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Constraining the size of the corona with fully relativistic calculations of spectra of extended corona

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The size and geometry of the X-ray emitting corona in AGNs are still not well constrained. Dovčiak & Done (2016) proposed a method based on calculations assuming a point-like lamp-post corona. To perform more self-consistent calculations of energy spectra of extended coronae, we develop monk, a Monte Carlo radiative transfer code dedicated to calculations of Comptonised spectra in the Kerr spacetime. In monk we assume Klein-Nishina scattering cross section and include all general relativistic effects. We find that for a corona located above the disc, the spectrum is not isotropic, but with harder and less luminous spectra towards observers at lower inclinations, owing to anisotropic illumination of the seed photons. This anisotropy also leads to an underestimated size of the corona if we assume the corona to be a point-like, isotropic source located on the black hole rotation axis, demonstrating the necessity of more self-consistent calculations. We also inspect the effect of motion and geometry of the corona on the emergent spectrum. Finally, we will discuss the implication of anisotropic corona emission for the reflection spectrum in AGNs as well as black hole X-ray binaries (BHXRBs).

Topic

Active Galactic Nuclei: accretion physics and evolution across cosmic time

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