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X-ray polarimetry as a tool to study the geometry of the emitting region in accreting black holes

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The geometry of the X-ray emission region in accreting black holes has been a subject of debate for over three decades. Despite extensive spectral and timing data, no consensus has emerged on the structure of these regions. The launch of the Imaging X-ray Polarimetry Explorer (IXPE) at the end of 2021 marked a major advancement in X-ray astronomy, as it is the first satellite specifically designed to measure X-ray polarization. IXPE has provided two crucial pieces of information—polarization degree and polarization angle—that add new insights into the geometry of the emission regions around black holes.

In this talk, I will review the key discoveries made by IXPE, with a focus on accreting black holes in X-ray binaries. I will also highlight important results for supermassive black holes in Seyfert galaxies. Additionally, I will demonstrate how X-ray polarimetry has advanced our understanding of the complex emission region geometry in the peculiar X-ray binary Cyg X-3. By leveraging the unique capabilities of IXPE, we can now explore these systems in unprecedented detail, shedding new light on the fundamental processes that govern black hole accretion.

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