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Current status of the ASACUSA Hbar HFS experiment

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The ground-state hyperfine splitting of antihydrogen promises one of the most sensitive tests of CPT symmetry. The ASACUSA collaboration is pursuing a measurement of this splitting in a Rabitype experiment using a polarized beam.
The antihydrogen atom beam is formed in a dedicated CUSP trap, which mixes antiprotons provided by the antiproton decelerator at CERN and positrons from a 22Na based positron source.
The GS-HFS will be driven using a tunable spin-flip resonator cavity. The spin state will be then analyzed with a superconducting sextupole magnet, which focuses the spin flipped atoms out of the beam. The remaining atoms are then counted with a dedicated detector, consisting out of a BGO detector and a hodoscope.
Major milestones achieved are the first observation of antihydrogen far from the formation region [3], followed by the analysis of the quantum states, where antihydrogen atoms with main quantum numbers n below 14 were detected [4].
In my presentation, I will give an overview of the current status of the experiment and give an outlook of our planned activities during the long shutdown 2 at CERN.
[1] A. Mohri and Y. Yamazaki, Europhys. Lett. 63, 207–213 (2003)
[2] E. Widmann et al., Hyperfine Interactions 215, 1 (2013)
[3] N. Kuroda et al., Nat. Commun. 5, 3089 (2014)
[4] C. Malbrunot et al., Phil. Trans. Roy. Soc. A 376, 2116 (2018)

Content of the contribution

Experiment

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