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High-precision mass spectrometry of rare isotopes with ISOLTRAP

ISOLTRAP is a state-of-the-art experiment at ISOLDE-CERN for Penning-trap mass spectrometry of short-lived nuclides [1, 2]. The Phase-Imaging Ion-Cyclotron-Resonance (PI-ICR) [3] technique, recently developed by SHIPTRAP at GSI, is a promising approach to gain precision and mass resolving power for Penning-trap spectrometers. Its use would lead to an enhancement in precision of a factor of 5 and in resolving power of a factor of 40, likewise to a decrease of the measurement time by a factor of 25 for achieving the same precision as the standard Time-of-Flight Ion-Cyclotron-Resonance (ToF-ICR) technique [3, 4]. The implementation of the PI-ICR technique at ISOLTRAP will potentially allow the study of exotic nuclear species with higher precision and within less measurement time than presently possible. To this end, a position-sensitive detector was recently assembled for off-line tests. Results of studies of the detector's characteristics will be presented, as well as preliminary investigations of the accuracy of ISOLTRAP for the implementation of the phase-imaging detection technique.

References :

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