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The ISOLDE Superconducting Recoil Separator: design, prototypes, and plans for the future.

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The HIE-ISOLDE facility can accelerate a wide variety of radioactive ions, from 6He to 232Ra, up to collision energies close to 10 MeV/A. Present physics program covers a broad range of nuclear structure aspects such as shell-evolution and nuclear shape transitions, unbound systems, reaction dynamics, and astrophysical processes. The ISOLDE Superconducting Recoil Separator (ISRS) [1] aims to extend and develop the HIE-ISOLDE physics programme by combining mass selectivity with target and focal plane spectroscopy. The performance of state-of-the-art linear spectrometers is limited by the length of drifts and dispersive planes, magnetic-field nonlinearities, ohmic losses and mechanical complexity of heavy, room-temperature magnets. ISRS follows a different approach [2]. The spectrometer consists of an array of iron-free superconducting multifunction magnets, cooled by cryocoolers, integrated into a compact particle storage ring that confine the reaction fragments using Fixed Field Alternating Gradient Focussing (FFAG). Unprecedented A/Q selectivity can be achieved by combining ToF with fragment's characteristic cyclotron frequency [3]. During the last year the collaboration has developed an intensive R&D program covering beam dynamics, design studies, and prototypes of critical subsystems. In this contribution we will review recent achievements and planned activities.

References
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[2] ISRS project web site, www.uhu.es/isrs/
[3] J. Resta-López et al., "Design of a compact superconducting recoil separator for HIE-ISOLDE". Proc. of IPAC 2023, TUPA050, 2023.

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