Co-Evolution of Central Black Holes and Galaxies
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Multi-Zone Warm and Cold Clumpy Absorbers in Three Seyfert Galaxies

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A soft ($E \lesssim 2\,\mathrm{keV}$) excess over the power-law component dominant at higher energies has been found in the X-ray spectra of many Seyfert galaxies. The origin of the soft excess is still an open issue. In the past it was often associated with the high-energy tail of the thermal emission of the accretion disk, but it has been shown recently that the temperature of the disk should be constant (0.1–0.2 keV), regardless of the mass and luminosity of the AGN (Gierlinski & Done 2004). This result implies that some other mechanism is at work, as the temperature of the disk should depend on both the mass of the black hole and the accretion rate.

We studied the *XMM–Newton* X-ray spectra of three Seyfert galaxies that present a strong soft excess below 2 keV, and find that this soft excess can be explained simply with a power-law continuum and clumpy absorbers that allow some of the primary flux below 2 keV to leak out and reach the observer.

The X-ray sources in UGC 3142 and ESO 383−18 are absorbed by two layers of partially covering neutral material. In UGC 3142, they have a column density of $N_{\rm H} \sim 10^{22}\,\mathrm{cm}^{-2}$ and covering factors of $f_1 \sim 0.92$ and $f_2 \sim 0.57$. In ESO 383−18, they have a column density of $N_{\rm H} \sim 10^{23}\,\mathrm{cm}^{-2}$ and cover a fraction of the X-ray source of $f_1 \sim 0.97$ and $f_2 \sim 0.76$. The spectra of ESO 140−43 can be fit well using a power law absorbed by three clumpy ionized absorbers with different values of covering factor, column density, and ionization parameter. From measures of the blueshift associated with the O VIII and the Ne X Lyα lines in the RGS, we find that the absorbing material is moving outwards, probably associated with a disk wind. The two *XMM–Newton* observations show strong spectral variability in a time span of 6 months, due to changes in the three warm absorbers. The existence of the soft excess might be, at least in some cases, related to an incorrect spectral model that ignores the complex absorption in AGN, thus overestimating the absorbed flux below 2 keV.

Reference

Gierlinski, M. & Done, C. 2004, *MNRAS*, 349, L7