

The unique conditions forming atomic and molecular complexes and clusters using superfluid helium nanodroplets have opened a seminal route to study the physical properties of matter on the nanoscale. In this talk we shine light on the specific characteristics of the formation of atomic clusters which are partly generated far from equilibrium in the helium environment, i.e. dimers in triplet states and a recently found metastable foam-like structure build out of magnesium atoms. As experimental tools mass spectrometry as well as photoelectron spectroscopy are applied in the measurements. Especially the formation of ion--snowballs which are interesting by itself is used to identify the complexes. Finally the interaction with stronger laser pulses leading a disintegration of the isolated complex is discussed with special emphasis on the caging dynamics.