Contribution ID: **415** Type: **Poster**

X-ray polarization from astrophysical sources. Development and early results of a large vol-ume Time Projection Chamber (TPC) from HypeX project

X-ray polarimetry is an observational technique with the potential to enrich our understanding of high-energy astrophysics by enabling the measurement of the polarization of X-rays emitted by exotic cosmic phenomena such as black holes, neutron stars, Gamma-Ray Bursts and more. This technique provides crucial insights into the magnetic field geometries, intensities, and emission mechanisms of these sources, offering valuable in-formation that could improve the current knowledge of these astrophysical objects significantly.
Currently, the IXPE space observatory, which features a photoelectric polarimeter with an active volume of 6.75 cm3, is the only instrument providing X-ray polarimetric measurements, in the range from 2 to 8 keV. The Xray-CMOS subproject of the PRIN project "HypeX: High Yield Polarimetry Experiment in X-rays", developed by a collaboration of GSSI, INFN and INAF researchers, aims to apply more modern experimental techniques for applications in X-ray polarization measurements in the energy range between 8 and 40 keV. Xray-CMOS subproject inherits the knowhow and detector concept from the CYGNO/INITIUM directional dark matter experiment optimizing it to the photoelectric polarization measurement. The technology, a TPC with triple-GEM amplification stage and optical readout exploiting the sensitivity and granularity of sCMOS cameras and PMTs, aims to achieve 3D reconstruction of photoelectrons and an active volume significantly larger—about 100 times—than the current state of the art. The prototype TPC, with a cylindrical active vol-ume of radius of 3.7 cm and height of 6 cm, was employed in several tests at the INAF-IAPS calibration fa-cility in Rome, Tor Vergata. The aim was to assess the instrument's sensitivity to low-energy X-ray polariza-tion and optimize parameters such as gas mixtures, amplification structures, and detector geometry. I will show the results of these data campaigns where we achieved complete reconstruction of photoelectrons in the 8-60 keV range with angular resolutions down to 15°. In addition, I will talk about the first measurements with a polarized X-rays beam which suggested modulation factors above 0.35 are possible at 17 keV.

Secondary track

T11 - Detectors

Author: DHO, Giorgio (INFN - LNF)

Presenter: DHO, Giorgio (INFN - LNF)

Session Classification: Poster T01

Track Classification: T01 - Astroparticles, Gravitation and Cosmology