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Photoionization dynamics of pure helium droplets: exciton formation vs autoionization OLEG KORNILOV, Lawrence Berkeley National Laboratory, UC Berkeley , OLIVER GESSNER, Lawrence Berkeley National Laboratory, OLIVER BUENNERMANN, CHIA WANG, STEVE LEONE, DANIEL NEUMARK, Lawrence Berkeley National Laboratory, UC Berkeley — ^4He droplets possess unique properties. In addition to fundamental quantum effects of superfluidity the droplets show ability to efficiently pick-up foreign atoms, molecules and complexes, which is used in a number of matrix isolation spectroscopies in energy domain. Complementary to these studies, novel time-domain experiments will be presented emphasizing dynamics of photoionization of pure helium droplets. The experiments follow up on a recent observation of ultraslow (E$<$ 1 meV) photoelectrons emitted from droplets upon ionization by synchrotron radiation. The dynamics of photoionization is studied by exciting droplets with a pulsed VUV radiation generated using the high-order harmonic generation technique. The droplets subsequently interact with an IR pulse, which probes transient electronic states before droplet autoionization. Femtosecond and picosecond relaxation dynamics and competition between droplet ionization and formation of a long-lived excited state are observed. Probe pulse leads to droplet "re-excitation" and production of even more ultraslow electrons. The results will be extended to doped droplets anticipating indirect dopant ionization dynamics.

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