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Recent Progress of ISOL Facility at RISP

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The RAON heavy ion accelerator facility is currently in the stage of commissioning under the Rare Isotope Science Project (RISP) launched in 2011. The RAON is planned to utilize an advanced rare isotope beam produced with a high power target by the Isotope Separation On-Line (ISOL) facility, aiming to deliver high purity and intense, neutron-rich rare isotope beams to the post-accelerator and experimental facilities. The RAON ISOL facility consists of a target/ion source module surrounded by movable shielding blocks in a bunker, remote handling facilities for the target operation, a pre-mass separator, a RFQ cooler buncher, an EBIS charge breeder, and an A/q separator. Installation and alignment of the ISOL facility were completed in June 2021. The target/ion source module allows us to bombard a thick target with a 70 MeV proton beam of RAON, producing a variety of rare isotope beams. The produced isotope beams extracted from the target/ion source can be transported to a pre-mass separator at energies up to 60 keV, and will be cooled in a RFQCB. Cooled ion beams can be sent to two different experimental facilities, such as a Mass Measurement System and a Collinear Laser Spectroscopy in ISOL experimental hall. Alternatively, for post-acceleration of ion beams, the singly charged ion beam of interest can be bunched to 10^8 ions and then delivered to the EBIS charge breeder through the EBIS branch system. The preparation of multi charged ion beams for the post-acceleration using the superconducting linac of SCL3 will be carried out through the EBIS charge breeder and A/q separator to match the energy of 10 keV/u with A/q<6 with the requirement of RAON Injector.

The first commissioning experiment of the ISOL system started from March 2021 using the ^{133}Cs and ^{120}Sn stable beams produced from the target container combined with the surface ion source and laser ion source. The stable beam experiments have demonstrated the overall functioning of the RAON ISOL system, and we are planning to carry out the first RI beam test using the SiC target with 70 MeV proton of cyclotron at the end of 2022.

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