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Characterization and quality control of the SMART board for the ADAPT hodoscope and calorimeter

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The Advanced Particle Astrophysics Telescope (APT) is a proposed next-generation space-based observatory designed for gamma-ray astronomy in the MeV-TeV energy range. To validate its technology and design, a small-scale prototype, the Antarctic Demonstrator for APT (ADAPT), is currently under development for a high-altitude balloon flight during the 2026-2027 Antarctic summer. Among its sub-detectors, there are a hodoscope that consists of four layers of interleaved scintillating fibers coupled to Silicon Photomultipliers (SiPMs), and an Imaging CsI calorimeter (ICC), formed by 4 layers of CsI(Na) crystals with crossed WLS fibers readout by SiPMs. Our work focuses on the development and characterization of a multichannel readout electronics system for the hodoscope's SiPM signals. Specifically, we employ the SMART (SiPM Multichannel ASIC for high Resolution Cherenkov Telescopes) ASIC, which offers a compact, cost-effective, and highly integrated solution for signal amplification. In this contribution, we present the quality control and performance characterization of the SMART readout board for the ADAPT hodoscope and ICC layers. This system is crucial for accurately reconstructing particle trajectories within the ADAPT detector stack, leveraging the high precision and efficiency of the SMART ASIC.

Eligibility for "Best presentation for young researcher" or "Best poster for young researcher" prize

Yes

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