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## The GAPS Experiment: A Search for Dark Matter Using Low-Energy Antinuclei

*Saturday 19 July 2025 13:35 (15 minutes)*

GAPS is a long-duration balloon experiment designed to measure the flux of low-energy ( $< 0.25$  GeV/n) cosmic antinuclei as signatures of dark matter. The GAPS instrument, which is assembled in Antarctica in preparation for its first flight later this year, will measure the antiproton flux in an unexplored low-energy range; be the first experiment optimized for cosmic antideuterons, a “smoking gun” signature for new physics; and deliver leading sensitivity to cosmic antihelium. GAPS consists of a ten-layer silicon tracker, cooled by a novel oscillating heat pipe thermal system, and surrounded on all sides by a precision timing plastic scintillator time-of-flight (TOF) and trigger system. GAPS utilizes a novel antiparticle identification technique, in which an incident antinucleus is slowed and trapped by the tracker material, forming an exotic atom. The incident particle  $dE/dx$  and velocity, characteristic de-excitation X-rays, and subsequent nuclear annihilation products uniquely identify the incident antinucleus species. This talk will cover the GAPS sensitivity and anticipated science impact on the current landscape of cosmic ray measurements, dark matter searches, and other beyond-the-Standard-Model physics investigations.

### Collaboration(s)

The GAPS Collaboration

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