

# ROSAT SPECTRA AND LIGHTCURVES OF BRIGHT BL LACERTAE OBJECTS AT LOW INTERSTELLAR ABSORPTION

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**Abstract.**

A programme to obtain soft X-ray spectra of bright BL Lac's from pointed observations with ROSAT has been started. So far 13 objects have been observed and another 6 have been accepted for observation. Available data for the following sources were reduced: OQ 530, OJ 287, B2 0912+29, GB 1011+496, ON 231, B2 1215+30, B2 1308+32, and Mrk 421.

In this sample the most outstanding observation clearly is that of Mrk 421. This source was observed with the ROSAT PSPC for a total of 34 ksec during May 5 and May 7, 1992, at a mean countrate of 159 cts/s (see Fink *et al.*, 1991, *A&A* 246, L6 for ROSAT survey results). At the time of the observations Mrk 421 was also very luminous in the optical bands (see poster by S. Kikuchi, this conference). Within the ROSAT band the spectrum is flatter at the soft end (photon index for broken power law model between -2.2 and -2.0) than at the hard end (photon index between -2.6 and -2.4). The countrate increases during the first 5 orbits with a maximum e-folding time of 1.5 days, reaching a maximum luminosity of  $4 \times 10^{45}$  erg/s in the energy range of 0.1 to 2.4 keV (for  $H_0 = 75$  km/s/Mpc). It is followed by a slow decline until a second rise starts which is much stronger in harder X-rays than at low energies. Plotting the hardness ratio (defined as the difference in the countrates above and below 0.5 keV divided by the total countrate) versus the total countrate the second rise displays a much steeper gradient than the first one (see figure 1a).

For most of the other BL Lac's the countrates are too low to detect variability on these timescales of hours to days, except for B2 1215+30 and OQ 530, where the chance probability for the observed variations is  $4 \times 10^{-4}$  and  $10^{-10}$ , respectively. Also no clear correlation between hardness ratio and countrate could be found. Spectral fits of single power law models with absorption result in photon indices ranging from -3.1 to -1.9 with no detectable absorption above the galactic value for 5 of these sources, and some additional absorption for GB 1011+496 and B2 1215+30 (see figure 1b).

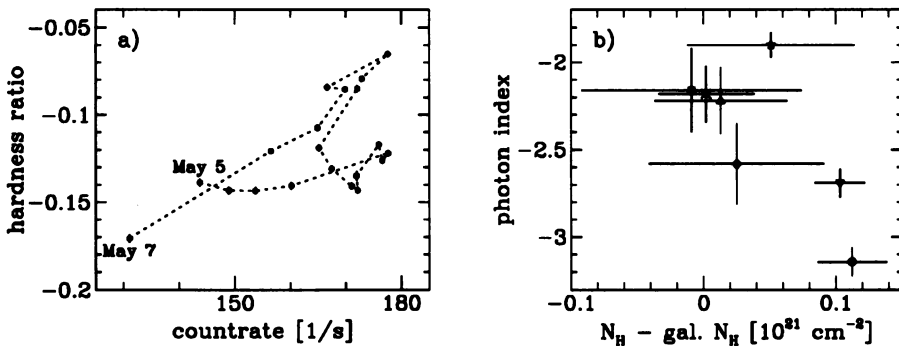


Fig. 1. a) hardness ratio vs. countrate for Mrk 421, b) photon index vs. intrinsic absorption for the other 7 BL Lac's