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Measurement of a polarised gamma ray beam from 1.7 to 74 MeV with the HARPO TPC

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Gamma-ray astronomy allows us to explore the non-thermal emissions of objects such as Active Galactic Nuclei (AGN), Gamma Ray Bursts (GRB) and pulsars. Current gamma-ray telescopes based on photon conversion to electron-positron pair use tungsten converters. They suffer of limited angular resolution at low energies, and their sensitivity drops below 1 GeV. A gaseous detector can achieve higher angular resolution in the MeV-GeV range thanks to reduced multiple scattering. This gives access to the linear polarisation of the photons through the azimuthal angle of the electron-positron pair.

The HARPO Time Projection Chamber (TPC) has been designed as a high angular resolution telescope for gamma-ray polarimetry. It was set up 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. The first results from the beam campaign will be shown.

Collaboration

HARPO collaboration:

D. Bernard, P. Bruel, M. Frotin, Y. Geerebaert, P. Gros, B. Giebels,
D. Horan, M. Louzir, P. Poilleux, I. Semeniouk, S. Wang
LLR, Ecole Polytechnique, CNRS/IN2P3, Palaiseau

D. Attié, D. Calvet, P. Colas, A. Delbart, P. Sizun
CEA, Irfu, CEA-Saclay, France

D. Götz
AIM, CEA/DSM-CNRS-Université Paris Diderot, France
IRFU/Service d'Astrophysique, CEA-Saclay, France

S. Amano, T. Kotaka, S. Hashimoto, Y. Minamiyama,
A. Takemoto, M. Yamaguchi, S. Miyamoto
LASTI, University of Hyōgo, Japan

S. Daté, H. Ohkuma
JASRI/SPring8, Japan

Primary author: Dr GROS, Philippe (LLR, Ecole Polytechnique)

Presenter: Dr GROS, Philippe (LLR, Ecole Polytechnique)

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