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The Anti Coincidence Detector for the APT Antarctic Demonstrator

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The Antarctic Demonstrator for the Advanced Particle-Astrophysics Telescope (ADAPT) is a NASA sub-orbital mission planned for a high-altitude balloon flight over Antarctica during the 2026-2027 season. ADAPT aims to validate key detector technologies for the forthcoming space-based Advanced Particle-Astrophysics Telescope (APT) mission, an MeV-TeV gamma-ray telescope designed to provide an order of magnitude improvement in sensitivity over any current mission, with a focus on dark matter and multimessenger science.

A segmented anti-coincidence detector (ACD) covers the ADAPT detector to select gamma-rays against the charged cosmic-ray background, thereby enhancing the detection sensitivity to gamma-ray events. A secondary objective of the ACD is to identify heavy nuclei that exploit the proportionality of the energy deposition to Z^2 (where Z is the atomic number of the nucleus). The ACD consists of a set of plastic scintillator tiles coupled with Silicon Photomultipliers (SiPMs), arranged to envelop the detectors in a configuration that ensures the veto of charged particle interactions while providing complementary measurements for nuclei identification.

This presentation will explore the technical specifications and design considerations of the ADAPT ACD, as well as its expected performance, which has been extensively evaluated through simulation modeling, tests in laboratory and with beam particles.

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

Yes

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