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Electron Attachment at Near Zero Scattering Energy

A. KORTYNA, M. DARRACH, A. CHUTJIAN, Jet Propulsion Laboratory, California Institute of Technology — A new apparatus has been developed for measuring electron attachment cross sections at very low scattering energies. Electrons are generated with $\approx$ 1 meV resolution by laser ionization of atomic xenon. Tunable ultraviolet radiation at $\approx 276\,nm$, produced through nonlinear mixing, is frequency tripled in a pulsed supersonic jet of xenon. The resulting vacuum ultraviolet photon energy is at, or slightly larger than, the $Xe^+(^2P_{1/2})$ ionization potential. Photoelectrons, continuously tunable between 0 and 100 meV, interact with target molecules in a 4π steradian scattering arrangement. The vacuum ultraviolet wavelength is accurately calibrated by observing the autoionizing Rydberg series leading to the $Xe^+(^2P_{1/2})$ threshold. This has allowed the determination of the *nd* Rydberg series up to quantum levels 30% closer to the ionization threshold than had previously been measured. The details of electron attachment to SF_6 at energies below 10 meV are currently being investigated.

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