

Topical Workshop - Low energy facility design and optimization through diagnostics



Contribution ID: 5

Type: **not specified**

Analyzing the ion composition of a beam stored in the electrostatic Cryogenic Storage Ring (CSR)

Thursday, 7 February 2019 10:45 (15 minutes)

New research opportunities in atomic, molecular, and cluster physics are available in form of cold ion beams stored in the electrostatic Cryogenic Storage Ring (CSR) at the Max-Planck-Institut für Kernphysik in Heidelberg. This mass-independent storage device operated at cryogenic temperatures has observation times of hours and allows studying even large biomolecular or cluster systems in the gas phase. In order to detect and suppress the manifold isobaric contaminations of heavy-mass molecular species analysis tools are essential. This becomes even more important for low-intensity beams of rare species below the detection threshold of standard current and Schottky pickup detection systems. Here, two alternative procedures to determine the revolution frequency and consequentially the mass of a stored ion beam are presented. Masses of a primary ion and of its contaminant can be distinguished and identified. In combination with a fragment analysis of the complex molecules the ion beam composition can be effectively determined. The methods itself as well as proof-of-principle experiments are presented and discussed.

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Session Classification: Session 3: Optimization towards experiments