Contribution ID: **9** Type: **Oral**

X-POT: X-ray Polarimetry with Optical Time projection chamber

Friday 16 May 2025 09:50 (25 minutes)

We present a novel large-volume, extended field-of-view Time Projection Chamber (TPC) tailored for hard X-ray polarimetry. Originally developed for directional Dark Matter searches, the system has been adapted to measure the polarization of X-rays, providing a new tool to probe the high-energy universe. The detector employs a triple-GEM configuration coupled with an optical readout, using a scientific CMOS (sCMOS) camera to image the secondary scintillation light produced during gas amplification. Featuring a cylindrical active volume (3.7 cm radius and 5 cm height), the prototype achieves full reconstruction of photoelectron tracks in the 10–50 keV range, with angular resolutions reaching 15° and energy resolutions between 10–15% over the 5–45 keV range. Calibration tests using a collimated ^{90}Sr source and a fully polarized 17 keV X-ray beam have yielded promising results, including modulation factors above 0.4 at 17 keV. This work not only extends the energy sensitivity of X-ray polarimetry but also offers the potential to observe transient phenomena such as Gamma Ray Bursts and solar flares also the detector's extended field of view and rapid response capabilities make it ideal for capturing transient high-energy phenomena, including Gamma Ray Bursts and solar flares, where polarization measurements can illuminate the processes driving particle acceleration and energy dissipation.
Future developments will focus on optimizing gas mixtures and scaling the detector to a wide-field configuration, paving the way for innovative X-ray polarimetry missions.

Eligibility for "Best presentation for young researcher" or "Best poster for young researcher" prize

Yes

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Session Classification: R&D of novel approaches and instruments