

**Plenarvortrag**

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**High-precision comparison of the antiproton-to-proton charge-to-mass ratio** — ●CHRISTIAN SMORRA for the Baryon Antibaryon Symmetry Experiment-Collaboration — CERN, 1211 Geneva 23, Switzerland — Ulmer Initiative Research Unit, RIKEN, 2-1 Hiro-sawa, Wako, Saitama 351-0198, Japan

Invariance under the combined charge, parity and time-reversal (CPT) symmetry is the most fundamental symmetry of the Standard Model. As consequence, particles and their conjugate antiparticles have identical masses, lifetimes, and charges and magnetic moments of opposite sign. This allows to test CPT invariance by high-precision measurements of these fundamental properties.

In this talk, I will present our recent charge-to-mass ratio compar-

ison of the proton and the antiproton. The measurement was carried out at the Baryon Antibaryon Symmetry Experiment (BASE) located at CERN's Antiproton Decelerator. To this end, the cyclotron frequencies of a single antiproton and a negative hydrogen ion as a proxy for the proton are compared by placing them alternately in the same magnetic field. Therefore, we developed a fast adiabatic shuttling technique, which allows to exchange particles non-destructively and 50 times faster than in previous experiments. From 6500 cyclotron frequency ratio measurements we obtain a fractional difference of  $(q/m)_{\bar{p}} / (q/m)_p - 1 = -1(69) \cdot 10^{-12}$ . This tests the standard model with an energy resolution of  $8 \cdot 10^{-18}$  eV. In the next step we are aiming to measure the antiproton magnetic moment with a fractional precision of  $10^{-9}$ . The progress towards this measurement will also be reported.