Poster Contributions: Statistical Studies and Evolution

https://doi.org/10.1017/S0074180900176703 Published online by Cambridge University Press

CM–WAVELENGTH FLUX VARIABILITY: CONSTRAINTS ON AGN MODELING

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1. Introduction

To study whether the radio properties of BL Lacertae type objects and QSOs differ, we initiated a program in 1979 to monitor the total flux density and linear polarization at 14.5, 8.0 and 4.8 GHz of the strongest then known BL Lac objects which met the Hewitt-Burbidge criteria (Ledden, private communications) plus 3 subsequently identified high declination BL Lacs (Biermann *et al.* 1981). Results based on the behavior of the 45 brightest sample members are compared here with the properties of the QSOs in the flux-limited Pearson-Readhead sample (Pearson and Readhead 1988).

2. Results

We find that: the average degree of variability is higher and the highest amplitude variations are exhibited by the BL Lac sources; the average spectral indices for the BL Lacs are near 0.0, but dramatic steepening to values near 1.0 ($S_\nu \propto \nu^{+\alpha}$) sometimes occurs during large outbursts; large events in both classes are often separated by intervals of several years, but well-resolved events are more common in BL Lacs than in QSOs (where the flux outbursts frequently represent simultaneous contributions from several components that are sometimes resolved in the polarization) – these BL Lac events often show rapid declines; and few BL Lacs exhibit a well-defined long-term stable position angle characteristic of many of the QSOs. While the data cannot be used to unambiguously distinguish the two types of objects, these characteristic properties suggest intrinsic differences. We attribute the high amplitude flux changes with rapid drop-offs in the BL Lacs to more pronounced energy loss along their jets. The lower degrees of ordering of the magnetic field in BL Lacs compared to QSOs suggests that here the polarized flux is commonly dominated by the contribution from the evolving compact components rather than by the well-ordered underlying quiescent flows in the jets.

This work was supported in part by grant AST 9120224 from the NSF.

References

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