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Rare Isotope Science Project in Korea

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The use of rare isotopes existing in the world only at a very short moment (radioactivity with short lifetime) is increasing nowadays in various research fields, not only for basic researches in nuclear physics investigating origin of matter, synthesis of new atomic elements, and exotic nuclear structure of rare isotopes but also for applied researches in medical-bio-life science, materials and nuclear sciences.
In Korea, a new heavy-ion (HI) accelerator complex, RAON (Rare isotope Accelerator complex for ON-line experiments), is under construction at Daejeon. Fully utilizing the conventional diversity of HI beams, in addition to the new availability of rare isotope (RI) beams, RAON is intended to become one of the world-leading HI beam facilities. RAON could provide new research opportunities in rare isotope science, which is recently attracting many interdisciplinary scientists, manifesting itself in the form of a second renaissance in heavy ion science.
Powered by a 400-kW superconducting heavy ion linear accelerator, RAON is intended to establish the In-flight Fragment (IF) and Isotope Separation On-Line (ISOL) facilities. The ISOL facility derived by a 70-MeV cyclotron could induce U-fission with a rate of 1014 fissions/s in maximum. The fission-product (FP) beam isolated by the ISOL will be post-accelerated by a superconducting linear accelerator SCL3 for low energy experiments (up to 18.5MeV/u for the beam of A/q~7). The IF facility will be derived by a 400kW superconducting linear accelerator system, SCL1 and SCL2, where U beam could be accelerated up to 200MeV/u. The post-accelerated FP beams can be injected to the SCL2 for further acceleration, e.g. up to about 250MeV/u for 132Sn, and then can derive the IF facility for producing more exotic rare isotope beams. The combined operation of the ISOL and IF facilities is unique feature of RAON, allowing to reach more than 80% of the unexplored region in the chart of nuclide.
Prototyping major accelerator components is almost complete, and the fabrication of major components will start soon. Especially putting the highest priority for early completion of the low-energy facility by the end of 2019, the process for the procurements of major components of the SCL3 is underway. The low-energy facility consisting of the cyclotron, ISOL and SCL3 will deliver various stable and RI beams with variable energy from around 500keV/u (RFQ linac energy) to the energies in maximum around between 18.5 MeV/u (U) and 90 MeV (p) according to their A/q values, to the very low- and low-energy experimental halls. This facility, though part of the full facility, is supposed to be unique and hence highly competitive machine in terms of available beam energy and variety of beam.
Following a brief overview of the project and facility RAON, the progress on the development of some components, especially important for an accelerator system to be integrated at an off-site test facility for demonstrating the successful operation of the front-end of the RAON, is presented.

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