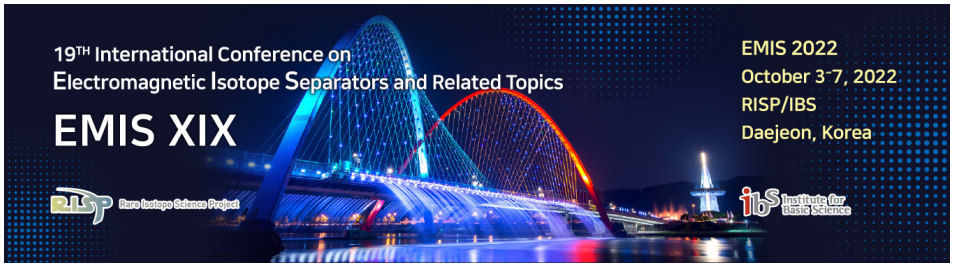

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Low Energy Radioactive Ion Beams at SPES for nuclear physics and medical applications

Wednesday, 5 October 2022 09:30 (30 minutes)

Around the world, many facilities producing Radioactive Ion Beams (RIBs) using the Isotope Separation On Line (ISOL) technique have been or are under construction. Among others, SPES (Selective Production of Exotic Species) is the facility in the installation phase in these years in the Laboratori Nazionali di Legnaro (LNL). In this type of facility, the radioactive atoms are produced using a 40 MeV-200 μA proton beam impinging the Uranium Carbide (UCx) target composed by seven disks in order to dissipate the 8 kW beam power. The fission products, in the order of 10^13 atoms/seconds, diffuse and effuse out of the target up to the ion source where are ionized and accelerated by an extraction voltage up to 40 kV. The formed RIB will be subsequently directed and focalized using different electromagnetic systems and purified in order to have a pure isotope beam without contaminants. The RIBs can be sent directly to the low energy experimental area and, afterwards, to the post-acceleration stage.
Currently the installation program concerning the RIB source provides the set-up of the apparatus around the production bunker. The main objective is to provide in the next years, the first low-energy radioactive beams for beta decay experiments using the b-DS (beta Decay Station) set-up and for radiopharmaceutical applications by means of the IRIS (ISOLPHARM Radioactive Implantation Station) apparatus. The goal of the ISOLPHARM project is to provide a feasibility study for an innovative technology for the production of extremely high specific activity beta emitting radionuclides as radiopharmaceutical precursors.
In this presentation, all the specific issues related to the SPES RIB and the Low Energy beam lines will be appropriately presented and commented, showing the results obtained in the last years. The main RIB systems, such as ion source systems, target-handling devices and the installation of low energy transport line, will be presented in detail.

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