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General AntiParticle Spectrometer (GAPS) - Hunt for dark matter using cosmic ray antideuterons

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The GAPS experiment is foreseen to carry out a dark matter search by hunting for low energy cosmic ray antideuterons with a novel detection approach. The theoretically predicted antideuteron flux resulting from secondary interactions of primary cosmic rays, e.g. protons, with the interstellar medium is very low. So far not a single cosmic antideuteron has been detected by any experiment, but well-motivated theories beyond the standard model of particle physics, e.g., supersymmetry or universal extra dimensions, contain viable dark matter candidates which could lead to a significant enhancement of the antideuteron flux due to self-annihilation of dark matter particles. This flux contribution is believed to be especially large at small energies which leads to a high discovery potential for GAPS. GAPS is designed to achieve its goals via a series of ultra-long duration balloon flights at high altitude in Antarctica and had a successful prototype flight in June 2012.

The presentation will give an overview of the theoretical and experimental implications for a cosmic ray antideuteron search and discuss the current status and perspectives of the GAPS experiment.

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