

In-ring decay experiments and plans for TSR & FAIR

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Heavy-ion storage rings coupled to radioactive-ion beam facilities allow for a wide range of physics experiments.

One of such experiments is the investigation of radioactive decays of highly-charged ions.

The latter offer the unique possibility to study, e.g., weak decays of clean well-defined quantum systems, exotic decay modes that are disabled in neutral atoms, or investigate the decay probabilities versus the number of bound electrons.

Since storage rings are, as a rule, operated under ultra-high vacuum conditions, radioactive ions in high-atomic charge states can be stored for extended periods of time sufficient to investigate their decays.

At present, the ESR at GSI is the only storage ring where such experiments are pursued. However, due to high kinetic energies employed, several exciting experiments on light nuclei are not feasible. This will be overcome with the TSR@ISOLDE.

In this contribution, the experimental program on decay studies of highly-charged ions will be presented with an emphasis on the uniqueness of the TSR@ISOLDE in comparison to the present ESR as well as the future CRYRING, CR and HESR rings of FAIR.

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