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Time-resolved photoionization of superfluid He droplets[1] OLEG KORNILOV, LBNL, UC Berkeley, OLIVER GESSNER, CHIA WANG, LBNL, STEPHEN LEONE, DANIEL NEUMARK, UC Berkeley — Superfluid helium droplets are unique objects of active theoretical and experimental research. They serve as model few-body quantum systems representing a simplified structure of nuclei as well as ultracold nano-containers for investigation of embedded atoms and molecules. The methods applied to study He droplets range from mass spectrometry to elaborate laser spectroscopy techniques, which renedered many exciting results including demonstration of free rotations inside the droplets. One of the very inspiring questions in current research is the dynamics of ionization of Helium droplets. The available experimental approaches have not given a clear picture of an ionization event, and, most interestingly, on influence of superfluid, coherent nature of the droplet on the ionization dynamics. If present, such influence is expected at very short time-scale before droplet heats up and looses its undergoes transition to normal fluid. In this paper the novel method of femtosecond time-resolved photoelectron spectroscopy is applied to He droplets. High-order harmonic generation process is used to create femtosecond VUV pulses to trigger the photoionization event and IR pulses are used as a probe. Several transient channels are observed and possible mechanisms of energy exchange are discussed.

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