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# Astrophysical X-Ray Polarimetry with the IXPE Mission

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My PhD project deals with astrophysical X-ray polarimetry. The state-of-art is the Imaging X-ray Polarimetry Explorer (IXPE), launched on 9 December 2021 (collaboration NASA and ASI) to measure the linear polarization of different astrophysical sources over the photon energy range 2-8 keV. One of the goals of my project is the analysis of IXPE data provided by current observations. In particular, I am focusing on Blazars, as, for example, Markarian 421. In such sources, called high-synchrotron-peaked BL Lacertae objects (HSP), the synchrotron luminosity peaks at X-ray energies. The polarization provides a way to study the order and geometry of their magnetic field and to better understand which acceleration process dominates in their relativistic jet. I am performing both time integrated and time-binned analysis in order to investigate about the time variability of the polarization vector, that could provide a way to study the shock mechanisms (e.g. magnetosonic shocks, magnetic reconnection, ...). These data are the results of the IXPE good imaging capabilities and unprecedented polarization sensitivity achieved thanks to the Gas Pixel Detectors (GPDs). The second goal of my PhD is a laboratory activity aimed to the characterization of GPD, studying also possible improvements in view of future missions (e.g. eXTP). I perform this work using the X-ray Calibration Facility (XCF), available at the Physics Department at the University of Turin, that employs an X-ray tube as source, with the possibility of varying the anode, to select the desired energy, and generating two identical beams. One of them is polarized via Bragg diffraction on a polarizing crystal. Thanks to a handling system, the GPD can measure both the unpolarized and polarized beams: a comparison between these two signals will provide a way to characterize the GPD itself.

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