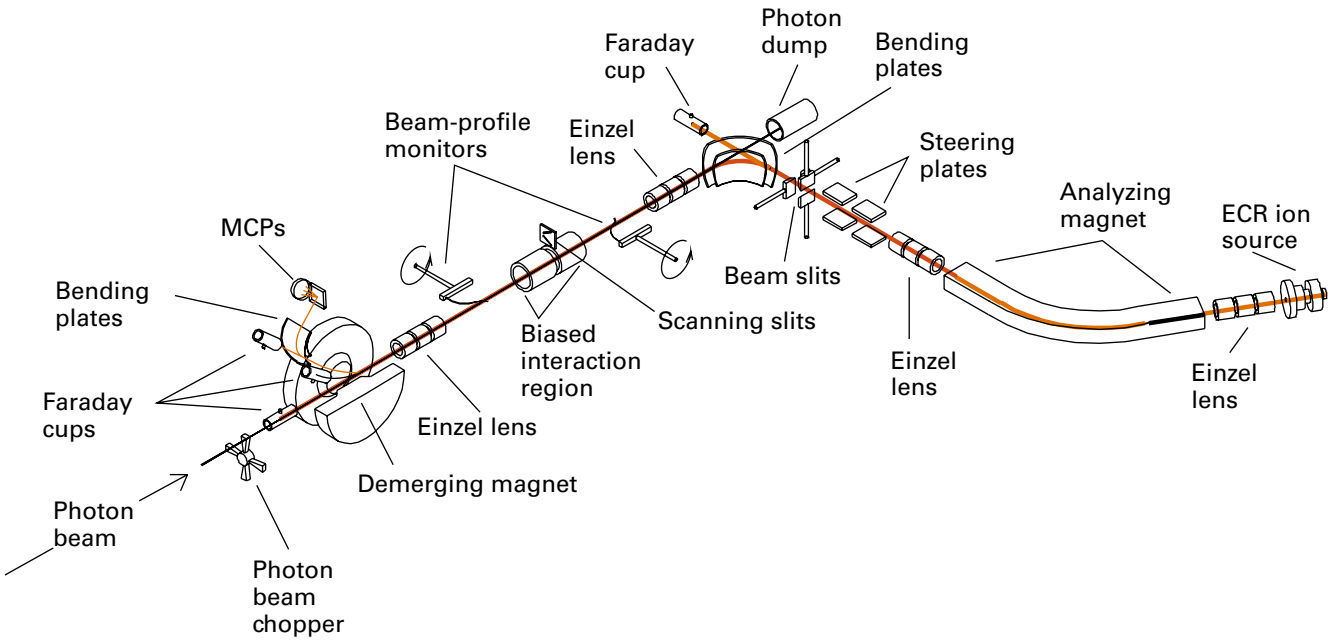
Ion Photon Beamline (IPB) • Beamline 10.0.1

Berkeley Lab • University of California

Endstation Specifications

Photon Energy Range (eV)	Photon Flux (photons/s/0.01%BW)	Spectral Resolution (E/ΔE)	Spot Size (mm)	Availability
17–340	$\leq 10^{12}$ (resolution dependent)	>10,000 (selectable by slit width)	1.5 (h) × 1.5 (v)	NOW



***IPB** endstation.*

Beamline 10.0.1 contains three branchlines, two of which are dedicated to the Atomic and Molecular Facility (AMF). The remaining branchline is dedicated to the High Energy Resolution Spectrometer (HERS) endstation, described in a separate data sheet.

The first AMF branchline serves the High-Resolution Atomic and Molecular Electron Spectrometer (HiRAMES) endstation (described in a separate data sheet). The second AMF branchline serves the collinear Ion-Photon Beamline (IPB) endstation and the Electron Spin Polarization (ESP) endstation (also described in a separate data sheet).

The Ion-Photon Beamline (IPB) endstation is designed for absolute photoion spectroscopy (photoionization cross-section measurements and excitation spectra) of singly and multiply charged positive ions and negative ions. A Colutron ion gun apparatus (CIGA) provides an intense source of ions that are photoionized by a collinear beam of VUV/soft x-ray photons. This beamline will also be used to study photoexcitation and photoionization of

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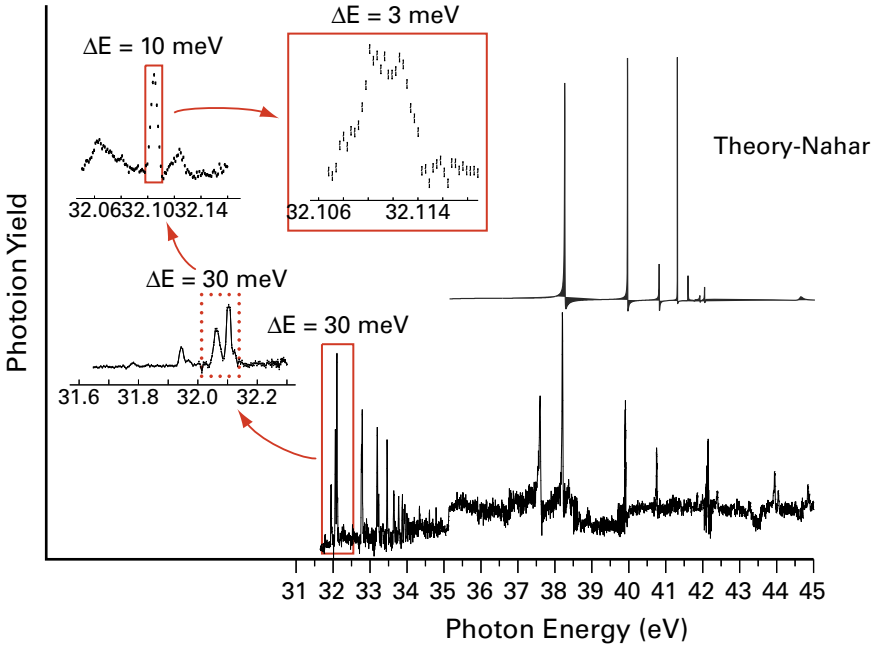
multiply charged ions produced by an electron cyclotron resonance (ECR) source.

The high brightness and low emittance that characterize the ALS make it an ideal facility for the study of photon-ion interactions. A common objective of the experiments to be conducted at the IPB is a deeper understanding of the complex multi-electron interactions that govern inelastic processes occurring in ionized plasmas, which constitute more than 99.99% of the known mass in the universe. The endstation has been designed for absolute measurements, which are important for benchmarking theoretical calculations of x-ray opacities. These are critical to the modeling of astrophysical, fusion, pulsed-power, and x-ray laser plasmas. Systematic studies along isoelectronic and isonuclear sequences of ions will permit a fine-tuning of their electronic structure and therefore provide a sensitive probe of the electron-electron interaction. ■



Photoionization measurements for O+ *in the energy range near the 4s ground-state threshold at 35.12 eV. The insets on the left indicate measurements made at increasing photon energy resolution. The inset on the right is provided for comparison to the R-matrix theory of S. Nahar [Phys. Rev. A 58, 3766 (1998)] for ground-state O+. Resonances observed at energies below 35.12 eV are due to 2D and 2P metastable components in the reactant ion beam. These metastable states are prominent in the ionosphere and in stellar atmospheres. Data courtesy of R. Phaneuf (University of Nevada-Reno) et al.*

To obtain a proposal form, go to www-als.lbl.gov/als/quickguide/independinvest.html.

For Endstation Information

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