

Electromagnetic Properties of Antihydrogen and the Antiproton: Recent Results from ALPHA and BASE

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The apparent dominance of matter over antimatter in the universe remains one of the greatest puzzles in science. The antiproton decelerator facility at CERN is home to several experiments dedicated to performing precise measurements of the properties of antimatter and hoping to provide insight into the matter-antimatter asymmetry problem. Recently the ALPHA and BASE experiments have reported measurements of the electromagnetic properties of the antihydrogen atom, and antiproton respectively, at unprecedented levels of precision.

Following the observation of the first optical transition in antihydrogen atoms in 2016, ALPHA recently characterised one of the hyperfine components of the 1S-2S transition in antihydrogen. It was determined that the resonance frequency of this transition in antihydrogen matches that of hydrogen, and is therefore consistent with CPT invariance, at a relative precision of 2×10^{-12} .

In 2017 the BASE collaboration reported a measurement of the magnetic moment of the antiproton to a relative precision of 1.5×10^{-9} , an improvement on the precision of their previous measurement by a factor of 350. The result rivals the precision of the proton magnetic moment measurement and provides a stringent test of CPT invariance.

In this talk I will review the recent measurement of the antiproton magnetic moment by the BASE collaboration, and spectroscopic measurements of the antihydrogen atom by the ALPHA collaboration.

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