Future plans for radioactive beams at CERN: HIE-ISOLDE

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The provision of accelerated radioactive ion beams (RIB) has been established by NuPECC as of the highest priority in the next decade. NuPECC recognises that EURISOL can only evolve from next-generation RIB projects such as HIE (High Intensity and Energy)-ISOLDE, SPES and SPIRAL-2.

The physics community that use radioactive ion beams, estimated to be about one thousand in Europe alone, requires diversity of ions species, diversity of beam energy and high beam intensities. REX-ISOLDE already provides the first of these; the aim of HIE-ISOLDE is to achieve the second and the third. This requires developments in post-acceleration (the present energy restricts the application of REX to studies of light nuclei) and radioisotope selection as well as target-ion source development and charge-breeding to cope with the increase in proton intensity promised by LINAC4. A five-year development programme, with a major contribution from CERN together with contributions from member states and the EU, will realise this facility and make CERN a major centre for RIB physics by the end of this decade.

This HIE-ISOLDE project aims to improve the target and front-end part of ISOLDE to fully profit from potential upgrades of the existing CERN proton injectors, e.g. faster cycling of the PS Booster and LINAC4. The beam emittance will be improved with an RFQ cooler implemented after a pre-separator but before a new High-Resolution Separator. The new HRS, based on the latest magnet technology, will have sufficient mass resolution to permit isobaric separation. The RFQ cooler will also permit a tailoring of the time structure of the beam, removing the dependence on the proton beam time structure and diffusion-effusion properties of the target and ion source units. Highly charged ions will be provided for REX and other users through an improved low energy stage of REX-ISOLDE and a possible parallel installation of an ECR charge breeder. The top energy of REX-ISOLDE will be increased in two stages with a first upgrade to 5.5 MeV/u and a second to 10 MeV/u.