Construction status of OEDO beamline

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The OEDO system is a new beamline proposed for high-quality slow-down RI beams.[1)] The OEDO is an abbreviation of **O**ptimized **E**nergy **D**egrading **O**ptics for RI beam. The idea behind it is to manipulate the timing degree of freedom in the phase space of an RI beams. To obtain a high-quality beam with a small spot size and a small energy spread, the OEDO system shifts the spreads of positions and angles to the timing spread of the beam, which corresponds to the rotation of the phase space ellipse on the position- (angle-)timing plane to obtain a small position (angle) spread. Radiofrequency (RF) electric ion-optical elements can rotate a phase space ellipse of spatial and timing components, as beams from a cyclotron have an RF bunch structure.

The main components of the OEDO system are an RF deflector[2)] synchronized with the cyclotron's RF and 2 sets of triplet quadrupole (TQ) magnets to achieve point-to-parallel/parallel-to-point ion optics. The OEDO system is to be installed downstream of a momentum-dispersive focus with a reasonable dispersion. The first TQ associates the beam energy with beam angle at the RF deflector, and the second TQ makes a small achromatic focus. This dispersion condition is fulfilled in the first half of the High-Resolution (HR) beamline.[3)] Therefore, the OEDO system will be implemented in the HR beamline by installing new electric/magnetic elements and rearranging the existing magnets.

The main part of the construction budget was funded and the OEDO project was launched in FY2014. The rearrangement from the HR beamline to the OEDO beamline will be finished in March 2017. Figure 1 shows the magnet arrangement of the OEDO beamline downstream of the FE7 focal plane, which corresponds to the FH7 focal plane of the HR beamline. The function of the OEDO system is built between the FE9 and FE11 foci. In December 2016, a superconducting triplet quadrupole (STQ) magnet was delivered. The FE12 focus is the target position of the SHARAQ spectrometer.

Figures 2 and 3 show the recent status of the delivered RF deflector and the entire OEDO system installed in the beamline leading to the SHARAQ spectrometer, respectively.

The RF deflector will be completed in March 2017 after its operation test. The commissioning run of the OEDO system is planned for the first half of FY2017.

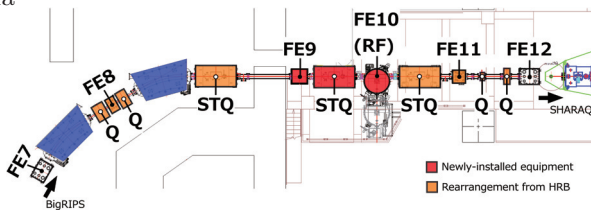

Fig. 1. Magnet configuration of the OEDO beamline

Fig. 2. A photograph of the delivered RF deflector.

Fig. 3. A photograph of the entire OEDO system.

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References

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