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Development of the GAPS Experiment for Cosmic-ray Antideuteron Search

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The GAPS experiment is designed to carry out a dark matter search by hunting for low-energy cosmic-ray antideuterons with a novel detection approach. So far not a single cosmic antideuteron has been detected by any experiment, but well-motivated theories beyond the standard model of particle physics contain viable dark matter candidates, which could lead to a significant enhancement of the antideuteron flux due to annihilation of dark matter particles. This flux contribution is calculated to be especially large at low energies, which leads to a high discovery potential for GAPS. The theoretically predicted antideuteron flux resulting from secondary interactions of primary cosmic rays, e.g. protons, with the interstellar medium is very low. GAPS is designed to achieve its goals via a series of ultra-long duration balloon flights at high altitude in Antarctica starting from 2020.

The presentation will report on the status of the different GAPS subdetectors as well as on the development of the simulation and analysis tools.

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