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GAPS: a New Cosmic-Ray Antimatter Experiment

Friday, 1 June 2018 14:30 (30 minutes)

The General AntiParticle Spectrometer (GAPS) is a balloon-borne instrument designed to detect cosmic-ray antimatter using the novel exotic atom technique, obviating strong magnetic fields required by experiments like AMS, PAMELA, or BESS. It will be sensitive to primary antideuterons with kinetic energies of $\approx 0.05-0.2$ GeV/nucleon, providing some overlap with the previously mentioned experiments at the highest energies. For 35×3 day balloon flights, and certain classes of primary antideuteron propagation models, GAPS will be sensitive to $m_{\rm DM} \approx 10-100$ GeV c^{-2} WIMPs with a dark-matter flux to astrophysical flux ratio approaching 100. This clean primary channel is a key feature of GAPS and is crucial for a rare event search. Additionally, the antiproton spectrum will be extended to cover the $0.07 \leq E \leq 0.25$ GeV domain. For $E > 0.2$ GeV GAPS data will be complementary to established experiments, while $E < 0.2$ GeV explores a new regime. The first flight is scheduled for late 2020 in Antarctica. This talk will describe the astrophysical processes and backgrounds relevant to the dark matter search, a brief discussion of detector operation, and construction progress made to date.

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