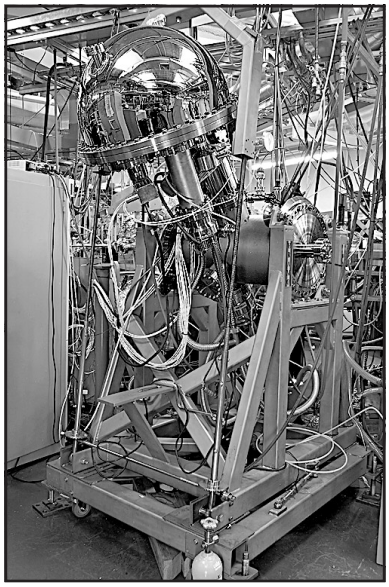
High-Resolution Atomic and Molecular Electron Spectrometer (HiRAMES) • Beamline 10.0.1

Berkeley Lab • University of California

Beamline Specifications

Energy Range (eV)	Photon Flux (photon/sec/0.01%BW)	Spectral Resolution (E/ΔE)	Spot Size (mm)	Availability
17–340	**$\leq 10^{13}$** (resolution dependent)	**10,000** (selectable by slit width)	**0.4 (h)** **1.0–0.5 (v)** (depending on exit slit setting)	**NOW**



***HiRAMES** endstation.*

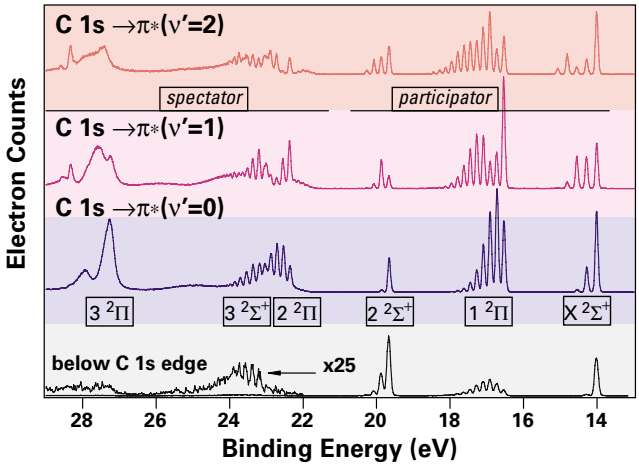
Beamline 10.0.1 contains three branchlines, two of which are dedicated to the Atomic and Molecular Facility (AMF). The remaining branchline is dedicated to the High Energy Resolution Spectrometer (HERS) endstation, described in a separate data sheet.

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

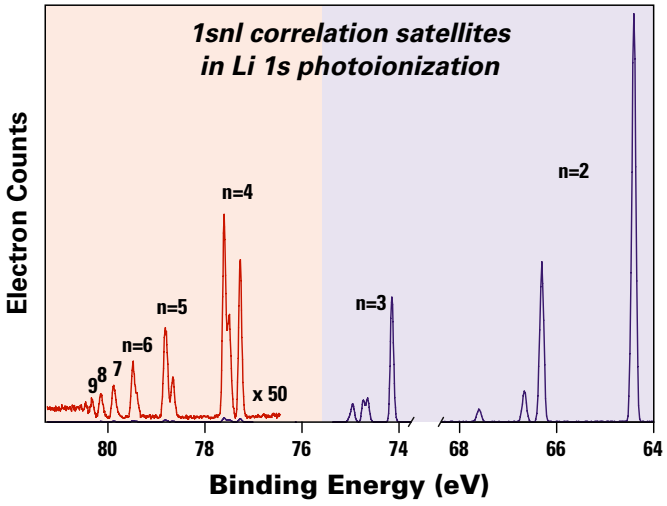
HiRAMES was constructed for gas-phase studies of atoms, molecules, and clusters. A key feature of the system is its ability to record angle-resolved data. The high electron energy resolution and angular selectivity of the spectrometer together with the high flux and spectral resolution of the undulator Beamline 10.0.1 are utilized to measure spectra that are highly differential in excitation energy, emission

energy, deexcitation energy, and angle. Knowledge gained from such studies helps to provide a clear understanding of electronic structure, dynamics, and of photoionization processes in general.

The heart of the station is a state-of-the-art Scienta SES-200 electron-energy analyzer capable of 5-meV resolution at 2-eV pass energy. The analyzer is mounted on a chamber that rotates about the photon-beam axis, thereby allowing electron spectra to be obtained at any desired angle relative to the polarization of the photon beam. Sample pressures as high as 10^{-5} Torr are isolated from the ultrahigh vacuum requirements of the beamline by windowless differential pumping. A rotatable seal maintains the vacuum integrity of the system when it is rotating, allowing for quick changes in the angle of the spectrometer. Gas samples enter a gas cell with differentially pumped openings for the photon beam to pass through and a slit allowing electrons to leave the cell in the direction of the analyzer. Provisions have also been made for other sample-introduction systems that will extend the utility of the endstation to systems other than simple gases. An oven is available to heat nonvolatile compounds. ■



Electron-energy spectrum *of the C 1s-to-π* excitation in CO. The Auger decay to various final ionic states are fully vibrationally resolved. Data courtesy of E. Kukk (LBNL) et al. [J. Chem. Phys. 111, 9642 (1999)].*



High-resolution electron-energy spectrum *of Li-metal vapor. Satellite levels up to n=13 are resolved. Data courtesy of W.T. Cheng (National Central University, Taiwan) et al.*

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

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