



Advanced Photon Sources and Applications in Nanoscale Imaging

June 4, 2022

In these lectures we will discuss EUV and x-ray sources, optics, and applications. In the source section we will describe the physics of undulator radiation, the extension to EUV and x-ray free electron lasers (FELs), and the physics of laser high harmonic generation (HHG). Regarding optics at these short wavelengths, we will describe important aspects of reflective optics, the very poor reflectivity at normal incidence, high reflectivity at glancing incidence, the critical angle, KB and Wölter optics. We will also describe EUV and x-ray multilayer coatings, and diffractive optics such as zone plates, gratings, and pinholes. Applications to materials science, the life sciences, cultural heritage, solar and astrophysics, CT scans on spatial scales of 10s nm to microns, EUV lithography, semiconductor diagnostics, and chemical dynamical studies at femtosecond and attosecond temporal resolution will be included in this short course.

Registration Link

<https://euvlitho.regfox.com/2022-june-4th-short-course---advanced-photon-sources>

Learning Outcomes

Course attendees will be able to increase their fundamental understanding of following topics:

- Undulator Radiation
- EUV and X-ray Free Electron Lasers (FELs)
- Laser High Harmonic Generation (HHG)
- Femtosecond/attosecond pulses and coherence
- Fundamentals of soft x-ray diagnostics
- EUV/x-ray optics
- Nanoscale imaging

Intended Audience

This short course is intended for anyone who is involved in the development of EUV Lithography, other emerging lithography techniques and Nanoimaging Technologies for applications in and beyond semiconductor areas. Those who are responsible for the development of the roadmaps and making technology decisions, as well as engineers and investors, will find this course valuable.

Instructors for One-Day Short Course



Instructor's Bio

David Attwood

David Attwood is Professor Emeritus at the University of California, Berkeley, and a member of the Nano-X group at Stanford's SLAC National Accelerator Laboratory. He received his PhD in Applied Physics from New York University in 1972. After his PhD, he joined [Lawrence Livermore National Laboratory](#) to work on [laser fusion](#). He was the first scientific director of the [Advanced Light Source](#) (1985-1988) and the founding director of the Center for X-Ray Optics at [Lawrence Berkeley National Laboratory](#). He co-founded the Applied Science and Technology (AS&T) PhD program at [UC Berkeley](#). His interests involve x-ray optics, the generation of coherent radiation at EUV and x-ray wavelengths, and applications to nanoscale imaging. He is co-author with Anne Sakdinawat of the text "X-rays and Extreme Ultraviolet radiation" (www.cambridge.org/xrayeuv).

