



Contribution ID: 153

Type: **Keynote**

Precision Tests of Fundamental Interactions and Their Symmetries using Exotic Ions in Penning Traps

Thursday, 20 July 2023 09:30 (45 minutes)

An overview is given on recent mass and g -factor measurements with extreme precision on single or few cooled ions stored in Penning traps. On the one hand, mass measurements provide crucial information for atomic, nuclear and neutrino physics as well as for testing fundamental interactions and their symmetries. On the other hand, g -factor measurements of the bound electron in highly charged hydrogen-like ions allow for the determination of fundamental constants and for constraining Quantum Electrodynamics. For example, the most stringent test of CPT symmetry in the baryonic sector could be performed by mass comparison of the antiproton with H^- and the knowledge of the electron atomic mass could be improved by a factor of 13.

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Session Classification: Session 10

Track Classification: Fundamental Symmetries and Interactions