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HARPO, TPC as a gamma telescope and polarimeter: Measurements in a polarised photon beam between 1.7 MeV and 74 MeV

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Gamma-ray astronomy has become an important branch of astroparticle physics. It now suffers from a sensitivity gap in the 1-100MeV range. Compton telescopes lose sensitivity above 1MeV, and pair production telescopes, due to multiple scattering, have low resolution and high background below a few 100MeV. HARPO proposes a gaseous detector, a TPC, to fill this gap and improve angular resolution by observing electron-positron pairs produced in gas up to 1GeV. It can also provide polarisation measurements above 1MeV, which has never been done in space.

A 30cm cubic demonstrator TPC has been built, equipped with a combination of Micromegas and GEM for amplification in a high pressure Argon based gas mixture. The TPC has been used to measure photons from 1.7MeV to 74MeV at the NewSUBARU accelerator in Japan. We will show the results

from this beam campaign, and perspectives on the continuation of the project.

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

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

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