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TSR@ISOLDE - The First Storage Ring Facility at an ISOL Facility

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It has been proposed to use the Test Storage Ring (TSR) from MPI-K, Heidelberg, at the High Intensity Energy Isolde (HIE-ISOLDE) facility to perform experiments with stored exotic nuclides. With the integration of TSR at HIE-ISOLDE it would become the first storage ring at an isotope separator on-line (ISOL) facility. This, in combination with the capability of going to low beam energies (some MeV/u), opens up a broad area of research and offers unique opportunities for studies in nuclear structure and nuclear astrophysics. A substantial fraction of the vast number of radioactive beams produced at the ISOLDE facility, largely exceeding 800 isotopes from 70 elements, could be injected into the ring for storage, beam deceleration or acceleration. As injector, the superconducting HIE-ISOLDE Linac could be used. This Linac is an energy upgrade of the present REX-ISOLDE facility, designed to provide a final beam energy of at least 10 MeV/u for ion mass-to-charge ratios less than 4.5.

The project layout at its present stage will be presented, including the interfacing of the ring with the HIE-ISOLDE Linac beam lines. The different operational possibilities and constraints that arise when the ring is connected to an ISOL facility with a successive charge breeder will be addressed. The aspects of beam storage life-time, with and without an internal gas jet target, and attainable beam intensities at these energies will be discussed. The possibilities to perform beam cleaning inside the ring to suppress isobaric contaminants which can be present from the ISOL production stage will be evaluated. Finally, the ion charge-state requirements will be mentioned among other items.

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