ROSAT All Sky Survey AGN spectra: Constraints on accretion disks

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Abstract. We found that ROSAT spectra of a sample of 89 AGN are generally steeper than 0.7. The excess above a hard X-ray power law spectrum in this energy range which has been found already with *Einstein* and EXOSAT for some AGN is now seen very clearly in most sources. Our α-disk models (Dörrer *et al.*, 1992 and references therein) which include Comptonisation and relativistic corrections are in agreement with the measured soft excesses when the $(\dot{M}_{Edd.}, \alpha)$ parameter space is restricted to $\alpha > 0.4$ and $\dot{M}_{Edd.} \in [0.4, 0.8]$ ($\dot{M}_{Edd.}$: Eddington accretion rate).

We attempt to model this soft X-ray excess emission in terms of thermal emission from a thin α-accretion disk which contributes both to the UV and soft X-ray emission (*big blue bump*). We have selected a sample of 89 QSO and Seyfert I galaxies for which soft X-ray (ROSAT All Sky Survey) and UV measurements (IUE) are available. Hard X-ray power law slopes as measured by EXOSAT, *Einstein* and GINGA were taken from the literature.

Fig. 1 shows the 68% and 90% confidence contours for the distributions of the spectral index α_{soft} in the ROSAT range and the index α_{hard} of hard X-rays (> 2keV), both for QSOs and Seyfert I galaxies. We have calculated the excess count rates in the spectral bands from 0.07 to 0.4 keV and from 0.4 to 1.0 keV over the hard power law (see above). A re-normalization of the hard power law to the ROSAT 1.0 – 2.4 keV count rate was applied to allow for variability. From the excess count rates *excess hardness ratios* were calculated. These were compared to predictions from our accretion disk model. The derived disk parameters are given in Fig. 2. We have also performed individual spectral fits for a number of bright AGN and determined their disk model parameters. Results from this agree well with the hardness ratio method.

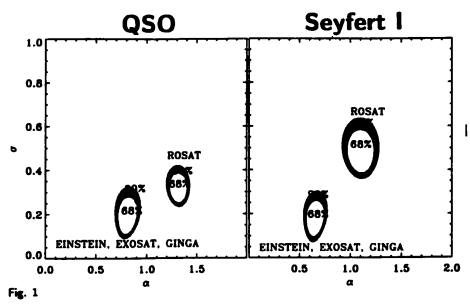

Fig. 1

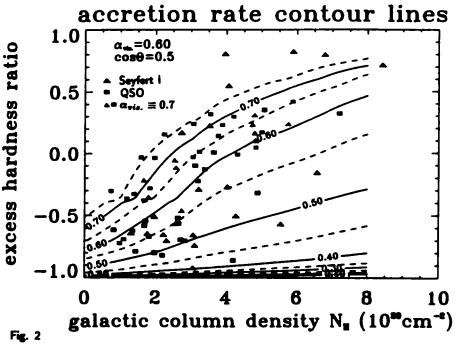

Fig. 2

References

Dörrer, T., Friedrich, P., Brunner, H., Staubert, R., Pussel, V., Riffert, H., Ruder, H.: 1992, *X-ray emission from active galactic nuclei and the cosmic X-ray background*, eds. Brinkmann and Trümper, *MPE report* **235**, 130

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