

A Multifrequency Study of Five Large Radio Galaxies

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Abstract. We present the results of GMRT and VLA observations of five large radio sources over a wide frequency range to investigate their structural and spectral asymmetries. The hot-spot brightness ratios suggest intrinsic source asymmetries, while the spectral indices show evidence of re-acceleration of particles.

Key words. Galaxies: active—galaxies: jets—galaxies: general—radio continuum: galaxies.

1. Introduction

We have selected five large radio sources J0318+684, J0949+732, J1211+743, J1918+742 and J2042+751 from the sample of Lara *et al.* (2001) to study their structural and spectral asymmetries, and examine the consistency with current scenarios.

2. Observational results

Figure 1 shows a selection of the radio images of these sources observed with the GMRT at low frequencies. The peak brightness ratios of the oppositely-located lobes vary from ~ 4 to 21. For a hot-spot speed of $0.5c$, the expected brightness ratio, $[(1 + \beta \cos \phi)/(1 - \beta \cos \phi)]^{(2+\alpha)}$, ranges from ~ 4 to 20 for a jet velocity of $0.5c$ and with the angle of inclination, ϕ , varying from 60° to 15° . Although the observed ratios are similar, the weaker peak of emission being farther in three of the sources suggests intrinsic source asymmetries.

The spectra of the sources and the components shown in Fig. 2 are consistent with power-law fits. The lobes with a more prominent hotspot or peak of emission tend to have flatter spectra. A more detailed examination of the spectral index profile of J1211+743 is shown in the lower right panel of Fig. 2. The southern lobe with a hotspot shows a spectral-index gradient towards the core, as expected due to radiative

