

THE RADIO PROPERTIES OF BL LACERTAE OBJECTS

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A recent study of the properties of BL Lacertae Objects at $\lambda\lambda 6$ and 21 cm by K.J. Johnston and myself has shown:

- I. SPECTRA OF COMPACT COMPONENTS ($\lambda 6$ cm -- $\lambda 2$ cm)
 - A) 11 of 34 (32%) have "normal" negative slope $\alpha < -0.05$.
 - B) 10 of 34 (29%) have no slope $-0.05 < \alpha < +0.05$.
 - C) 13 of 34 (38%) have "inverted" positive slope $\alpha > +0.05$.
 - D) Half of the sources have $-0.15 < \alpha < +0.15$.
 - E) Spectral indices are much flatter than a general sample of radio sources or quasars.

- II. STRUCTURE ($\lambda 6$ cm)
 - A) 23 of 42 (55%) have extended structure ($\theta > 1$ arcsec)
-- usually containing $< 50\%$ of the total flux.
 - B) 27 of 31 (87%) have very compact structure ($\theta < 2E-3$ arcsec)
-- usually containing $> 50\%$ of the total flux.

- III. PHYSICAL PROPERTIES
 - A) Extended structures
 - 1) Sizes $3 \lesssim D$ (kpc) $\lesssim 200$.
 - 2) Radio luminosities $\sim 1E41$ -- $\sim 1E45$ erg/sec.
 - 3) Particle energies $\sim 1E57$ -- $\sim 1E60$ erg.
 - 4) Magnetic fields $\sim 1E-5$ -- $\sim 1E-6$ Gauss.
 - B) Compact structures
 - 1) Sizes $0.6 \lesssim D$ (pc) $\lesssim 14$.
 - 2) Radio luminosities $\sim 1E42$ -- $\sim 1E46$ erg/sec.
 - 3) Particle energies $\sim 1E52$ -- $\sim 1E55$ erg.
 - 4) Magnetic fields $\sim 1E-1$ -- $\sim 1E-2$ Gauss.

Briefly then, the BL Lacs closely resemble the other classes of strong sources in their radio properties.

A more detailed description of these results as well as a comparison of the optical properties of the BL Lacertae Objects with those of quasars and radio galaxies is in press in the Monthly Notices of the Royal Astronomical Society.

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DISCUSSION

A.S. Wilson: One hears the suggestion from time to time that BL Lac objects are elliptical galaxies with double radio source type relativistic beams directed almost exactly towards and away from the observer. If that were the case, one might expect the large-scale radio structure to be more or less spherically symmetric about the core, rather than of double-radio-source type. What do your results say about this?

Weiler: Our study was designed to provide the statistics of source sizes rather than the structures of individual sources. However, new results from the Jodrell interferometer reported at the General Assembly by D. Stannard show a variety of structures, from classical doubles to core-halos. Thus, it seems that the radio structures, as we also found for the radio sizes, energies, etc., are similar to those seen in radio galaxies and quasars. This argues against a "preferential alignment" explanation for BL Lacs.