

Abstract for an Invited Paper
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Project ALPHA: Trapping Antihydrogen Atoms for Fundamental Symmetry Tests¹

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ALPHA (Antihydrogen Laser PHysics Apparatus) is an international project just getting underway at CERN (Geneva), whose aim is to achieve the first stable trapping of antihydrogen, the simplest atomic form of neutral antimatter. Trapped antihydrogen would offer a unique opportunity to study anti-atoms, and via comparisons with well-studied hydrogen, possibilities to make precision tests of fundamental symmetries between matter and antimatter. In 2002, the ATHENA experiment, and subsequently the ATRAP experiment, succeeded in producing large quantities of cold antihydrogen. However, the anti-atoms produced in these experiments, while nearly at rest, were not confined and soon annihilated on the wall of the apparatus. In order to probe matter-antimatter symmetry at the highest possible precision, it is essential that the antihydrogen be suspended in vacuum to allow for detailed interrogation, e.g. via laser light or microwaves. In this talk, I will first give an overview of antihydrogen physics with the emphasis on results from the ATHENA experiment. I will then discuss the exciting prospects of antihydrogen trapping with the project ALPHA, which is coming on-line this summer.

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