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**Pipken Award: Nuclear physics mysteries revealed by precision ion trap measurements**

JENS DILLING, TRIUMF and University of British Columbia

Nuclear Physics is a fundamental science discipline for over 100 years, and started with precision measurements by Rutherford. Much has been learned and understood in the meantime, but some questions remain and also new nuclear phenomena have been discovered. Precision experiments open new venue to address these. Ion trap technologies, originally conceived for atomic and molecular physics have been adapted to the specific requirements stemming from nuclear physics, for example, to couple ion traps to accelerators and achieve very high speed and efficiencies. In this talk I will show some recent examples and technical developments pertaining to nuclear physics questions and phenomena and how they are addressed with precision ion trap measurements.