

Electron attachment to trapped clusters for poly-anion production

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The charge state of a cluster is a crucial parameter as the number of electrons affects its properties, e.g. the geometrical shape, ionization potential, polarizability, or dissociation energy. In the present study, poly-anionic clusters are produced by electron attachment to cluster mono-anions. The poly-anion production is investigated for two different ion storage devices.

In an ion-cyclotron-resonance (ICR) trap charged particles up to a critical mass-over-charge ratio can be stored at the same time. Thus, cluster anions are stored together with electrons, simultaneously, allowing for electron attachment [1]. The poly-anion production rate depends, among others, on the properties of the electron cloud. In particular, the electrons have to have enough energy to overcome the Coulomb potentials of the anionic precursor clusters which limits the highest poly-anionic charge accessible [2,3].

Radio-frequency (RF) traps do not allow a simultaneous storage of electrons and clusters. However, trapped cluster anions are exposed to an electron beam for production of higher anionic charge states. To this end, tailored RF trapping fields can be used [4]. With appropriate storage conditions, the poly-anionic reaction products remain trapped and are available for further experiments.

Poly-anion production in both trap types of the ClusterTrap setup (indicated in Fig. 1) as well as recent experimental results will be presented. The project was supported by a Collaborative Research Center of the DFG (SFB 652, TP A03).

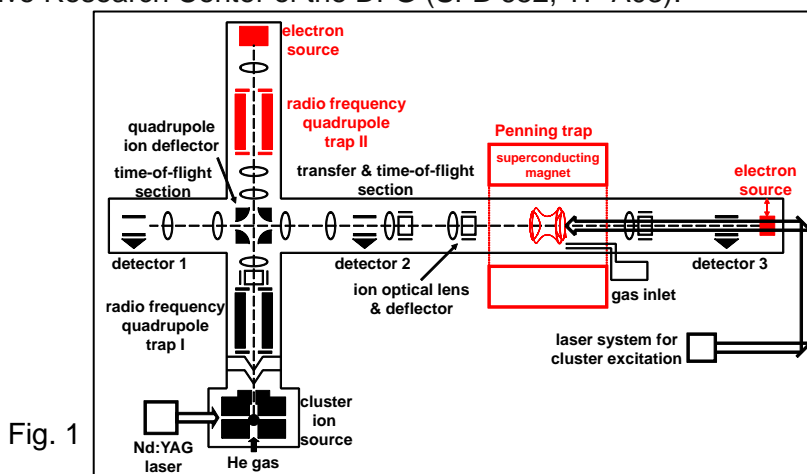


Fig. 1

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