HOW TO CHOOSE A RANDOMLY ORIENTED SAMPLE+

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Efficient VLBI tests of relativistic models for superluminal motion require a complete sample of sources free from selection effects in orientation, coupled with an observational requirement for bright cores. Probably the best way to construct such a sample is to extract from a low frequency sample those sources with the highest radio luminosity, since these tend to have the strongest cores. One must then ask whether there are any sources included which would not be if they were differently oriented; that is, either the flux or the power falls below the limit for the sample when the core and jet flux is removed.

Taking the sample of 166 3C sources of Jenkins et al. (1977) and power limit $P_O \geqq 10^{28}$ WHz^{-1} sr^{-1} one finds 19 quasars and 8 galaxies with measured redshifts. (Unfortunately even the 3C sample contains a number of faint galaxies without measured redshifts. The number of these in our sample depends sensitively on the apparent magnitude-redshift relation used; but there are unlikely to be more than 7.)

Some of the powerful sources are famous and thoroughly investigated. However many remain obscure and have no useful map. Morrison, Muxlow and I have mapped some of these with the MERLIN interferometer which gives 0.3 arcsec resolution at 1.67 GHz. Combining our observation with those made elsewhere at higher frequencies enables us to estimate component spectral indices over a reasonable range of frequencies, and hence to guess the origin of the flux at the selection frequency.

We have confirmed that a number of sources (e.g. 3C181) are classical doubles. For some of the smaller sources further observation will be needed to fully elucidate their structures. For example 3C454 has a curious twisted shape : we cannot yet identify the components. For our high luminosity subset of the 166 sample we find :

(i) Ten of the 34 sources have cores and there are a few "don't knows".

(ii) About 75% of the sample consists of classical doubles or triples. The hotspots are quite symmetrically disposed about the nucleus

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indicating that the hotspot advance speed is not highly relativistic.

(iii) A rough estimate of the hotspot advance speed for the Northern component of 3C9 (the most powerful member of the sample) can be made. It turns out to be ∿ 0.2c, similar to that deduced for classical doubles as a whole. For ram pressure confinement present observations demand n ∿ 10^3 m^{-3}, similar to that required for Cygnus A. Thus while question marks remain over a few sources, the majority are bonafide members of our sample.

REFERENCE

Jenkins, C.J., Pooley, G.G. & Riley, J.M., Mem. R.A.S., 84, 61.

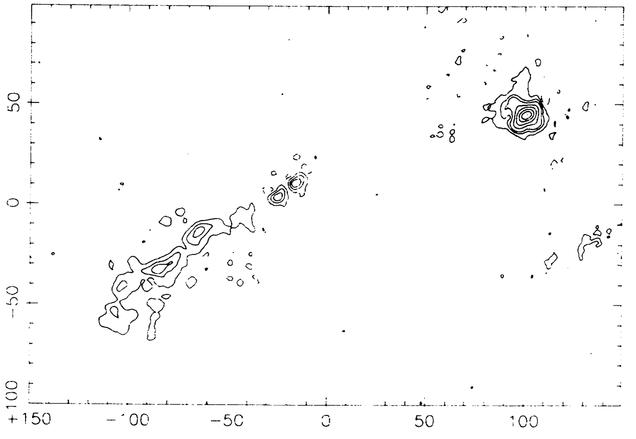

Fig. Caption: 3C280.1 : a candidate for exclusion?
(1.67 GHz HPBW 0.4" x 0.4" coordinates are 0.1 arcsec)

The jet has a surprisingly steep spectrum, $\alpha_{1.7}^{5}$ ∿ 1. If the jet were relativistic then this source might warrant exclusion from our sample. It seems unlikely however, that the absence of a Southern hotspot is an effect of orientation.

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