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EBIS Charge Breeder Performance Using Rare Isotope Beam in RAON

The Rare Isotope Accelerator complex for ON-line experiments (RAON) was constructed to produce more exotic rare isotopes (RI) by combining the ISOL and IF methods. In the ISOL facility, RIs are generated in the Target/Ion Source (TIS) module with the proton beam and extracted to the ISOL beamline. The properties of the RI ion beam transported through the ISOL beamline should be matched to the injection conditions of the post-accelerator, which require $A/q < 6$ and 10 keV/u. To satisfy these conditions, an Electron Beam Ion Source (EBIS) charge breeder was installed, producing highly charged ions of RI in the ISOL system. The singly charged ions are injected into the EBIS charge breeder, and their charge states increase by using the electron beam up to 2 A in the high magnetic field of 6 T. These highly charged ions with $A/q < 6$ in the EBIS are extracted and transported to the post-accelerator. Before using the RI ions, the commissioning of the RAON EBIS using stable ions, including the Cs ion beam in 2021 and the Sn and Na ion beams in 2022, confirms matching the required conditions. The first RI generation in the ISOL system has been started with the SiC target. Upon extracting RI beams from the ISOL system, the RAON EBIS will report the charge breeding results with RI beams to match the conditions of the post-accelerator in RAON.

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Yes

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