Abstract Submitted
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Electron dynamics in superfluid helium nanodroplets monitored by femtosecond XUV photoelectron imaging[1] MICHAEL ZIEMKIEWICZ, CAMILA BACELLAR, STEPHEN LEONE, DANIEL NEUMARK, Lawrence Berkeley National Laboratory, University of California Berkeley, OLIVER GESSNER, Lawrence Berkeley National Laboratory — Superfluid helium nanodroplets, size selected in the range from 10^4 to 10^6 atoms, are photoionized using a two photon pump-probe scheme. A femtosecond extreme ultraviolet (XUV) pulse electronically excites the droplet at 23.8 eV, close to but below the 24.6 eV ionization energy of a free helium atom. A second femtosecond infrared (IR) beam detaches an electron at an adjustable time delay. Due to the complexity of the droplets and the large amount of energy deposited by the XUV photon, several relaxation channels are available to the system including the ejection of single Rydberg atoms from the droplet, the escape of very low energy (ZEKE) electrons, and the formation of electronically excited helium dimers and trimers. By varying the timing of the pump and probe lasers while simultaneously analyzing the full energy distribution of product photoelectrons, we examine the effect of cluster size on electronic structure and dynamics in helium droplets. The results are discussed in the context of a differentiation between dynamics that proceed primarily in the surface-region and the bulk of the superfluid clusters.

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