Title: Beam Manipulation and Purification at ISOLDE and REX-ISOLDE
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At ISOLDE and REX-ISOLDE a large number of projects are on-going in order to improve the beam characteristics of the low-energy and post-accelerated beams. The area covers as diverse topics as low-intensity beam identification, beam purification methods in REXTRAP, development of polarized beams and, charge breeder upgrade plans among other things. A brief overview of some of these beam manipulation and beam purification activities at ISOLDE and REX-ISOLDE will be given.

To suppress isobaric contaminants present in the ISOLDE beam the inherent mass-resolving power of REXTRAP can be used before the beam is charge bred and post-accelerated. The concept has been evaluated during two campaigns. The main result obtained is an optimal mass resolution of 3E4 for 39K for a suppression factor of 98%. It was furthermore shown that the transverse phase space cooling in the trap during this process was sufficient for injection into the successive charge breeder REXEBIS. A total transmission efficiency of 2.5% was achieved for this particular case. Nevertheless, disturbing space charge effects occurred for more than 1E6 ions/bunch (including the contaminants). For instance, spurious double peaks in the cyclotron resonance scan occurred, and the positive results (as well as anomalies) were not fully reproducible. With the recent upgrade of the auxiliary systems for REXTRAP the situation should have improved as the control of the RF settings is made easier and, there now exists a possibility to apply rotating wall excitation in addition to the quadrupolar and dipolar excitations among other things. For the future mass-resolving tests on real beams are expected as well as a follow-up of the rotating wall cooling tests.

The beam identification of the post-accelerated beams is presently performed by the users, by means of a gas-Si telescope detector. The setup has the capability of resolving elements within an isobar up to approximately Z=40. There are discussions about detaching the beam identification from the users and handing it over to the ISOLDE/REX responsible. The use of a monolithic silicon telescope detector from ST Microelectronics from Catania will be investigated. SRIM simulations suggest that Sr and Rb should be resolved in such a device. An initial test with a Sr-Rb cocktail beam is foreseen for the fall.

A test campaign in order to evaluate the suitability of diamond detectors for current amplification, particle counting and energy measurements at REX-ISOLDE has been performed. Single- and poly-crystalline CVD detectors were tried out by E. Griesmayer, Bergoz Instrumentation in collaboration with REX-ISOLDE. Different stable beams were post-accelerated to 1.9 and 2.8 MeV/u. With the sCVD detectors counting rates up to 1E7 particles/s could be demonstrated. In favorable situations an energy resolution of 1.1% (1 sigma) was achieved. The time structure of the accelerator RF was clearly visible, suggesting a time response <1 ns. The results from the pCVD diamond detectors were less convincing as for example the current amplification mode could not be used due to strong variations in the leakage current. The low beam energy (a few MeV/u) means that the impinging particles are stopped within the detectors and this most likely deteriorates the crystal behavior. A follow-up of the applicability of diamond detectors at REX-ISOLDE and the HIE-ISOLDE linac will be done by M. Parlog.

For particle counting in the ISOLDE low-energy (<60 keV) beam lines a Multi-Channel Plate (MCP) can be used. The detector being capable of counting also stable beam particles complements the radioactive beam measurements performed at the tapestation. A fast, low-ringing MCP (Hamamatsu, F9890-13S221) geared towards time-of-flight applications has been ordered. The MCP has a low-resistance extended gain, thus allowing for counting rates up to 1E6 particles/s. The MCP is foreseen to be installed after the tapestation and first results are hoped for before the end of the year.

A superconducting solenoid identical to the one at REXEBIS has been recuperated from the Manne Siegbahn Laboratory. The solenoid is under re-commissioning, i.e. being cooled down and tested at CERN for the moment. It will act as a spare solenoid for REXEBIS in case of failure and, as a test bench for new electron beam gun designs and cathodes. A new IrCe cathode type has been purchased and a matching gun is being designed. The setup, called the TwinEBIS testbench, could in an extension serve as a provider of highly charged to test for example the EMILIE cw trap suggested within the NUPNET network.

With TwinEBIS alternative solutions for a more reliable operation of REXBIS can be tested. However, the main charge breeding parameters can not be improved as they are strongly connected to the magnetic field strength and its configuration. Thus, within the HIE-ISOLDE project a design study of an upgraded breeder will be performed. The performances required from a point-of-view of increased REX-ISOLDE beam energy and increased beam intensity from ISOLDE will be considered. In addition, the specific requirements of the Test Storage Ring at ISOLDE will be addressed.

In the presentation several related topics were omitted, such as the production of post-accelerated polarized beams using the tilted foils technique, improvement of the High Resolution Separator and results from the new fast tape station.