ICRC
The Astroparticle Physics Conference
34th International Cosmic Ray Conference
July 30 - August 6, 2015
The Hague, The Netherlands

Contribution ID: **499** Type: **Poster contribution**

# A Novel CubeSat-Sized Antiproton Detector for Space Applications

*Thursday, July 30, 2015 3:30 PM (1 hour)*

Measuring cosmic antimatter fluxes probes many astrophysical processes. The abundancies and energy spectra of antiparticles support the understanding of the creation and propagation mechanisms of cosmic rays in the Universe. Deviations from theoretical predictions may hint to exotic sources of antimatter or inaccuracies in our understanding of the involved processes. Specifically, geomagnetically trapped antiprotons in Earth's inner radiation belt are directly linked to the production of secondary cosmic ray particles and their motion in Earth's magnetic field.
The planned Antiproton Flux in Space (AFIS) experiment is designed to measure this antiproton flux using a novel CubeSat-sized particle detector. This active-target detector consists of 900 scintillating fibers read out by silicon photomultipliers and is sensitive to antiprotons in the energy range below 100 MeV. With its almost $4\pi$ angular acceptance, it covers a geometrical acceptance of 270 $cm^2\cdot$ sr. The particle identification scheme for antiprotons relies on a combination of Bragg curve spectroscopy and the characteristics of the annihilation process.
In order to verify the detection principle, a prototype detector with a reduced number of channels was tested at a stationary proton beam. Its energy resolution was found to be less than 1 MeV for stopping protons of about 50 MeV energy.
We will give an overview of the AFIS mission and explain the working principle of the detector. We will also discuss the results from the beam test and the construction of the first full-scale detector.
This research was supported by the DFG cluster of excellence "Origin and Structure of the Universe" (www.universe-cluster.de).

## Collaboration

– not specified –

## Registration number following "ICRC2015-I/"

580

**Primary author:** Mr PÖSCHL, Thomas (Technische Universität München)

**Co-authors:** Mr LOSEKAMM, Martin (Technische Universität München); Mr MILDE, Michael (Technische Universität München); Prof. PAUL, Stephan (Technische Universität München)

**Presenter:** Mr PÖSCHL, Thomas (Technische Universität München)

**Session Classification:** Poster 1 CR

**Track Classification:** CR-IN