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Low Frequency Observations of a Head-Tail Radio Source

Dharam Vir Lal*, A. Pramesh Rao†
National Centre for Radio Astrophysics (TIFR), Pune Univ. Campus, Ganeshkhind, Pune 411 007

Abstract. We have mapped the head-tail radio galaxy, 3C 129 at 240 and 610 MHz using the GMRT and studied the detailed morphology and spectral index variations in this object. This is the first attempt to observe a sample of head-tail sources at low frequencies. We find weak spectral steepening as we go away from the head along the jet. The Crosspiece has a spectral index of 0.7 ($S_\nu \propto \nu^{-\alpha}$) and is flatter than the spectral index estimated by Lane et al. (2002). We also see a low surface brightness, diffuse feature at 240 MHz and could be a possible radio relic candidate (see Figure).

Keywords : galaxies: individual: 3C 129, jets, radio continuum

'Head-tail' or tadpole shaped radio sources discovered by Ryle & Windram (1969, MNRAS, 138, 1) mostly occur in clusters of galaxies and are characterised by a head identified with the optical galaxy and two trails sweeping back from the head (Miley et al. 1972, Nature, 237, 269).

The VLA map of the strong, prototype head-tail source 3C 129 at 325 MHz shows a small perpendicular object, referred to as the Crosspiece, near the head of the galaxy. This feature has a steep spectrum and has been interpreted by Lane et al. (2002, AJ, 123, 2985) as a pre-existing fossil radio source that is revived due to 3C 129 ploughing through it. The relic source is compressed by the bow shock of 3C 129 causing it to radiate behind the shock front, producing the characteristic shape. If the above interpretation is correct, structures like the Crosspiece should be rare. This can be verified by making high resolution low frequency maps of a well defined sample of head-tail sources. With such observations, we would be able answer, if all head-tail sources, in general, show such a distinct feature, Crosspiece *or* it is characteristic only to 3C 129.

*e-mail: dharam@ncra.tifr.res.in
†e-mail: pramesh@ncra.tifr.res.in

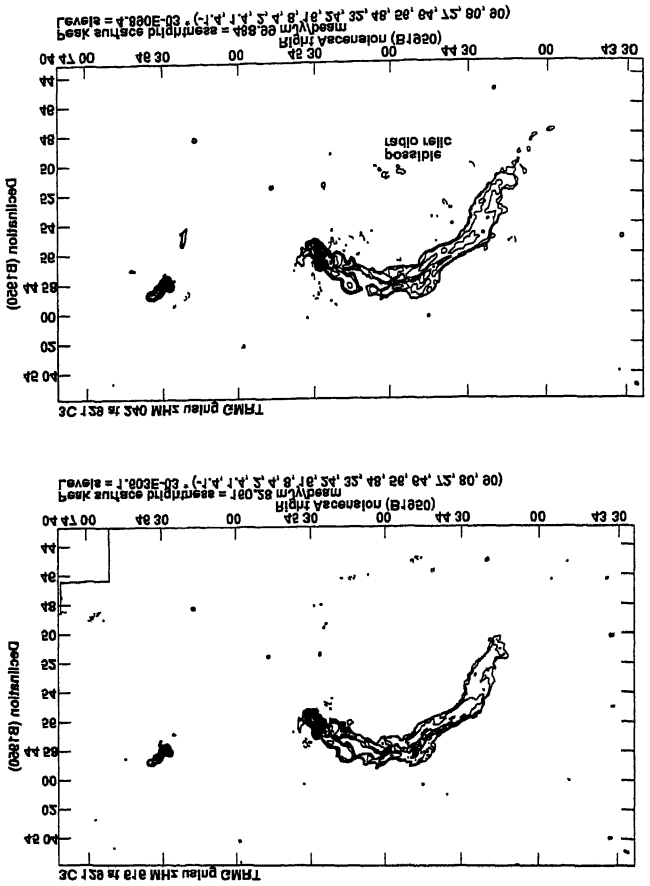

Figure 1. GMRT images of 3C 129 source at 240 & 610 MHz. The possible radio relic source seen in 240 MHz map is shown.

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