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Rydberg States of Na-doped Helium Nanodroplets MARCEL DRABBELS — The dynamics of excited states of Na atoms deposited on the surface of helium nanodroplets has been investigated with velocity map ion imaging, photoelectron spectroscopy and time-of-flight mass-spectroscopy. For the first time, the excitation spectra of Na-doped helium nanodroplets corresponding to Rydberg states of Na atoms have been measured from the lowest excited 3p state up to the ionization threshold. All lines in the excitation spectra are shifted and broadened with respect to the corresponding atomic lines. In addition to bare Na* atoms also Na*He_N (N = 1-6) exciplexes are detected upon excitation. Photoelectron spectroscopy reveals the desorption of Na* not only in the initially excited states but also in lower lying states, indicating that relaxation plays an important role. The recorded velocity distributions show interesting characteristics: for the lowest states the mean kinetic energy of Na* increases linearly with excitation energy. The velocity distributions of Na*He_N exciplexes do not manifest such remarkable properties. The observations can be largely explained by assuming that the interaction of Na* with the helium nanodroplet can be described by the sum of Na*-He pair potentials.

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