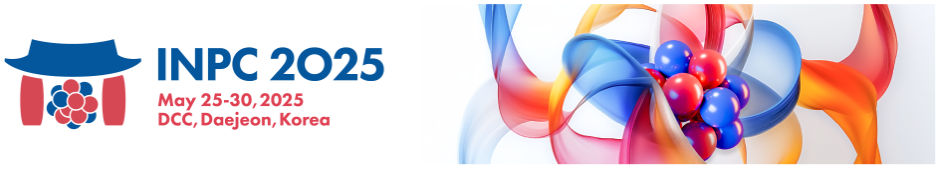

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High-precision direct mass measurement of trans-uranium isotopes using the MRTOF systems at RIKEN/KEK

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The multi-reflection time-of-flight mass spectrograph (MRTOF-MS) [1] is one of the tools for high-precision direct mass measurement of the nuclides. We have operated several MRTOFs in the RIKEN RIBF facility. The SHE-Mass facility, which couples MRTOF-MS + α-TOF detector with the gas-filled recoil ion separator GARIS-II [2], is working on the mass measurement of heavy and superheavy nuclides produced in fusion reactions. The MRTOF-MS connected to the KEK isotope separation system KISS [3] allows the mass measurement of neutron-rich nuclides produced via multi-nucleon transfer reaction.
In the SHE-Mass facility, we have measured the mass of dubnium isotopes (Z=105) produced by the fusion reaction[4], which are the heaviest nuclides directly measured to present. Also, in the KISS setup, we have performed the first investigation of the MNT actinide products formed in the ^{238}U + ^{198}Pt system. We have succeeded in the direct mass measurements of nineteen neutron-rich actinide nuclides spanning from protactinium to plutonium, including the first identification of a new uranium isotope (^{241}U) since the 1970s [5].
In this talk, I will introduce the detail and result of the experiments, and our future plans.

[1] P. Schury et al., Nucl. Inst. Meth. B 335, 39 (2014).
[2] D. Kaji et al., Nucl. Instrum. Meth. B 317, 311 (2013).
[3] Y. Hirayama et al., Nucl. Instrum. Meth. B 412, 11 (2017).
[4] P. Schury et al., Phys. Rev. C 104, L021304 (2021).
[5] T. Niwase et al., Phys. Rev. Lett. 130, 132502 (2023).

Consent

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