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CPT symmetry and gravity tests with antihydrogen

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AEGIS and ASACUSA collaborations

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A growing number of collaborations are performing experiments at the CERN Antiproton Decelerator (AD), the only available facility providing slow antiprotons suitable for precision measurements with anti-atoms. The majority of these experiments are forming antihydrogen atoms with the main goal of probing the atomic transitions which have been measured in hydrogen to a remarkable precision. The precise comparison between the hydrogen and antihydrogen transitions has indeed the potential to provide one of the most sensitive tests of CPT symmetry. More recently, experiments have begun to employ antihydrogen atoms to test the validity of the Weak Equivalent Principle on antimatter by measuring the fall of these anti-atoms in the Earth's gravitational field.
I will focus my talk on the recent developments of the ASACUSA-CUSP and AEGIS experiments. AEGIS plans on performing a direct measurement of the acceleration of cold antihydrogen atoms in the Earth gravitational field with a precision of 1 to 10% in the first experimental phase while the ASACUSA-CUSP experiment aims at measuring the ground-state hyperfine splitting of antihydrogen to the ppm level using an atomic spectroscopy beamline.
After shortly describing the experimental setups and discussing their respective sensitivities, I will highlight the latest developments and the upcoming experimental challenges towards the first CPT and gravity tests with antihydrogen.