27th June 2013 – 10:00 a.m.

CFEL-bldg. 99, seminar room I and II (EG.076/078)

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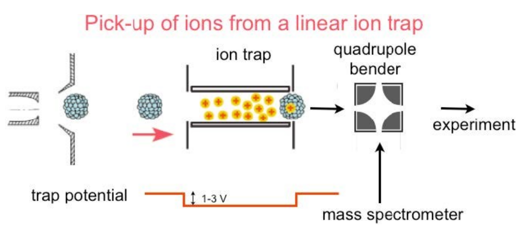
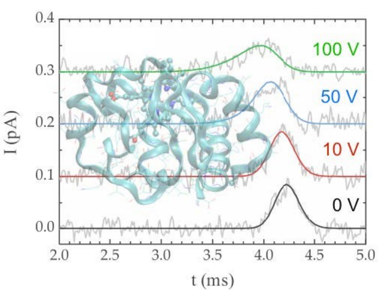
Biomolecules in the gas phase and in liquid helium droplets

In the condensed phase, the structure and dynamics of biological molecules is governed by a subtle balance between the intramolecular interactions, and the intermolecular interactions with its surroundings. To disentangle those and to obtain data that expand and test our fundamental knowledge of biological molecules, it can be useful to them out of their native environment and investigate them under well-defined conditions. Two techniques that deliver direct structural information are gas-phase ion mobility measurements and optical spectroscopy, particular in the infrared. Those two techniques are rather complementary, as ion mobility proves the overall shape and is not very sensitive to the local structure whereas IR spectroscopy probes the bonds between the atoms and is not as sensitive to the overall structure.
At the FHI, we use ion mobility experiments to characterize conformations and conformational distributions of mass/charge selected gas phase biomolecules. In a first experiment, we investigated the protein Cytochrome c and observe from some charge states an unexpected compaction upon complexation with crown-ether molecules.
To perform spectroscopy experiments, mass-to-charge selected ions are embedded in liquid helium droplets. In those experiments, the ions that are stored and accumulated in an ion trap are picked up by helium droplets traversing the trap. Further downstream, the charged droplets can be investigated and detected. Results from UV spectroscopic investigations on single amino-acids as well as larger systems, such as small peptides, will be presented.



Scheme of the setup for ion-pickup by helium droplets



Time traces for helium droplets doped with the proteine cytochrome c

Host: Jochen Küpper, CFEL Molecular Physics Seminar