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OEDO – Slowing-Down Beam Line in RIKEN RIBF

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The RI beam factory (RIBF) at RIKEN has expanded the variety of nuclides, which provides numerous kinds of exotic isotope beams over the nuclear chart by using the in-flight fission or the projectile fragmentation reactions of U or other heavy ions at 345 A MeV. Because of the relatively high energy of the primary beam, typical energies of RI beams for in-beam secondary reaction have been restricted to an energy region typically above 200 A MeV. The deceleration of such intense RI beams provided in the RIBF enables us the further research based on exotic nuclei/exotic states by using low-energy reactions such as transfer reaction, fusion-like reaction and so on. In order to realize this, we have set up OEDO (Optimized Energy Degrading Optics for RI beam) project1), where a new energy-degrading beam line in the RIBF have been constructed consisting of two quadrupole magnets, an RF electric deflector and a mono-energetic degrader. An application of energy degrader at dispersive focus is a general method to degrade the beam energy, while it induces the broadening of beam spot. In the OEDO beam line, an RF electric deflector is employed as focusing element based on the time structure of the beam bunch corresponding to the velocities of the ions. The basic idea, the design, the performances in the commissioning experiment, and some physics experiments are presented as well as possible future physics programs and applications.

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1) S. Michimasa et al., Prog. Theor. Exp. Phys. 2019, 043D01 (2019)
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Topic

Experiment

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