

High Energy Physics - Experiment

Antihydrogen formation dynamics in a multipolar neutral anti-atom trap

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Antihydrogen production in a neutral atom trap formed by an octupole-based magnetic field minimum is demonstrated using field-ionization of weakly bound anti-atoms. Using our unique annihilation imaging detector, we correlate antihydrogen detection by imaging and by field-ionization for the first time. We further establish how field-ionization causes radial redistribution of the antiprotons during antihydrogen formation and use this effect for the first simultaneous measurements of strongly and weakly bound antihydrogen atoms. Distinguishing between these provides critical information needed in the process of optimizing for trappable antihydrogen. These observations are of crucial importance to the ultimate goal of performing CPT tests involving antihydrogen, which likely depends upon trapping the anti-atom.

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