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Field Rose Rogers (MIT): Searching for Antinucleon Signatures of Dark Matter in Cosmic Rays with GAPS

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GAPS is the first experiment optimized primarily to detect low-energy cosmic antideuterons and antiprotons. Any observation of low-energy antideuterons would indicate new physics because the expected flux of such particles from conventional astrophysics is extraordinarily small. Meanwhile, low-energy antiprotons can be used to probe cosmic-ray propagation models, and with sensitivity to both antiprotons and antideuterons, GAPS will be able to probe previously unexplored dark matter parameter space. The GAPS experimental program consists of several long-duration balloon flights from Antarctica, with the first flight scheduled by NASA for December 2020. The detector consists of layered planes of lithium-drifted Silicon (Si(Li)) detectors surrounded by a plastic scintillator time-of-flight, which are used for a novel particle identification technique based on exotic atom capture and decay, making GAPS sensitive to antinuclei in an unprecedentedly low energy range (<.25GeV/n). I present here the design and status/schedule of GAPS, in particular the Si(Li) detectors that lie at the heart of the experimental design.

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