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In Search of Cosmic-Ray Antinuclei from Dark Matter with the GAPS Experiment

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The General Antiparticle Spectrometer (GAPS) is the first experiment optimized to identify low-energy (<0.25 GeV/n) cosmic antinuclei, in particular antideuterons from dark matter annihilation or decay. Using a novel detection approach which relies on exotic atom formation and decay, the GAPS program will deliver an unprecedented sensitivity to cosmic antideuterons, an essentially background-free signature of various dark matter models, as well as a high-statistics antiproton spectrum in an unexplored energy range and leading sensitivity to cosmic antihelium. GAPS is currently under integration and preparing for the first Antarctic balloon flight while two follow-up flights are planned.

In this contribution, we will present GAPS custom-developed instrument technology, including large-area silicon detectors and a large-acceptance time-of-flight system, as well as detailed simulation studies, while focusing on the anticipated scientific impact of the GAPS program on cosmic-ray searches for dark matter, and the path forward to the initial flight.

In-person participation

No

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