

**Present and Future Experiments with Stored Exotic Nuclei at GSI**Hans Geissel<sup>1,2</sup><sup>1</sup>*GSI Helmholtzzentrum für Schwerionenforschung GmbH, 64291, Darmstadt, Germany and*<sup>2</sup>*Justus-Liebig Universität, 35392 Giessen, Germany*

Recent results and perspectives of experiments with stored exotic nuclei at GSI-FAIR will be presented. An overview on the planned NUSTAR experiments will also be presented. Relativistic exotic nuclei produced via projectile fragmentation and fission were separated in flight by the fragment separator FRS and injected into the storage-cooler ring ESR for accurate mass- and lifetime measurements. Direct mass measurements of electron-cooled exotic nuclei were performed using time-resolved Schottky spectrometry. Fragments with half-lives shorter than the time required for electron cooling have been investigated by time-of-flight measurements with the ESR being operated in the isochronous mode. This novel experimental technique gives access to all nuclei with half-lives down to the microsecond range and has been successfully applied. Lifetimes of stored bare and few-electron ions have been measured with the goal to study the beta-decay under ionization conditions prevailing in stellar plasma. For the first time the direct observation of bound-state beta decay has been achieved with  $^{207}\text{Tl}$  fragments. The future project FAIR includes a new large-acceptance in-flight separator (Super-FRS) in combination with a new storage ring system (CR, NESR) which will be ideal tools to study exotic nuclei far from stability.