

# PROCEEDINGS OF SPIE

## ***Adaptive X-Ray Optics II***

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

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## 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.

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

