

X-ray Polarimetry of the Galactic Center: Tracing Past Flares and Magnetic Structures with IXPE

Frédéric Marin, on behalf of the IXPE team

The Galactic center, due to its proximity, constitutes a privileged region of study for understanding both the current and past nuclear activity of galaxies. However, because of the large amount of dust and gas along the line of sight, this region remains opaque at many wavelengths. To circumvent this limitation, X-rays can be used: their energy is sufficient to penetrate the obscuring material and to probe the most energetic structures of the Milky Way.

While X-ray observations have been used for decades, it is only recently (2023) that their polarization could be measured, thanks to the IXPE (Imaging X-ray Polarimetry Explorer) mission. In this presentation, I will summarize all the imaging polarimetric observations carried out by IXPE within the central 50 parsecs of the Galaxy, and I will present the key results obtained. I will focus in particular on the polarized signal from the Sgr A region, where molecular clouds seen in reflection have allowed us to confirm a past episode of active galactic nucleus-like activity at the heart of the Milky Way. I will also discuss the polarization detected in the X-ray filament G0.13–0.11, which reveals a strong signal consistent with synchrotron emission produced by a pulsar wind nebula (PWN).

These results highlight the potential of X-ray polarimetry to constrain both the radiative history of the Galactic center and the magnetic field structure in dense environments. They open new perspectives for understanding the energetic and dynamical processes shaping the core of our Galaxy.