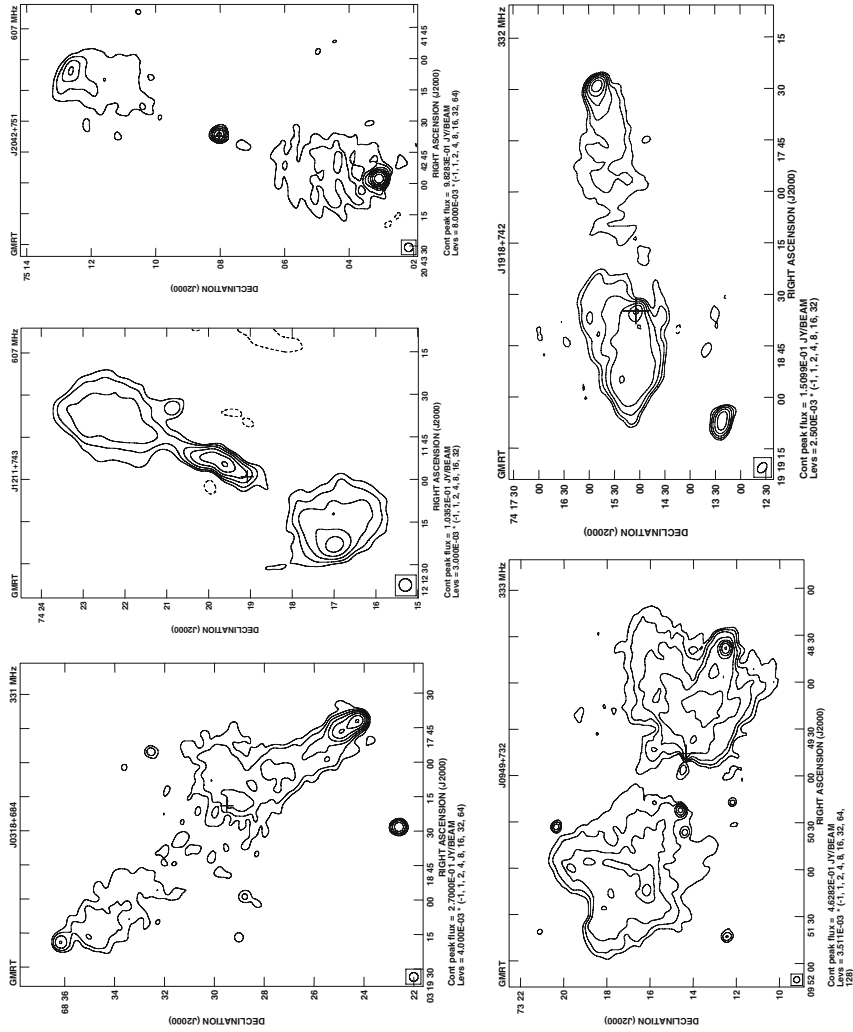


Figure 1. GMRT low frequency images of J0318+684, J1211+743 and J2042+751 are shown in the upper panel, while J0949+732 and J1918+742 are shown in the lower panel.

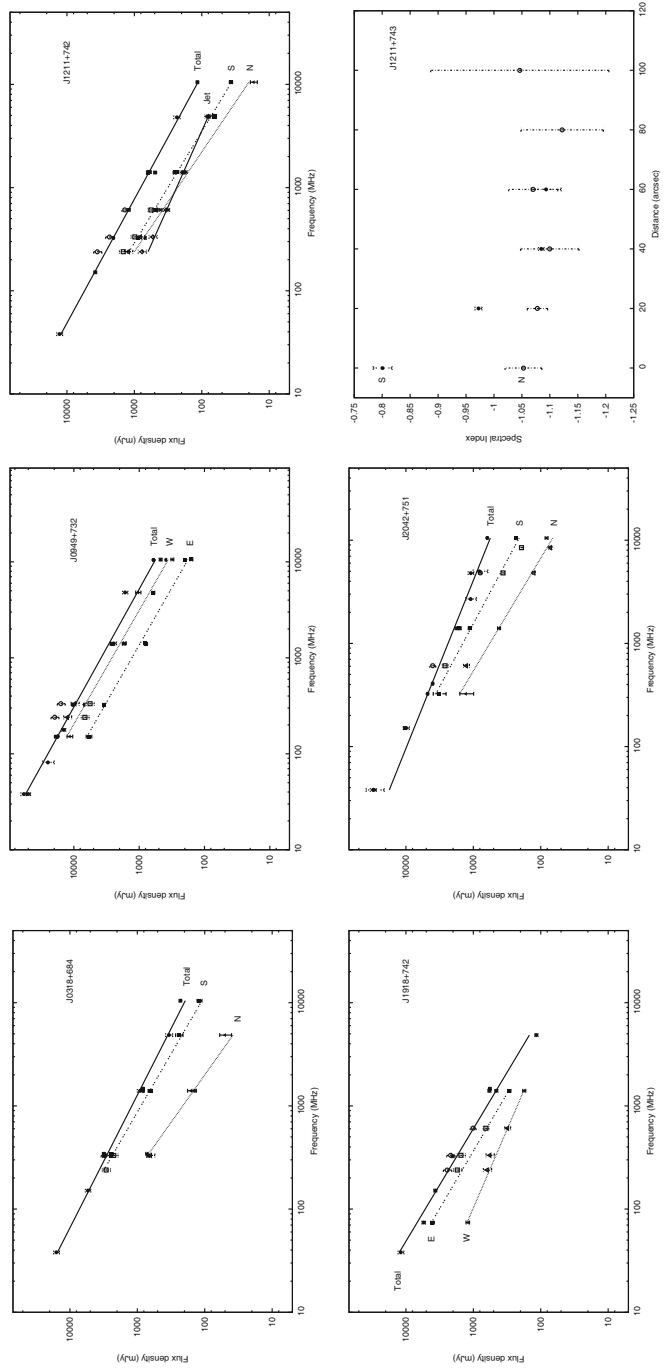


Figure 2. The radio spectra of the five sources and the spectral index profile of J1211+743 (the lower right panel).

losses, while in the northern lobe the spectral index is relatively constant. This could be due to re-acceleration of particles in the lobes.

Reference

Lara, L., Cotton, W. D., Feretti, L., Giovannini, G., Marcaide, J. M., Marquez, I., Venturi, T. 2001, *Astron. Astrophys.*, **370**, 409.