A Self-Consistent Study of the ionized X-ray reflection in AGN and GBHCs.

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The problem of computing the reflected continuum and lines off the surface of an accretion disk is a central one for interpreting X-ray observations of AGN and GBHCs. With the advent of new ever more sensitive X-ray telescopes, the reflection component and the iron line emission profile provide superb tools to test different accretion disk theories and geometries. However, past theoretical studies of the X-ray reflection in accretion disks have always assumed a fixed gas density in the X-ray illuminated layer of the disk. We here report a development of a new X-ray ionization code which matches or exceeds all the previously developed codes in the treatment of the ionization balance and radiation transfer, and also self-consistently *solves* for the gas density based on the pressure balance.
We show the ionized layer temperature structure, and the resulting spectra for a set of parameter values. We find that the self-consistent gas density determination dramatically changes the behavior of the X-ray reprocessing features with luminosity compared with the past studies, and that it in fact provides natural explanations for many of the otherwise unexplained X-ray observations.