

New opportunities for in-ring experiments using ISOLDE beams

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Experiments with exotic nuclei stored in a ring have shown a huge discovery potential in the last decades. Such experiments profit from high revolution frequencies of stored beams which allows for reaching relatively high luminosities even when using thin gaseous internal targets. Internal gas targets are windowless and thus the corresponding background contributions do simply not exist. Electron cooling of stored beams leads to small transversal size and high momentum definition.

Broad experimental programs with stored ions are being pursued at the ESR of GSI, the CSRe of IMP and R3 of RIKEN. However, these are dedicated machines tuned to store beams with a few hundred A MeV energies. The quest today is to approach lower, below 10 A MeV, energies, where numerous new physics cases have been proposed. For instance, deceleration of beams in the ESR enabled studies of proton-induced reactions for the astrophysical p-process. Furthermore, a dedicated low-energy storage ring CRYRING is being commissioned behind the ESR. However, the lengthy slowing down process at GSI limits the use of the ESR-CRYRING for investigations of short-lived nuclei.

Therefore the proposal to store HIE-ISOLDE beams in a dedicated storage ring and to perform nuclear and atomic physics experiments is extremely attractive. This will be a worldwide unique facility with an access to stored and cooled short-lived nuclei for in-ring experiments.

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