

Holistically Optimized Laboratory XAS Systems

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<https://ucmerced.zoom.us/j/82563852897>

Abstract

For the first time, holistically optimized laboratory x-ray absorption spectroscopy (XAS) systems enable XAS measurements of most elements in the periodic table ($Z > 13$) in minutes with energy resolution better than 0.7 eV, approaching capabilities of XAS facilities using bending magnet beamlines at second generation synchrotron light sources. The optimizations include:

- High brightness x-ray source with high thermal conductivity target incorporating diamond substrate, multiple target materials providing smooth spectrum free from characteristic x-ray lines, x-ray source size and shape optimized for using low miller index diffraction planes of cylindrically bent Johannsson crystal analyzers at low-medium Bragg angles, which provides optimal tradeoff between x-ray energy resolution and flux.
- Making use of dispersion of cylindrically bent Johannsson crystal analyzers in both tangential and sagittal directions for efficient use of source x-rays.
- 2D photon counting detector for recording x-rays dispersed by the crystal analyzer in tangential and sagittal directions and rejecting harmonics reflected by a crystal analyzer.

With those options, we have developed laboratory XAS systems operating from 1.7 keV to 25 keV, providing monochromatic x-ray flux over $2 \times 10^7/s$, and achieved energy resolution better than 0.7eV. The design and performances of the systems will be presented.

Biography

Dr. Wenbing Yun received a PhD degree from the physics department of the State University of New York at Stony Brook in 1986. Then, he joined the Argonne National Laboratory and played an important role in the early construction and development of the facility at the Argonne National Laboratory in the United States. In 1996, Dr. Yun joined Lawrence Berkeley National Laboratory and worked on X-ray optics for Advanced Light Source (ALS). In 2000, Dr. Yun founded XRadia, an X-ray imaging company, which was acquired by Zeiss in 2013. In 2015, Dr. Yun founded his second company Sigray. Sigray won the California East Bay District Innovation Award 2019.

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