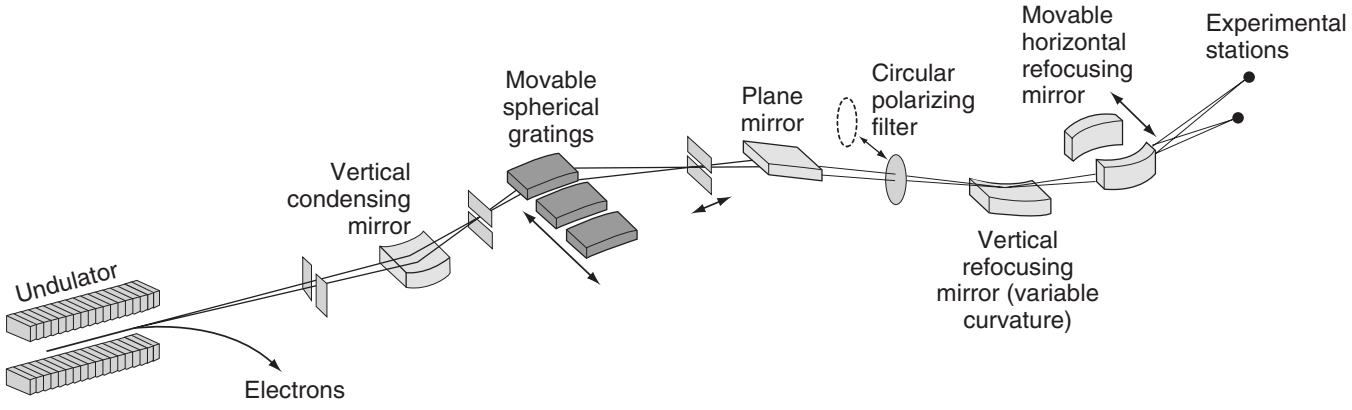
High-Resolution, High-Flux Facility for Spectromicroscopy • Beamline 7.0.1

Berkeley Lab • University of California

Beamline Specifications

Photon Energy Range (eV)	Photon Flux (photons/s/0.01%BW)	Spectral Resolution (E/ΔE)	Spot Size (μm)	Availability
50 – 1200	≤ ~ 10^{13} (dependent upon resolution & energy)	≤ 8000 (selectable by slit width)	50 ~0.10 (microscopy)	NOW



Schematic layout of Beamline 7.0.1.

Beamline 7.0.1 serves "The Spectromicroscopy Facility," which consists of several permanently placed experimental stations, each described in a separate data sheet. Scanning transmission x-ray (STXM) and scanning photoemission (SPEM) microscopes share beamtime with a high-energy and high-angular-resolution photoemission (UltraESCA) station by means of deflection mirrors. All of these stations permit near-edge x-ray absorption fine-structure (NEXAFS) measurements of gases and solids. There is also a soft x-ray fluorescence (SXF) spectrometer.

The beamline operates over the energy range from 50 to 1200 eV using a 5-cm-period undulator and a spherical-grating monochromator (SGM) with three interchangeable gratings. The resolution of the monochromator is selectable by means of variable entrance- and exit-slit widths. Spectral resolutions up to 8,000 can be achieved with a flux around 10^{13} photons/s for low energies (<200 eV), 10^{12} photons/s for intermediate energies, and 10^{11} photons/s for higher energies (>500 eV).

The polarization of the undulator light, while normally linear in the horizontal plane, can be made circular by insertion of freestanding magnetic films and multilayers.

The coherence of the undulator light may also be exploited in x-ray scattering experiments. The coherent flux is 10^{9} photons/s at 300 eV. ■

