



PHYSIKALISCHES KOLLOQUIUM

Referent:

Dr. Christian Smorra

BASE collaboration

RIKEN, Ulmer Initiative Research Unit, Wako-shi, Japan

CERN, Geneva, Switzerland



Thema:

Testing fundamental physics with antimatter at the antiproton decelerator of CERN

Zeit und Ort:

Dienstag, 10.01.2017, 16:40 Uhr

Recknagel-Bau, Hörsaal REC/C213, Haeckelstr. 3

Leiter:

Prof. Dr. Michael Kobel

Kurzfassung:

One of the puzzles of modern physics is the striking imbalance of matter and antimatter observed in our universe. The Standard Model of particle physics and cosmology struggle to find a satisfying explanation for the lack of antimatter in our universe today. The experiments conducted at the antiproton decelerator facility (AD) of CERN are inspired by this intriguing puzzle. We probe the fundamental pillars of physics with antimatter by measurements on these simple antimatter systems. This allows to test the most fundamental symmetry of the Standard Model, the combined charge, parity, and time reversal CPT symmetry. Further, the weak equivalence principle can be directly probed with antimatter by free fall experiments with antihydrogen.

The AD of CERN is a unique facility which provides bunches of slow antiprotons (5.3 MeV) which can be stopped and confined in charged-particle traps. This allows to conduct precision measurements with single antiprotons, and to synthesize and study antihydrogen, the simplest anti-atom, and other exotic atoms like antiprotonic helium.

I will present a general overview of the AD physics program, with emphasis on the recent results on the spectroscopy of single antiprotons. This includes the high-precision measurement of the antiproton charge-to-mass ratio with 7×10^{-11} relative uncertainty carried out by the BASE collaboration, which is currently the most sensitive test of CPT invariance with baryons.

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