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Towards antihydrogen spectroscopy at ALPHA

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Spectroscopy of antihydrogen has the potential to yield high-precision tests of the CPT theorem and shed light on the matter-antimatter imbalance in the Universe. We will describe the progress made in the production of a trapped sample of antihydrogen atoms at CERN's Antiproton Decelerator. Sensitive diagnostics of the temperatures, sizes, and densities of the trapped antiproton and positron plasmas have been developed, which in turn permitted development of techniques to precisely and reproducibly control the initial experimental parameters. The use of a position-sensitive annihilation vertex detector, together with the capability of controllably quenching the superconducting magnetic minimum trap, enabled us to carry out a high-sensitivity and low-background search for trapped synthesised antihydrogen atoms. We will report results from ALPHA's recent data-taking run and outline the prospects for the near future.

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