The 8th International Workshop on X-ray Optics and Metrology—IWXM 2024

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Founded more than a decade ago, the International Workshop on X-ray Optics and Metrology (IWXM) is a unique triennial event held in conjunction with the International Synchrotron Radiation Instrumentation (SRI) Conference. First initiatives to exchange results and experiences on x-ray optics are traced back to the International Workshop on Metrology for X-Ray and Neutron Optics held in March 2000 at Argonne National Laboratory.[1] IWXM brings together leading experts from synchrotron and x-ray free-electron laser (XFEL) facilities, industry, and academia to explore the latest advances in x-ray optics, from fabrication and metrology to beamline integration and commissioning as well as simulation and data handling.

The workshop is hosted at major light source facilities to enable stimulating site visits and direct engagement with local scientists and instrument developers, fostering meaningful collaboration across institutions and disciplines.

Driven by the rapid evolution of low-emittance synchrotron radiation sources and XFELs, the demand for high-performance x-ray optics has surged. These next-generation facilities—characterized by their extreme brightness and coherence—have ushered in a new era of scientific discovery. Meeting their stringent requirements has pushed the boundaries of x-ray optics and associated *ex situ* and *in situ* metrology. Unlike visible-light optics, x-ray mirrors and diffractive optical elements, such as gratings and reflection zone plates, demand specialized manufacturing techniques and metrology tools, with only a limited number of commercial suppliers worldwide capable of meeting these challenges.

Since its inception, IWXM has served as a premier platform for developers and researchers to present cutting-edge technologies, share insights, and shape future directions in x-ray optics and metrology. Participation in IWXM has grown steadily, cultivating a vibrant and engaged international community. The 8th edition, IWXM 2024, was held at Helmholtz-Zentrum Berlin's BESSY II facility September 2–5, 2024, as a satellite event of SRI2024. The workshop welcomed 118 delegates from 14 countries (see also Fig. 1). The four-day program featured 12 themed sessions comprising 55 oral presentations and 32 poster contributions. Topics spanned the latest innovations in x-ray optics, with a strong emphasis on mirror technologies and metrology—including novel concepts, instrumentation, and advances in wavefront diagnostics and control. The last day of the workshop was dedicated to novel developments in the field of manufacturing and measuring of diffractive gratings for applications in the soft- to tender-x-ray energy range.

This Special Topic gathers a set of peer-reviewed articles derived from a subset of the full workshop presentations.

FIG. 1. Group photograph of the IWXM 2024 attendees at the BESSY II synchrotron radiation facility of Helmholtz-Zentrum Berlin, Germany.

In summary, IWXM 2024 successfully fulfilled its mission of showcasing the latest critical advancements in x-ray optics fabrication, optimization, and both *in situ* and *ex situ* metrology. The workshop also highlighted emerging techniques in wavefront sensing and control, reinforcing its role as a vital forum for exchanging knowledge, catalyzing innovation, and strengthening the global community dedicated to precision x-ray instrumentation.

For more information about the workshop and workshop presentations, see the IWXM 2024 website: https://www.helmholtz-berlin.de/events/iwxm-2024/index_en.html.

We thank the International Advisory Committee, Local Organizing Committee, and Selection Committee of the Giovanni Sostero Award for their efforts to make the workshop run smoothly. The local organizing committee members Anna Maminska, Jana Buchheim, and Grzegorz Gwalt (all with Helmholtz-Zentrum Berlin) deserve a warm acknowledgment for their assistance with the workshop organization. We are grateful to Helmholtz-Zentrum Berlin for hosting the workshop at the BESSY II synchrotron radiation facility in Berlin-Adlershof.

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AUTHOR DECLARATIONS

Author Contributions

Frank Siewert: Conceptualization (equal); Writing – original draft (equal); Writing – review & editing (equal). **Michael Krumrey**: Conceptualization (equal); Writing – original draft (equal); Writing – review & editing (equal). **Lahsen Assoufid**: Conceptualization (equal); Writing – original draft (equal); Writing – review & editing (equal).

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