Contribution ID: **42** Type: **not specified**

HIE-ISOLDE: A look to the Physics

Thursday 19 November 2009 09:00 (30 minutes)

The provision of high-intensity accelerated radioactive beams (RIB) is currently of high priority for the nuclear physics community World wide.

ISOLDE has nowadays a vast variety of species produced, more than 1000 nuclei from almost 70 elements, the largest number by far of the existing ISOL-facilities. A key feature of the accelerated RIB at ISOLDE, REX-ISOLDE, is that essentially all isotopes produced can be charge bred and accelerated further up to 3 MeV/u. The present energy range limits the experimental program to Coulomb excitation of light and intermediate mass nuclei and to transfer reaction for the lightest species.

The ISOLDE facility has been expanded several times in order to continue being a reference facility. Improvement of beam quality, increase in intensity and availability of new radioactive beams will boost decay experiments as well as the study of ground state properties as, for instance, Penning trap mass measurements that continuously refine our understanding of the nuclear mass surface. An energy upgrade will make all produce nuclei available for reactions up to and above the Coulomb barrier opening new avenues from the physics point of view. The enlarged dynamic energy range up to 10 MeV/u, will allow the optimization in each case with respect to cross section and reaction channel open.

The availability of high quality and versatile RIB at ISOLDE, in particular the well-defined variable energy beams will facilitate measurement of single particle and collective structure in exotic nuclei. In this talk examples of these studies will be presented.

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Session Classification: Session 5: HIE ISOLDE