THRESHOLD PHOTOELECTRON SPECTROSCOPY WITH VELOCITY FOCUSING OPTICS

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We have built a threshold photoelectron spectrometer (TPES) with velocity focusing optics. A continuum light source dispersed by a 1 m normal incidence monochromator provides the ionizing radiation. Threshold electrons produced in the 10x5 mm ionization source are focused to a 1.5 mm aperture located at the end of a 12 cm drift region. Threshold electrons are collected with a channeltron located at the end of the drift region. In order to eliminate the contribution of energetic electrons that have their initial velocity vector directed perpendicular to the extraction voltage, we also collect "hot" electrons, which pass through a ring around the central collector. The true TPES is then obtained by subtracting a fraction of the hot spectrum from the central spectrum. Examples of recent spectra are those of CH_2Cl_2, t-C_4H_9NC (t-butyl isocyanide). The latter shows vibrational structure well above the dissociation limit indicating slow curve crossing via a charge transfer to the repulsive potential energy surface.