HIGH-RESOLUTION ELECTRON AND PHOTOELECTRON SPECTROSCOPY IN THE EXTREME ULTRAVIOLET (XUV)

F. MERKT, *Laboratorium für Physikalische Chemie, Eidgenössische Technische Hochschule, ETH-Zentrum, CH-8092 Zürich, Switzerland*.

We present recent progress in high-resolution spectroscopic studies of atomic and molecular Rydberg states using narrow-bandwidth XUV laser sources and millimeter waves. From such studies one can (1) derive very detailed information on the energy level structure (including the hyperfine structure) of molecular Rydberg states up to principal quantum numbers beyond $n = 50$, (2) improve the current understanding of the unusual properties of the very high Rydberg states with $n > 150$ probed by pulsed-field-ionization zero-kinetic-energy (PFI-ZEKE) photoelectron spectroscopy, and (3) use this improved understanding to better exploit the advantages of this technique, in particular its resolution, to study the structure and dynamics of molecular ions.
To illustrate the potential of high-resolution electron and photoelectron spectroscopic studies, we shall present our recent results on several molecular systems such as H_2, N_2, CH_4 and the corresponding singly charged cations.