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Status of the GAPS simulation and analysis development

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The General Anti Particle Spectrometer (GAPS) is a balloon-borne cosmic-ray experiment scheduled for long duration balloon flights from McMurdo station in the Antarctic. Its primary science goal is the search for light antinuclei in cosmic rays at energies in the region below 0.3 GeV/n. This energy region is of great interest and still mostly uncharted. Searches for light antimatter nucleons with energies below ~ 0.3 GeV/n promise a potential break-through approach for the search of dark matter. GAPS will search with unprecedented sensitivity for antiprotons and especially antideuterons.

To reach the required sensitivity, the GAPS instrument incorporates a new approach for antimatter detection, utilizing a time of flight system together with a tracker with lithium-drifted silicon detectors in a novel design. The instrument is capable of measuring beta and dE/dx profiles of tracks together with exotic-atomic X-ray deexcitations emerging from antimatter captures in the tracker material. The observation of the X-ray cascade from exotic atoms is a golden channel for the identification of antideuterons.

In this talk, an overview will be given of the current status of the GAPS simulation and analysis framework. The focus will be set on simulation of light antinuclei interaction as well as identification techniques. We will present the current status of event reconstruction as well as discuss the GAPS antideuteron sensitivity.

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