*International Nuclear Physics Conference INPC2013: 2-7 June 2013, Firenze, Italy*

# ISOLDE upgrade: HIE-ISOLDE

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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 last 45 years. The nuclear physics studies focused at first on fundamental properties (mass, spin, magnetic moments, decay modes) of exotic nuclei using low energy beams of 30-60 keV. New fields of research opened up in 2001 when the Radioactive beam EXperiment, REX, started operation and allowed reaction experiments to be carried out up to 3.1 MeV/u. Unique feature of REX-ISOLDE is that essentially all isotopes produced can be charge-bred and accelerated further. The variety in isotope production is matched by the versatility in ion manipulation so that the physics studies can take place in the energy range from $10^{-6}$ eV in the case of low-temperature nuclear orientation, to several MeV/u.

In a decade of physics with post-accelerated beams [1] beautiful results have been obtained exploring, by Coulomb excitation with the Miniball HPGe-array the island of inversion at N=20 and shape transitions in extreme neutron rich middle mass nuclei. The heaviest REX-ISOLDE beams of Radon nuclei were employed to investigate shape asymmetric configurations. Elastic, inelastic scattering, and transfer reaction yield important and unique information in the structure of exotic nuclei. Unfortunately the present beam energies at REX-ISOLDE restrict studies to the 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 [2]. The main feature are to boost the energy of the beams, going in steps from currently 3.1 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, ionization efficiency and optical quality are addressed. The experimental equipment will undergo extensive transformation during the long shutdown of the accelerator complex in 2013 to commit to the new Physics challenges [3].

In this contribution recent ISOLDE highlights, the HIE-ISOLDE project and the first proposed experiments will be presented.

[1] P. V. Duppen and K. Riisager, J. Phys. G. Nucl. Part. 38, 02405 (2011).
[2] HIE-ISOLDE: the technical options ed. by M. Lindroos, T. Nilsson, CERN Report, CERN-2006-013
[3] HIE-ISOLDE, the scientific opportunities ed. By K. Riisager, P. Butler, M. Huyse and R. Krcken, CERN Report, CERN-2007-008