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A slow antihydrogen beam for ground-state hyperfine spectroscopy

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The ASACUSA Cusp antihydrogen experiment aims to test CPT symmetry through spectroscopic studies of antihydrogen ground-state hyperfine splitting. Planned antiatomic beam spectroscopy will be conducted in an environment where a perturbing magnetic field is small. The experiment recently upgraded the antiproton trap, the positron trap, and the Double Cusp trap in order to produce slow and intense antihydrogen atomic beams. Plasmas of positrons and antiprotons are mixed under a cusp magnetic field to produce cold antihydrogen atoms. The cusp magnetic field polarises the spin state of antiatoms by focusing low field seeking states of antihydrogen along the beam axis while defocusing high field seeking states if antiatoms are slow enough. Therefore, the preparation of colder plasmas in the double Cusp trap is crucial for producing slow antihydrogen atoms. Recent progress on preparing cold plasmas, improvements in antihydrogen yield, and the production of slow antiatomic beams will be presented.

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