



detector seminar

SPEAKER: PACIFICO, N. (CERN)
TITLE: **Detection of antiprotons using GRACE: A new facility for the extraction of very low energy antiprotons at the CERN AD**
DATE: Fri 25/11/2016 11:00
PLACE: 40-S2-A01 - Salle Anderson

ABSTRACT

In antimatter research, the detection and tagging of antiprotons has so far been accomplished indirectly, through the tracking of nuclear fragmentation products. In some instances, however, it proves useful to have the antiprotons annihilating directly within the detector volume, with the potential of sensibly improving the resolution on the position determination.

This seminar will cover the efforts over the last years within the AEGIS collaboration, which aims at a direct-annihilation detector for antiprotons and antihydrogen. First tests were performed in 2012 on MAPS and a 3D sensor using the FE-I4 chip within the main AEGIS apparatus. The first promising results triggered the development of a dedicated facility for detector tests, GRACE.

GRACE is currently running at the CERN Antiproton Decelerator, exploiting the secondary branch of the DEM beam line that it shares with the AEGIS experiment. GRACE is conceived as an easily accessible facility for detector tests with very low energy (1-8 keV) antiprotons.

Over the last two years GRACE has been employed to study the performance of the Timepix3 as a direct annihilation detector. The Timepix3 is an ASIC developed within the Medipix3 collaboration, characterized by an extremely high spatial resolution and accurate TOA and TOT information. We employed the Timepix3 coupled to a particularly thick (680 μm) sensor, allowing a much improved tracking length for angled particles. These characteristics make it ideal to tag the typical signature of an antiproton annihilation, where several charged products depart from the annihilation site with typical energies of hundreds of MeV, creating a signature star-shaped event.

The future developments of this innovative tagging method will be discussed as well.

Organised by: Burkhard Schmidt (EP-DT)