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Indirect Dark Matter Search with GAPS Antiproton and Antideuteron Measurement

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The general antiparticle spectrometer (GAPS) experiment is a proposed indirect dark matter search focusing on antiparticles produced by WIMP (weakly interacting massive particle) annihilation and decay in the Galactic halo. Since antideuteron signals at low energy are free of background, GAPS has a strong capability to observe dark matter signatures through the antideuteron search. In particular, GAPS will be able to detect light neutralino dark matter ($m \sim 30$ GeV) as inferred by the recent Fermi results. Along with excellent antideuteron sensitivity, GAPS will be able to measure antiprotons at ultra-low energy ($E < 0.25$ GeV), a region previously inaccessible to any experiments, and thus uniquely search for dark matter and primordial black holes. Both GAPS antiproton and antideuteron searches will provide stringent constraints on light dark matter models, where strong tension exists between the positive and negative results by the recent dark matter searches. The GAPS prototype flight was successfully launched in 2012 and the GAPS science flight is proposed to fly from Antarctica in the austral summer of 2018-2019.

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