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The ISOLDE Facility and the HIE-ISOLDE project

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The On-Line Isotope Mass Separator ISOLDE at the CERN Proton-Synchrotron Booster (PSB) is a facility dedicated to the production of a large variety of radioactive ion beams for many different experiments in the fields of nuclear and atomic physics, materials science and life sciences.

The facility has garnered unique expertise in radioactive beams over the years since its approval fifty years ago.

The ISOL method involves in this case the bombardment of a thick target with an intense 3×10^{13} proton beam, producing high yields of exotic nuclei with half-lives down to the millisecond range. By a clever combination of target and ion source units including the use of ionization lasers pure beams of 700 different nuclei of 75 elements have been produced and delivered to experiments where properties of the nuclei such as masses, radii, structure and shapes are determined. The high quality of the beams allows high-precision measurements of beta decay and particle correlations including measurement of beta-neutrino correlations in order to prove fundamental interactions in nuclei. Since more ten years ISOLDE offers the largest variety of post-accelerated radioactive beams in the world today. The post-accelerated beams expand from 6He to ^{224}Ra . In a decade of physics with post-accelerated beams beautiful results have been obtained exploring, by Coulomb excitation with the Miniball HPGe-array the shape transitions in extreme neutron rich middle mass nuclei as well as transfer reaction in light nuclei.

The HIE ISOLDE upgrade (HIE stands for High Intensity and Energy), intends to improve the experimental capabilities at ISOLDE over a wide front. The main features are to boost the energy of the beams, going in steps from currently 3 MeV/u via 5.5 MeV/u to finally 10 MeV/u, and to accommodate a roughly fourfold increase in intensity. In addition improvements in several aspects of the secondary beam properties such as purity, ionisation efficiency and optical quality are addressed. Presently the facility and the experimental equipment undergo extensive transformation to commit to the new physics challenges.

In this presentation recent ISOLDE highlights, the HIE-ISOLDE project and the day one proposed experiment for 2015 are discussed.

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