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## Experimental techniques for in-ring reaction experiments with EXL

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EXL (EXotic nuclei studied in Light-ion induced reactions at storage rings) is a project within NUSTAR at FAIR. It aims for the investigation of light-ion induced direct reactions in inverse kinematics with radioactive ions in storage rings at the future FAIR facility. The existing ESR at GSI, together with its internal gas-jet target, provides the unique opportunity to perform this kind of experiments on a smaller scale already today. The demanding vacuum conditions of a storage ring made it necessary to develop a novel detector system. This had to be ultra-high vacuum (UHV) compatible and, at the same time, feature an energy threshold as low as possible to enable the measurement of particles scattered at low momentum transfer. To equally fulfil both conditions, a windowless detector system was developed in which the UHV is separated from an auxiliary vacuum by a silicon strip detector. This novel technical concept, which was utilized in the latest EXL campaign at the ESR, allowed to successfully study a nuclear reaction with stored radioactive beam for the first time ever. The present contribution will discuss the implementation and essential features of the detection system. This work was supported by BMBF (06DA9040I, 05P12RDFN8, 05P15RDFN1), the European Community FP7-Capacities, contract ENSAR n° 262010, HIC for FAIR, GSI-RUG/KVI collaboration agreement and TU Darmstadt-GSI cooperation contract.

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