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ON THE IMPORTANCE OF X-RAY POLARIMETRY IN THE DIAGNOSIS OF THE IRON Kα APPARENT BROADENING MECHANISM IN AGNs AND BHXRBs

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While being of different scales, the innermost regions of Active Galactic Nuclei (AGN) behave similarly to Black Hole X-ray Binaries (BHXRB), where reflection onto accretion disc produces fluorescent emission. In some bright Seyfert-1 galaxies and galactic black hole systems, the emitted iron line appears to be broadened by general gravity effects and is used to constrain the black hole spin. However, the interpretation of the line's extended red wing is actually a matter of debate. On the one hand side, it is believed that the line is due to reflection and reprocessing of X-ray photons in parts of the accretion disk that reach down to the innermost stable orbit (ISCO). In this case, the line enables us to probe the Keplerian motion in the direct vicinity of the black hole. Assuming that the disk and its irradiation are indeed truncated at the ISCO, the line thus puts important constraints on the black hole spin. On the other hand, the broad iron line has also been explained by absorption processes in a partially covering outflow that is located on the line of sight. In this case the curvature of the line's red wing would be much less connected to the black hole spin. A spectral and even a timing analysis of currently available, high-quality X-ray data of bright Seyfert galaxies and BHXRB may not solve the debate. Here we theoretically explore to which extend an X-ray polarization measurement in the iron line band of MCG-6-30-15 could help to resolve the issue. We apply STOKES, a multi-wavelength radiative transfer code that includes polarization to produce a set of absorption models. Assuming various configurations of the wind, we estimate the degree and position angle of X-ray polarization induced by (multiple) scattering inside the outflow and compare it to the polarization signature of relativistic reflection models. We thereby put constraints on the reflection and absorption geometries that allow a distinction between the two scenarios by the means of X-ray polarimetry.