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## Upgrade of ASACUSA's Antihydrogen Detector

The goal of the ASACUSA (Atomic Spectroscopy And Collisions Using Slow Antiprotons) experiment at CERN's Antiproton Decelerator is to measure the difference of the ground state hyperfine splitting of antihydrogen and hydrogen in order to test CPT symmetry.

The ASACUSA hodoscope is an octagonal barrel-type detector consisting of plastic scintillators and read out by silicon photo multipliers (SiPMs). If the antiproton of antihydrogen annihilates in the center of the hodoscope, particles (mostly pions) are produced and travel through the various layers of the detector and produce signals.

The hodoscope was successfully used during the last data taking period at CERN. The necessary time resolution to discriminate between cosmic particles and annihilation products was previously achieved using waveform digitisers. The disadvantage of this readout scheme with digitisers is the slow readout speed, which was now improved by two orders of magnitude. This was achieved by replacing the wave form digitisers by TDCs reading out a digital time-over-threshold signal produced by the SiPM amplifier boards.

Additional scintillator tiles are under construction to also improve the tracking capabilities and position resolution of the detector. The upgraded setup is currently under test and should be installed spring 2022.

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