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Nuclear spectroscopy of neutron-rich Ta, W, Re at KISS

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The neutron-rich transitional nuclei with $A \sim 190$ demonstrate a shape transition from well-deformed to γ-soft structures with increasing neutron number [1]. Some of the nuclei in this region have been well studied in previous experimental investigations of nuclear masses, nuclear structure, and transitions, as summarized in a recent review paper [2].

Recently, the use of multi-nucleon transfer reactions at KEK Isotope Separation System (KISS) [3] in RIKEN have enabled us to expand multi-faceted nuclear spectroscopy in this region via decay spectroscopy of ^{187}Ta [4] and mass spectroscopy of ^{189}W, ^{192}Re using a MRTOF-MS [5]. In this work, the decay scheme of ^{187}Ta has been newly established, connecting previously known γ-transitions in ^{187}W. The masses of ^{189}W and ^{192}Re were successfully measured, and the trend of the two-neutron separation energies for neutron-rich W and Re isotopes was interpreted based on DFT calculations, suggesting that shape transitions from prolate deformation begin at $N = 116$ and $N = 117$ in the W and Re isotopic chains, respectively, consistent with previous studies.

In this talk, we will introduce the details of the experiments and discuss the above experimental results.

References:

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