# X-RAY SPECTRA OF BL LACERTAE OBJECTS FROM THE ROSAT ARCHIVE

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## 1. Observations and data analysis

Our sample comprises all BL Lac objects listed in the catalogue of Véron-Cetty & Véron (1993) and which are detected in a ROSAT PSPC observation with at least 50 source counts: 74 objects in total. We reduced the data from the ROSAT archives at MPE and GSFC and fitted single power-law models with photoelectric absorption to the spectra. We calculated the broad band spectral indices $\alpha_{rx}$, $\alpha_{ro}$, and $\alpha_{ox}$ from the ROSAT 1 keV fluxes, 5 GHz radio, and optical V band fluxes (Véron-Cetty & Véron 1993).

## 2. Results

We find that particularly X-ray or radio bright objects (with extreme values of $\alpha_{rx}$) have considerably harder X-ray spectra than the more intermediate objects (see Fig. 1a). We interpret this finding as a signature of a convex soft (synchrotron) and a hard (Compton) spectral component intersecting each other at different energies below, within, or beyond the soft X-ray band.

We compare the measured spectra with spectral simulations based on a set of simple two component models, including a hard power law and a parabolically steepening soft component with different cutoff energies (Fig. 1b). Figures 1a, 2a, and 2b show that the X-ray spectra as well as the broad band properties are well reproduced by the model. As the new data require a broad range of synchrotron cutoff energies, it is unlikely that the differences of RBLs and XBLs are caused by different viewing angles (e.g. Ghisellini & Maraschi 1989, Celotti et al. 1993); probably intrinsic differences are involved (e.g. Padovani & Giommi 1995).



*R. Ekers et al. (eds.), Extragalactic Radio Sources*, 265–266.

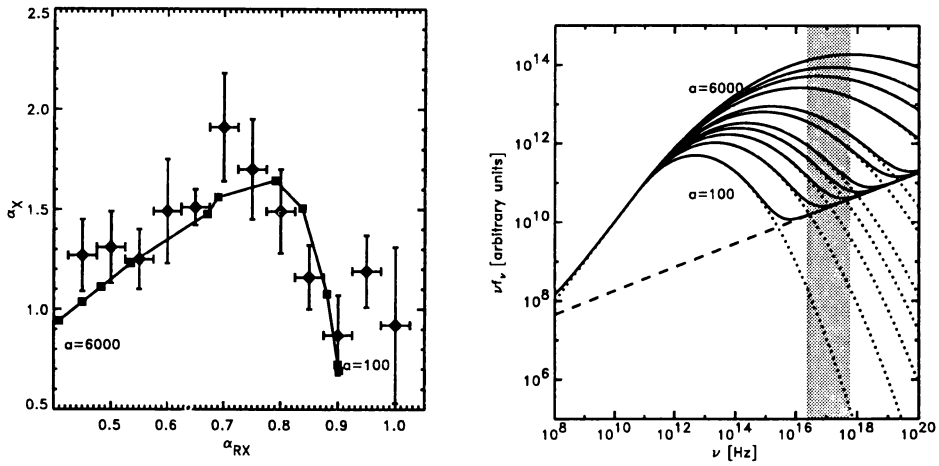


*Figure 1.* *a: (left)* Binned X-ray spectral slopes vs. $\alpha_{rx}$ (data points) with simulations (connected points). *b: (right)* Model spectra used for the simulations. Dotted: soft component, dashed: hard powerlaw, solid: total, shaded: PSPC energy range

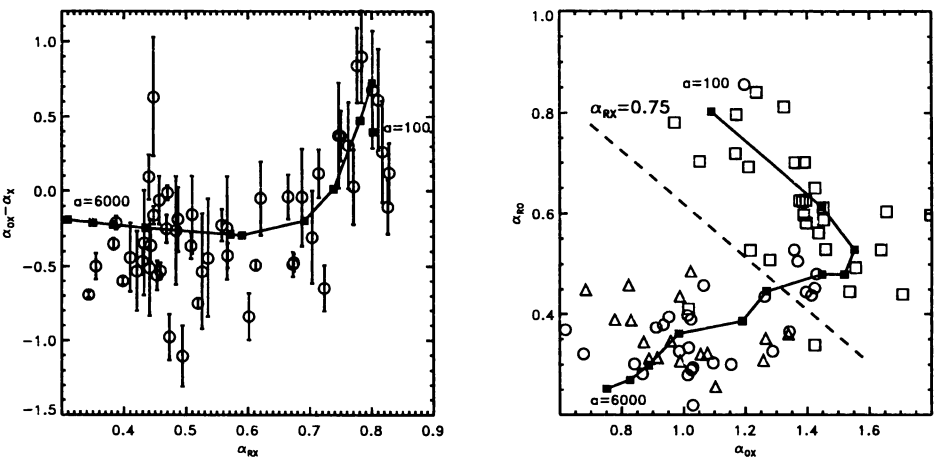


*Figure 2.* *a: (left)* Flattening ($(\alpha_{ox}-\alpha_x) > 0$) or steepening of the X-ray spectra relative to the optical– X-ray slope as function of $\alpha_{rx}$ compared with simulations (connected points) *b: (right)* Distribution of the broad band spectra in the $\alpha_{ox}$–$\alpha_{ro}$ plane. Triangles: EMSS objects, squares: 1 Jy objects, circles: others, connected points: simulated spectra.

## References

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