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Upgrade of the scintillator detector for particle tracking in experiments with antiprotons

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Experiments with antiprotons often require the tracking of the charged particles emerging from the annihilation process. The ASACUSA (Atomic Spectroscopy And Collisions Using Slow Antiprotons) collaboration at the CERN Antiproton Decelerator (AD) has used several panels of scintillating bars placed around an interaction region to reveal the passage of charged pions and determine the annihilation vertex position and time.

The panels are composed of ~1 m long extruded scintillating bars with a cross section of 1.5x2.0 cm^2 and a hole along the bar axis with WLS fibers glued to collect the light. Several fibers are grouped and readout by multi-anode PMTs for a total of ~500 readout channels.

After operating for several years, the fiber-PMT coupling has degraded and a major upgrade of the light readout system has been planned. The PMTs will be replaced by SiPMs with an active surface of 1 mm^2 (1 SiPM per fiber) and the front-end electronics will be changed accordingly. An improvement is expected in the efficiency and the uniformity of the detector response, moreover it will be possible to work in magnetic field regions.

In this contribution the commissioning of the upgrade will be described and expected performances discussed. Preliminary tests with cosmic rays have been completed, the light yield of a single bar has been measured and the fiber-SiPM system validated. The front-end electronics to cope with the new signal source have been designed and prototype boards tested. The mechanical structure has been adapted and the final assembly is ongoing.

Is this abstract from experiment?

Yes

Name of experiment and experimental site

ASACUSA

Is the speaker for that presentation defined?

Yes

Details

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