Understanding Black Hole Binaries with X-ray Reflection: Coronal Geometry, Disk Truncation and Iron Abundance

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Abstract

In order to explore the rich phenomenology of black hole binaries (BHBs) in the X-ray band, it is crucial to employ accurate and sophisticated models. During the past decade, a wealth of spectral and timing data have been accumulated and analyzed. In some cases, results from these analyses are found to be in disagreement. For example, estimates for the location of the disk inner-radius in GX 339-4 from reflection spectroscopy, QPOs, and reverberation studies are in serious discord by more than an order of magnitude, some studies finding large truncation radius, while others predicting a disk that extends close to the innermost stable circular orbit. Additionally, models implementing a lamppost geometry for the illumination of disk seem to reproduce the observations well, but they have been recently challenged on theoretical grounds. Finally, there is growing observational evidence for very large iron abundances inferred from modeling reflection spectra of both BHBs and AGN, unexpectedly exceeding the Solar value for factors of a few. In this presentation we review our current efforts to address the observational and theoretical challenges posed by these three issues.

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