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Ion Traps for Precision Experiments at TRIUMF

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Ion traps are of growing popularity at rare-isotope-beam facilities due to their textbook-like conditions and tailorability. This versatility is exemplified at TRIUMF's Ion Trap for Atomic and Nuclear science (TITAN) facility, where ion traps are used for beam preparation and high-precision measurements. Penning trap mass spectrometry has provided insight into the evolution of the N = 20 shell in the island of inversion, nucleosynthesis via the r-process, and the unitarity of the quark-mixing matrix. In-trap decay spectroscopy research has focused on branching ratios to investigate the double-beta-decay problem and now includes studies of the role of electronic structure in nuclear decay. Moreover, investigations with preparatory traps are being used to extend the reach of TITAN, by reducing beam contamination, improving beam availability beyond ISOL-produced beams, and increasing ion bunch size. A selection of recent highlights and advances will be presented.

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