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High-precision mass measurement of n-rich Rb & Sr isotopes at TITAN

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High-precision mass spectroscopy plays a decisive role in addressing several open questions in contemporary nuclear physics, for example, to explain the observed abundances of atoms heavier than iron. About half of the neutron-rich isotopes up to uranium are synthesized via the rapid-neutron capture process (r-process) where the final nuclear abundance depends sensitively on the nuclear mass. Due to the exotic nature of r-process nuclei, their masses are usually uncertain (or unmeasured) and must be calculated using nuclear mass models. We have performed mass measurements of nuclei in the A = 100 mass region that lies in the r-process path using ion-trapping techniques to better constrain nuclear mass models. The masses of isotopic chains of ⁹⁹⁻¹⁰³ Rb and ⁹⁹⁻¹⁰⁵Sr were measured with ¹⁰³Rb and ¹⁰⁴⁻¹⁰⁵Sr being measured for the first time.

The mass measurements were performed at TRIUMF's Ion Trap for Atomic and Nuclear science (TITAN) facility, which is one of a kind for precision mass spectrometry. A Multi-Reflection Time-Of-Flight Mass Separator (MR-TOF-MS) was used as the mass spectrometer of choice. We have used the MR-TOF technique to measure these masses of ions with low intensities (˜0.1 pps) and small half-lives (>25 ms). In this conference, we would like to present the results of mass measurements of n-rich Rb and Sr isotopes.

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