

PHYSICS AND ASTRONOMY COLLOQUIUM

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TRIUMF

TITAN: Ion traps for experimental nuclear and atomic physics

Ion traps have long been utilized in atomic physics experiments and are playing an increasingly important role in experimental nuclear physics. Ion traps are particularly well suited for studies of ground-state properties of radioactive nuclides. For example, Penning trap mass spectrometry currently provides the most precise atomic mass determinations. Such measurements improve our understanding of nuclear structure, yield insight into stellar burning, and provide input for tests of fundamental symmetries. Moreover, ion cooling, manipulation, and storage techniques are becoming increasingly mature and sophisticated. These techniques are critical to improving and tailoring the beam properties to the needs of the experiment, especially at rare isotope beam facilities.



I will discuss the techniques used at TRIUMF's Ion Trap for Atomic and Nuclear science (TITAN), where Penning trap mass spectrometry has been performed on the shortest-lived nuclides to date (≥ 9 ms) and on highly charged ions. TITAN is the sole on-line facility with charge-breeding capabilities and has leveraged them for novel beam-purification schemes. Highlights from the mass-measurement program will be presented as will an overview of the in-trap decay spectroscopy program. The latter focuses on branching-ratio measurements of intermediate double electron-capture decay candidates.

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