

Precision Penning trap mass measurements - Status and perspectives

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Like few other parameters, the mass of an atom and its inherent connection with the atomic and nuclear binding energy is a fundamental property, a unique fingerprint of the atomic nucleus. Each nuclide comes with its own mass value different from all others. With the nowadays achievable accuracy in Penning trap mass spectrometry on short-lived exotic nuclides as well as stable atoms, precision fundamental tests can be performed, among them a test of the Standard Model, in particular with regard to the weak interaction, the CPT conservation, and the unitarity of the Cabibbo–Kobayashi–Maskawa quark mixing matrix. In addition, accurate mass values of specific nuclides are important for neutrino physics as well as for the search of physics beyond the Standard Model. The present status in high-precision Penning trap mass spectrometry as well as recent experimental results and future prospects will be presented.