OPTICAL MICROVARIABILITY IN COMPLETE SAMPLES OF BL LAC OBJECTS

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A radio-selected (1 Jy, Stickel et al., 1991) and a x-ray selected (EXOSAT, Giommi et al., 1991) sample of BL Lac objects was monitored by performing relative CCD photometry in order to examine the duty cycle, the dominant time-scales and the typical amplitudes of the variability. The samples consist of 34 and 11 objects, respectively.
28 (82%) of the radio-selected BL Lac objects (RBLs) were variable at any given epoch, whereas only 6 (55%) x-ray selected BL Lac objects (XBLs) displayed variability behaviour. One RBL and two XBLs were variable on time-scales longer than the length of the specific campaign (typically 7 nights). The amplitudes are 10-20% on average in RBLs, in most extreme cases 70% (on time-scales as short as 1-2 days). The mean amplitude in the XBLs was 5%, but never higher than 10%. Several RBLs were observed during two or more campaigns. None of these objects changed its variability behaviour. This implies that the duty cycle in these objects remain constant and may be a characteristic property of these objects. The non-variable objects were the optically faintest during the observations among both samples. It seems that there is a correlation between duty cycle and apparent brightness (in only two objects of each sample the errors are too large to detect microvariability). This, however, has to be confirmed by repeated measurements of the duty cycle in these objects.
The fraction of variable RBLs is higher than that of variable XBLs and they show larger amplitudes of the variability. This implies that on average the contribution of the nonthermal flux from the jet to the total flux is in RBLs higher than in XBLs and supports the unified scheme picture, in which the XBLs and RBLs are FR I radio galaxies seen at different angles between jet axis and the line-of-sight.

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References

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