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## Unlocking the Future of X-ray Polarimetry with IXPE: Lessons Learned and Next Steps.

*Thursday 15 May 2025 09:00 (25 minutes)*

The launch of the Imaging X-ray Polarimetry Explorer (IXPE) on December 9, 2021, marked a transformative milestone in high-energy astrophysics, solidifying X-ray polarimetry as the “Holy Grail” of this field. IXPE has not only met but has consistently upheld its pre-launch performance expectations, operating with an impressive duty cycle close to 100%. In particular detectors are compliant with all the requirements and the few contingencies encountered thus far have never been attributed to the instrument itself.

Throughout IXPE’s operational lifetime, we have continuously monitored and addressed key pre-flight-identified challenges, refining our understanding to inform the development of next-generation X-ray polarimetry missions. Specifically, we have tackled:

1. The gain drop caused by charging effects in the Gas Electron Multiplier (GEM).
2. The gain increase resulting from gas absorption within the Gas Pixel Detector.
3. Limitations imposed by detector dead-time, requiring in-flight filtering for very few extremely bright sources.
4. Pixel-to-pixel response variations to unpolarized radiation, mitigated through in-flight dithering for improved calibration.
5. Significantly higher background levels—approximately 20 times greater than those of a proportional counter in the same energy range.
6. The “leakage” effect, where spurious modulation arises in presence of strong intensity gradients in bright sources.

While for the upcoming eXTP of the China Academy of Science some of these issues have been already resolved,

in this talk, we will discuss these limitations, the solutions currently being implemented, and the crucial advancements needed for the next generation of X-ray polarimetry. By leveraging IXPE’s insights, we aim to pave the way for future missions that will further revolutionize our understanding of the high-energy universe.

### Eligibility for “Best presentation for young researcher” or “Best poster for young researcher” prize

No

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