]
V. Cotroneo, W. N. Davis, V. Marquez, P. B. Reid, D. A. Schwartz, Harvard-Smithsonian Ctr. for Astrophysics (United States); R. L. Johnson-Wilke, S. E. Troler-McKinstry, R. H. T. Wilke, The Pennsylvania State Univ. (United States)
- 8503 0A **Improving yield of PZT piezoelectric devices on glass substrates** [8503-10]
R. L. Johnson-Wilke, R. H. T. Wilke, The Pennsylvania State Univ. (United States); V. Cotroneo, W. N. Davis, P. B. Reid, D. A. Schwartz, Harvard-Smithsonian Ctr. for Astrophysics (United States); S. Troler-McKinstry, The Pennsylvania State Univ. (United States)
- 8503 0B **Adaptive x-ray optics development at AOA-Xinetics** [8503-11]
C. F. Lillie, Lillie Consulting, LLC (United States); D. D. Pearson, J. L. Cavaco, A. D. Plinta, J. A. Wellman, Northrop Grumman AOA-Xinetics (United States)
- 8503 0C **Progress report on using magneto-strictive sputtered thin films to modify the shape of a x-ray telescope mirror** [8503-12]
M. P. Ulmer, X. Wang, J. Cao, J. Savoie, B. Bellavia, M. E. Graham, S. Vaynman, Northwestern Univ. (United States)
- 8503 0D **Comparing theory with experimental data in studying the deformation of magnetically smart films deposited on nickel and glass substrates** [8503-13]
X. Wang, J. Cao, M. P. Ulmer, M. E. Graham, S. Vaynman, J. Savoie, B. Bellavia, Northwestern Univ. (United States)

SESSION 4 SIMULATION AND CHARACTERIZATION

- 8503 0E **Piezoelectric actuation of a thin Wolter-1 shell in a rigid mounting scheme** [8503-14]
C. Feldman, R. Willingale, Univ. of Leicester (United Kingdom)
- 8503 0F **Simulating correction of adjustable optics for an x-ray telescope** [8503-15]
T. L. Aldcroft, D. A. Schwartz, P. B. Reid, V. Cotroneo, W. N. Davis, Harvard-Smithsonian Ctr. for Astrophysics (United States)
- 8503 0G **X-ray wavefront characterization with two-dimensional wavefront sensors: shearing interferometers and Hartmann wavefront sensors** [8503-16]
K. L. Baker, Lawrence Livermore National Lab. (United States)

- 8503 0H **Simulating wavefront correction via deformable mirrors at x-ray beamlines** [8503-17]
T. Pardini, L. A. Poyneer, Lawrence Livermore National Lab. (United States); A. Plinta,
J. L. Cavaco, Northrop Grumman AOA-Xinetics (United States); M. J. Pivovarov,
Lawrence Livermore National Lab. (United States)
- 8503 0I **Aliasing in a Hartmann wavefront sensor at x-ray wavelengths** [8503-18]
L. A. Poyneer, B. Bauman, B. Macintosh, Lawrence Livermore National Lab. (United States)

Author Index

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- 1 Light-Source Applications
Ali Khounsary, Argonne National Laboratory (United States)
- 2 Astronomical Applications
Daniel A. Schwartz, Harvard-Smithsonian Center for Astrophysics
(United States)
Michael Hart, Hart Scientific Consulting International L.L.C.
(United States)
- 3 Device Development
Thomas G. Bifano, Boston University (United States) and Boston
Micromachines Corporation (United States)
Kevin L. Baker, Lawrence Livermore National Laboratory
(United States)
- 4 Simulation and Characterization
Melville P. Ulmer, Northwestern University (United States)

Introduction

Adaptive or active optics (AO) has become indispensable for applications in which aberrations would otherwise limit performance—including ground-based astronomy, retinal imaging, free-space laser communication, and synchrotron x-ray optics. The emergence of economical wavefront sensing and control hardware has leveraged technical advances in this field. The resulting scientific achievements—especially in infrared/visible ground-based astronomy and retinal ophthalmology—have inspired the exploration of AO technologies for x-ray applications.

X-ray beam control and imaging systems are rarely diffraction limited, and thus provide a promising new frontier for active optics. A significant challenge involves development of wavefront sensing and correcting hardware and algorithms that provide suitable control of surface figure to improve x-ray system performance, both in grazing-incidence and near-normal-incidence systems, at wavelengths ranging from extreme ultraviolet (with applications in lithography) through soft and hard x-rays (with applications in space-based astronomy, medicine, and microscopy).

This volume comprises the papers presented at the second biennial conference series on Adaptive X-ray Optics within SPIE Optics + Photonics. The conference serves as a forum for reviewing recent advancements in "traditional" adaptive optics, for examining extension of that technology to active or adjustable x-ray optics, and for reporting progress in what we loosely term "Adaptive X-ray Optics".

The Conference comprised four sessions. The first session focused on deformable mirror systems developed for grazing-incidence control of synchrotron x-ray sources. The second session focused on astronomical applications, from a ground-based infrared AO system for imaging exoplanets against the light of the host star, to studies of prospective next-generation x-ray space telescopes. The third session reported on deformable mirror devices and actuation technologies. The final session addressed simulation and characterization of x-ray AO technologies and systems.

We thank the speakers and session chairs for their contributions. We are grateful to Conference Co-Chairs Sergio R. Restaino, Stuart B. Shaklan, and Kazuto Yamauchi for their advice and support. Finally, we appreciate the invaluable help of the SPIE staff in hosting this Conference and in publishing these Proceedings.

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Stephen L. O'Dell
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