

## Measurement of 1.7 to 74 MeV polarised gamma rays with the HARPO TPC

Current gamma-ray telescopes based on photon conversion to electron-positron pair, such as Fermi, use tungsten converters. They suffer of limited angular resolution at low energies, and their sensitivity drops below 1 GeV. The low multiple scattering in a gaseous detector gives access to higher angular resolution in the MeV-GeV range, and to the linear polarisation of the photons through the azimuthal angle of the electron-positron pair.

HARPO is an R&D program to characterize the operation of a TPC (Time Projection Chamber) as a high angular-resolution and sensitivity telescope and polarimeter for gamma-rays from cosmic sources. It represents a first step towards a future space instrument.

A 30cm cubic TPC demonstrator was built, and filled with 2bar argon based gas. It was put in a polarised gamma-ray beam at the NewSUBARU accelerator in Japan in November 2014. Data were taken at different photon energies from 1.7 MeV to 74 MeV, and with different polarisation configurations. The full experimental setup of the TPC and the photon beam will be described. First results from reconstructed conversion events will be shown.

The challenges and plans towards a balloon borne prototype will also be discussed. The TPC should be able to work autonomously with a very light environment. A lightweight system for gas circulation and purification was designed and tested for long term use. A topological trigger using the TPC signal with self-trigger electronics is under development.

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