

Fundamental Symmetry Tests with the ALPHA Antihydrogen Trap

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The ultimate goal of the ALPHA experiment at CERN is to test symmetry between matter and antimatter at highest possible precision via comparisons of the properties of atomic hydrogen with its antimatter counter-part, antihydrogen. After several years of development, we achieved the first major milestone, trapping of antihydrogen, in 2010. Subsequently, in 2011, ALPHA has reported confinement of antihydrogen for as long as 1000 seconds, an increase by a factor more than 5000 from the initial result. Most recently in 2012, ALPHA has succeeded in performing the first spectroscopic measurement on antihydrogen atoms by driving its hyperfine transitions with microwaves. Currently, ALPHA is going through a major upgrade to construct an entirely new apparatus, ALPHA-2, which will allow laser access to the trapped anti-atoms, and provide improved magnetic field configurations for microwave spectroscopy. Possibilities for a measurement of antimatter-gravity interactions are also being explored. This talk will discuss the recent achievements and the future prospects of ALPHA experiment.