VUV-IR Two Photon Ionization of Argon

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The first combination of infrared optical parametric oscillator (OPO) light source and synchrotron radiation (VUV region) has been introduced at Chemical Dynamics Beamline of the Advanced Light Source (ALS) associated with the Lawrence Berkeley National Laboratory. When the new technique VUV-IR double resonance combines with other detection method such as pulsed field ionization–zero kinetic energy photoelectron (PFI-ZEKE), photoelectron-photoion coincidence (PEPICO) and photo-induced Rydberg ionization (PIRI) spectroscopy etc., it becomes a very powerful tool to obtain high-resolution photoionization spectroscopic information. To demonstrate the well-alignment of the new set-up of the combined VUV-IR light source, two photon ionization spectra of argon have been recorded between the first ionization threshold ($Ar^+ {}^2P_{3/2}$) and the second spin-orbit excited ionization threshold ($Ar^+ {}^2P_{1/2}$). The autoionization Rydberg series of the np′ and the nf′ resonances have been observed up to principal quantum number of n=57, which is limited by the current IR beam bandwidth.

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