Contribution ID: **141** Type: **not specified**

Status of EXL (NUSTAR)

Wednesday, 15 October 2014 14:20 (20 minutes)

EXL (EXotic nuclei studied in Light-ion induced reactions at the NESR storage ring) is a project within NUSTAR at FAIR. It aims for the investigation of light-ion induced direct reactions in inverse kinematics with radioactive ions cooled and stored in the future NESR (New Experimental Storage Ring). A universal detector system will be built around an internal target of the NESR in order to detect the target-like recoils. One of the key interests of EXL is the investigation of reactions at very low momentum transfers where, for example, the nuclear matter distribution, giant monopole resonances (GMR) or Gamow-Teller transitions can be studied [1]. The existing ESR (Experimental Storage Ring) at GSI, together with its internal gas-jet target, provides a unique opportunity to perform this kind of experiments on a smaller scale already today. In the last years we have developed a UHV compatible detector setup mainly based on DSSDs (Double-sided Silicon-Strip Detector) for the target-like recoils [2] and an in-ring detection system for the projectile like heavy ions. With this setup we were able to successfully investigate reactions with a stored radioactive beam for the very first time. As a part of the first EXL campaign we investigated the reaction 56Ni(p,p)56Ni in order to measure the differential cross section for elastic proton scattering and deduce the nuclear matter distribution and the radius of 56Ni. Furthermore, as a feasibility study, we aimed for the investigation of the GMR of 58Ni by utilizing 58Ni(α,α')58Ni. This contribution will present the current status of the project and preliminary results.

This work was supported by BMBF (06DA9040I and 05P12RDFN8), the European Commission within the Seventh Framework Programme through IA-ENSAR (contract no. RII3-CT-2010- 262010), HIC for FAIR, GSI-RUG/KVI collaboration agreement and TU Darmstadt-GSI cooperation contract.

[1] H.H. Gutbrod et al. (Eds.), FAIR Baseline Technical Report, ISBN-3-9811298-0-6, Nov. 2006
[2] B. Streicher et al, Nucl. Instr. And Meth. A 654 (2011) 604

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Session Classification: Parallel Tier 2