DAMOP08-2008-020089

Abstract for an Invited Paper
for the DAMOP08 Meeting of
the American Physical Society

Experiments with Reaction Microscopes in ion storage rings - first results and prospects

DANIEL FISCHER, Max Planck Institute for Nuclear Physics

Reaction Microscopes became a standard tool to study the dynamics of atomic and molecular break-up processes. They enable measurements of kinematically complete data sets by momentum resolved and coincident detection of all target fragments produced in single collisions with electrons, ions, single photons, or in strong laser fields. Here we report on the first operation of a Reaction Microscope in a heavy-ion storage ring, the ESR at GSI in Darmstadt (Germany). The ESR provides excellent experimental conditions w.r.t intensity and emittance of the ion beam and thus, in combination with a Reaction Microscope, represents the ideal tool to obtain highly differential information on fundamental HCI-atom collision processes. The results of first experiments on target ionization and charge transfer in collisions of highly charged projectiles ranging from 13 AMeV U^{92+} to 400 AMeV Ni^{28+} with He, Ne, and Ar targets will be presented. Future experiments are planned to study e.g. radiative and non-radiative charge transfer reactions where also photons are detected in coincidence. Furthermore, simultaneous ionization of target and projectile shall be investigated to obtain insight into the dynamics of collision induced electron emission from HCIs.