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Feasibility Studies for the EXL Project at FAIR*

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As part of the upcoming FAIR facility, the EXL (Exotic nuclei studied in Light-ion induced reactions at the NESR storage ring) project is proposed to capitalize on light-ion induced direct reactions in inverse kinematics by using storage ring techniques. This contribution presents the results of feasibility measurements performed at GSI, Darmstadt and Tübingen University for the EXL project.
In order to investigate the response of the DSSD (Double-Sided Silicon Strip Detector) to very low energy recoil protons, a detector test was performed at the 3 MeV Van de Graaff accelerator at Tübingen University. The proton beam with an energy around 500 keV was scattered by carbon and gold targets. After reducing the energy of the protons in a Mylar foil, low-energy protons were detected in a prototype detector for the EXL recoil detector array, namely a 300 μm thick 7.1×7.1 mm2 DSSD with 300 μm pitch. The results of the measurements will be presented.
In order to investigate the performance of a Si detector under realistic storage ring conditions, a measurement was carried out at the Experimental Storage Ring (ESR) of GSI. The stored 400 MeV/nucleon 40Ar beam was interacting with an internal hydrogen gas-jet target. An UHV compatible single-sided Si strip detector of 1 mm thickness and 40×40 mm2 area was mounted inside the UHV chamber around the internal gas-jet target to detect the recoil protons. The Si strip detector was read out in five groups of eight strips each. Energy deposition and position of the particles were obtained by the charge division method. Preliminary results of the target performance, the background condition of the detector for very low energy recoil protons, as well as the differential cross section for p+40Ar elastic and inelastic scattering will be presented.

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