

First Mass Measurements with the Rare-RI Ring in RIKEN

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Nuclear mass plays an essential role in the understanding of the r-process which is responsible for the synthesis of about one-half of elements heavier than iron up to bismuth and all of thorium and uranium. The nuclei around the doubly magic numbers $N=50$, $N=82$ and $N=126$ are believed to be waiting points where matter accumulates and therefore form the major peaks in the r-process abundance. Sensitivity studies for the r-process have indicated that masses of neutron-rich nuclei in those regions have a significant impact on the final elemental abundance pattern. The binding energy deduced directly from nuclear masses of these nuclei can also be a sensitive probe of the structure of these nuclei.

Rare-RI ring (R3) is an isochronous mass spectrometer at RIBF in RIKEN. It aims at measuring the mass of exotic nuclei with a precision of 10^{-6} within less than 1ms. Thus, we can measure the mass of exotic nuclei with very short half-lives and low production yields.

In this contribution, we report on the first mass measurement campaign at R3 conducted in the Autumn of 2018. The masses of $^{74,76}\text{Ni}$ in the $N=50$, $Z=28$ region which is related to the weak r-process nucleosynthesis were measured. The mass of ^{122}Rh , $^{123,124}\text{Pd}$ and ^{125}Ag isotopes in the southwestern of $N=82$, $Z=50$ region which are relevant for the main r-process nucleosynthesis were also measured.

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