Beitrag ID: **10** Typ: **Talk Main Workshop**

Recent Precision Mass Measurements At ISOLTRAP

Mittwoch, 20. August 2025 09:35 (30 Minuten)

The ISOLTRAP experiment [1] is a multi-ion-trap mass spectrometer located at ISOLDE/CERN for high-precision mass measurements of artificially produced, short-lived, exotic radionuclides far from stability. Experimentally, ISOLTRAP uses multi-reflection time-of-flight and Penning-trap mass spectrometry for absolute and relative atomic mass measurements.

Following Einstein's famous mass-energy equivalence, $E = mc^2$, the measured masses can be related to nuclear binding energies which reflect the underlying interactions and structure in the nucleus. Knowledge of the binding energies therefore allows the study of nuclear structure and nuclear astrophysics while precise mass measurements have also applications in fundamental physics such as neutrino or weak interaction studies.

This contribution will highlight recent mass measurements at ISOLTRAP with a focus on the neutron-deficient ^{97,98}Cd ground states in vicinity of the self-conjugate doubly-magic ^{100}Sn and the high-lying 25/2+ isomer ^{97n}Cd as well as the first mass measurements of the neutron-rich ^{209,210,212}Hg.

In addition, recent technical developments at ISOLTRAP, such as the first online experiments using a linear Paul trap for mass-selective re-trapping [2] and a temperature stabilization system for the multi-reflection time-of-flight mass spectrometer will be presented, which pave the way for mass measurements of more exotic nuclides at ISOLDE.

[1] Lunney, D. et al., J. Phys. G: Nucl. Part. Phys. 44, 064008 (2017)

[2] Dickel, T. et al., J. Am. Soc. Mass Spectrom. 28, 1079 (2017)

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