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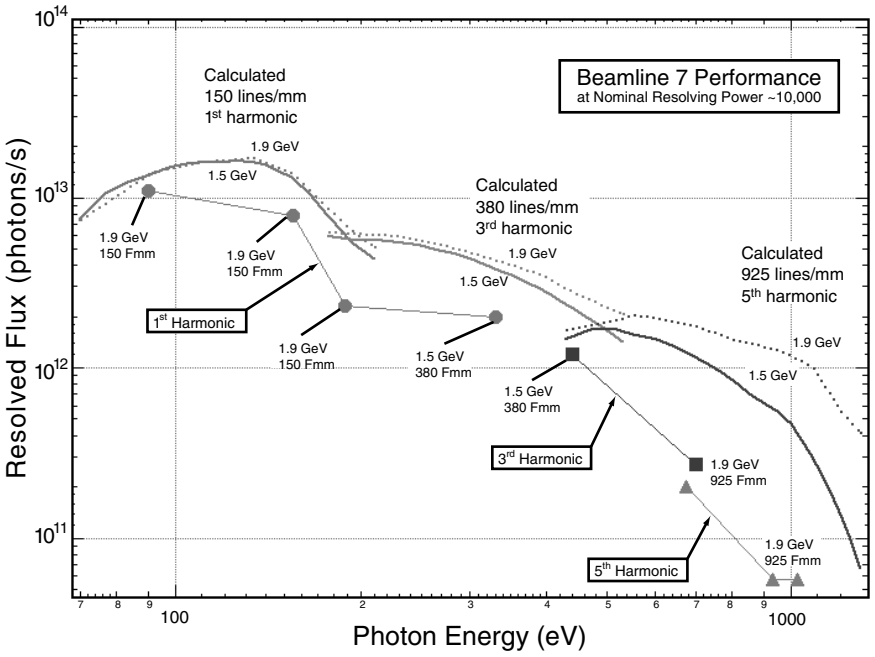
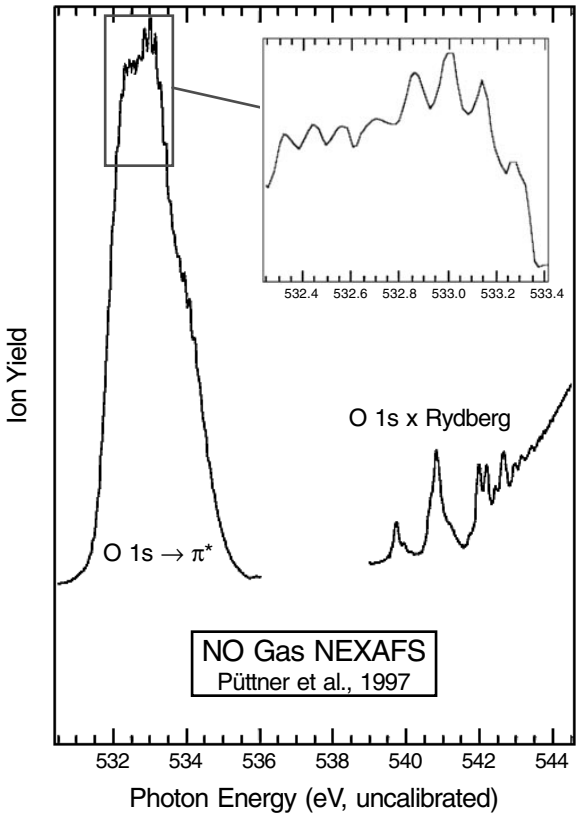


***Photon flux at a resolving power of 10,000**. Three gratings with line densities of 150, 380, and 925 lines/mm are used in the monochromator. The bold lines show the photon flux calculated for each grating at a resolving power of 10,000 over its full range (excluding the effects of undulator-field errors and electron-beam energy spread) for 1.5 GeV (solid) and 1.9 GeV (dashed). The symbols give the results of measurements made at various harmonics of the U5 undulator with the ALS operating at 1.5 or 1.9 GeV and normalized to a 400-mA beam current.*



Near-edge absorption spectrum (NEXAFS). Oxygen K-edge gas-phase NO photoabsorption spectra showing the 1sÆπ region (left) and Rydberg series (right) corresponding to a monochrometer resolving power (E/DE) in excess of 8000. Data courtesy of R. Püttner (Freie Universität Berlin) et al. [Phys. Rev. A 59(5), 3415 (1999)].*

This beamline is available to independent investigators by submitting a proposal.

For Beamline Information

Eli Rotenberg
Advanced Light Source
Berkeley Lab, MS 2-400
Berkeley, CA 94720
Tel: (510) 486-5975
Fax: (510) 486-7696
Email: erotenberg@lbl.gov

PRT Spokesperson

James G. Tobin
Chemistry & Material Sciences
MS L-357
Lawrence Livermore National Laboratory
Livermore, CA 94550
Tel: (925) 442-7247
Fax: (925) 423-7040
Email: tobin1@llnl.gov

To Obtain a Proposal Form

Bernie Dixon
User Services Office Manager
Advanced Light Source
Berkeley Lab, MS 6-2100
Berkeley, CA 94720
Tel: (510) 486-6722
Fax: (510) 486-4773
Email: alsuser@lbl.gov

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