

Present Status and Future Plans of GAPS Antiproton and Antideuteron Measurement for Indirect Dark Matter Search

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The General Anti-Particle Spectrometer (GAPS) experiment aims to measure cosmic-ray antiparticles with unprecedented sensitivity in the low-energy range around 100 MeV. The low-energy cosmic-ray antiprotons and antideuterons are expected to be unique probes in indirect searches for dark matter candidates e.g. supersymmetric neutralinos. In order to achieve high sensitivity, GAPS introduces a novel antiparticle-identification method using exotic atom physics. GAPS plans to realize its first physics run by long-duration balloon flight over Antarctica around 2020. In this paper, the present status and future plans for GAPS are discussed.

KEYWORDS: cosmic-ray, antiparticle, antimatter, dark matter, balloon experiment

1. Introduction

The General Anti-Particle Spectrometer (GAPS) project aims to contribute to early-universe physics, especially for the dark matter (DM) physics, through a highly sensitive observation of cosmic-ray antiprotons and antideuterons [1,2]. The primary goal of GAPS is to search for undiscovered antideuterons in the low-energy (sub-GeV) range with unprecedented sensitivity. Various DM models theoretically predict enhanced antideuteron flux in the sub-GeV region which is two or three orders of magnitude higher than the antideuteron flux originating from the secondary interactions of