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Resonant Quantum Transitions in Trapped Antihydrogen

Thursday, 21 June 2012 09:00 (30 minutes)

The progress in producing and trapping antihydrogen [1-3] in the last decade has opened up the way to perform stringent tests of the validity of the CPT theorem (charge conjugation, parity and time reversal symmetry) using a purely anti-atomic system. The comparison of the 1S-2S transition in antihydrogen with that of hydrogen, of which the latter is measured with a relative accuracy of about 2 parts in 10^-14, would constitute a compelling, model-independent test of CPT. Similar test between the ground-state hyperfine parameters of the antiatom and its matter counterpart are also of great interest. In this case a relative accuracy of about 10^-12 has been obtained for hydrogen.

In this talk we describe the production and subsequent magnetically trapping of antihydrogen atoms in a 0.54 K magnetic well, followed by resonant spin-flip transitions into high field seeking antiatoms [4]. We also describe how the annihilation signal from the antihydrogen atoms migrating to the wall was isolated from background sources such as cosmic rays [5].

[1] G. B. Andresen et al. (ALPHA collaboration), Nature 468, 673 (2010).
[2] G. B. Andresen et al. (ALPHA collaboration), Phys. Lett. B 685, 141 (2010).
[3] G. B. Andresen et al. (ALPHA collaboration), Nature Phys. 7, 558 (2011).
[4] C. Amole et al. (ALPHA collaboration), Nature 483, 439 (2012).
[5] C. Amole et al. (ALPHA collaboration), New J. Phys. 14, 015010 (2012).

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