Intrinsic disc emission and the Soft X-ray Excess in AGN

Chris Done (Durham), Shane Davis (CITA), Chichuan Jin (Durham), Omer Blaes (UCSB), Martin Ward (Durham)

(Submitted on 27 Jul 2011 (v1), last revised 6 Sep 2011 (this version, v2))

(Abridged) Narrow Line Seyfert 1 (NLS1) galaxies have low mass black holes and mass accretion rates close to (or exceeding) Eddington, so a standard blackbody accretion disc should peak in the EUV. However, the lack of true absorption opacity in the disc means that the emission is better approximated by a colour temperature corrected blackbody, and this colour temperature correction is large enough (~ 2.4) that the bare disc emission from a zero spin black hole can extend into the soft X-ray bandpass. Part of the soft X-ray excess seen in these objects must be intrinsic emission from the disc unless the vertical structure is very different to that predicted.
However, the soft excess is much broader than predicted by a bare disc spectrum, indicating some Compton upscattering by cool, optically thick material. We associate this with the disc itself, so it must ultimately be powered by mass accretion. We build an energetically self consistent model assuming that the emission thermalises at large radii, but that at smaller radii the gravitational energy is split between powering optically thick Comptonised disc emission (forming the soft X-ray excess) and an optically thin corona above the disc (forming the tail to higher energies). We show examples of this model fit to the extreme NLS1 REJ1034+396, and to the much lower Eddington fraction Broad Line Seyfert 1 PG1048+231. We use these to guide our fits and interpretations of three template spectra made from co-adding multiple sources to track out a sequence of AGN spectra as a function of L/L_{Edd}. The new model is publically available within the {\sc xspec} spectral fitting package.

Comments:	13 pages, 9 figures, accepted in MNRAS
Subjects:	**High Energy Astrophysical Phenomena (astro-ph.HE)**; Cosmology and Extragalactic Astrophysics (astro-ph.CO)
Cite as:	**arXiv:1107.5429 [astro-ph.HE]**
	(or **arXiv:1107.5429v2 [astro-ph.HE]** for this version)

Submission history

From: Chris Done [view email]
[v1] Wed, 27 Jul 2011 10:13:41 GMT (215kb)

[v2] Tue, 6 Sep 2011 16:43:15 GMT (216kb)

Which authors of this paper are endorsers?