

## Antihydrogen Physics at ALPHA/CERN

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Cold antihydrogen has been produced at CERN [1, 2] with the aim of performing a high-precision spectroscopic comparison to hydrogen. The CPT theorem asserts that an atom and its charge conjugated anti-atom should have exactly the same properties. Hydrogen, a unique system used for the development of Quantum Mechanics and Quantum Electrodynamics, has been continuously used to produce high-precision tests of theories and measurements of fundamental constants. After the initial production of cold antihydrogen atoms by the ATHENA group, the ALPHA Collaboration [3] – that evolved out of ATHENA – has set forth an experiment to trap and perform high-resolution laser spectroscopy on the 1S-2S transition on both atoms. In this contribution, we will review the motivations, goals, techniques and recent developments towards this fundamental Physics test.

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[1] M. Amoretti, C. Amsler, G. Bonomi, A. Bouchta, P. Bowe, C. Carraro, C. Cesar, M. Charlton, M. J. T. Collier, M. Doser, *et al.*, *Nature* **419**, 456 (2002)

[2] G. Gabrielse, N. S. Bowden, P. Oxley, A. Speck, C. H. Storry, J. N. Tan, M. Wessels, D. Grzonka, W. Oelert, G. Schepers, *et al.*, *Phys. Rev. Lett.* **89**, 213401 (2002)

[3] <http://alpha.web.cern.ch/>