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Rare-RI Ring in cyclotron facility RIBF

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The Rare-RI Ring (R3) is located at RIKEN RI Beam Factory for the purpose of the systematic measurement for the basic properties of nuclei such as mass and lifetime including the r-process region. The R3 is an isochronous ring of an unprecedented concept that can inject, circulate, and quickly extract an ion one-by-one. An isochronous field can be formed precisely in a wide momentum range by trim-coils attached to R3 like a cyclotron. This mechanism makes it possible to perform precise mass measurements of extremely short-lived (~ 1 ms) Radioactive Isotopes (RIs) that are rarely produced (several particles/day). In the commissioning using RIs whose masses are well-known, we demonstrated that the masses of several RIs within a wide range of m/q ($\sim 5\%$) can be derived relatively from one reference RI by measuring the flight time under precise isochronous optics. The accuracy can be reached to an order of 10^{-6} by performing beta- or rigidity-correction. In the presentation, the features of R3 will be described with the results of commissioning, and the future prospects will be mentioned.

Primary author: YAMAGUCHI, Yoshitaka

Presenter: YAMAGUCHI, Yoshitaka

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