

A combined GMRT/CLFST image of IC443 at 150 MHz

D. Mitra¹, D. A. Green² and A. Pramesh Rao¹

¹National Centre for Radio Astrophysics, Tata Institute of Fundamental Research,
Pune University Campus, Post Bag 3, Ganeshkhind Pune 411007, India
email: dmitra@ncra.tifr.res.in, pramesh@ncra.tifr.res.in

²Cavendish Laboratory, 19 J. J. Thomson Ave., Cambridge, CB3 0HE, U.K.
email: dag@mrao.cam.ac.uk

Abstract. IC443 is a relatively large Galactic (≈ 45 arcmin) SNR with a high radio surface brightness. It has fine scale structure down to arcsec scales, and so is difficult to image on all angular scales with a single instrument. Here observations of IC443 at 151 MHz made with both the GMRT and the CLFST are combined to give a composite image of IC443 on all scales from > 45 arcmin down to ≈ 20 arcsec.

1. Background

IC443 (=G189.1+3.0) is a relatively bright SNR in the Galactic anti-centre, where the Galactic background emission is relatively faint. It is ≈ 45 arcmin in diameter, with brighter emission to the northeast, and fainter emission (with a somewhat larger out radius) in the southwest. Structure is seen at radio wavelengths down to scales of arcsec (e.g. Dickel *et al.* 1989; Wood *et al.* 1991). Various observations show that IC443 is interacting with a surrounding molecular cloud (e.g. Rosado *et al.* 2007), and radio spectral index studies reveal a region of flatter spectrum emission in the east (see Green 1986).

2. Observations and Results

We have combined observations made of IC443 at 151 MHz from two telescopes (see Table 1), in order to cover a wide range of angular scales. The Giant Metrewave Radio Telescope (GMRT) – see Pramesh Rao (2002) – is a synthesis telescope that provides baselines up to ~ 25 km, but lacks good *uv*-plane coverage on baselines less than a few hundred metres. The GMRT observations of IC443 miss about 20% of the total expected flux density of the SNR (≈ 280 Jy at 151 MHz, Green 1986), due to the missing

Table 1. Parameters of the GMRT and the CLFST.

	GMRT	CLFST
number of antennas	30	60
antenna type	45-m dish	4×10 -element yagi
number of baselines	435	776
longest baseline	~ 25 km	~ 4.6 km
shortest baseline	~ 100 m	~ 12 m
array layout	14 in central ‘square’ 16 in 3 arms	\sim east–west
frequency	153 MHz	151.5 MHz
bandwidth	6 MHz	0.8 MHz
primary beam	$\sim 3^\circ$	$\sim 17^\circ$

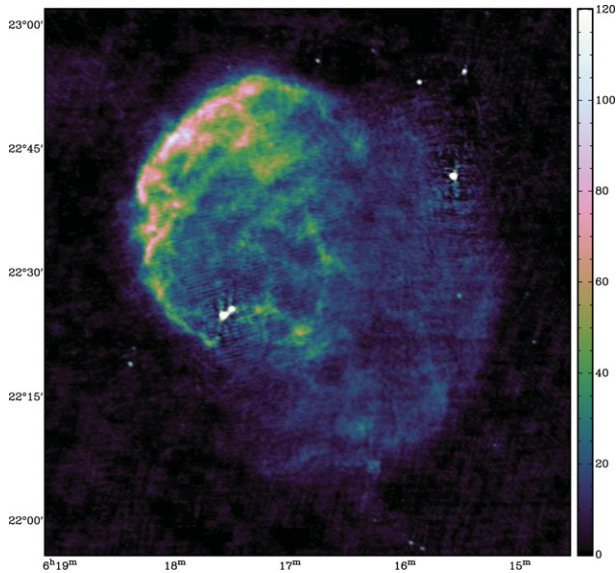


Figure 1. Combined GMRT plus CLFST image of IC443 with a resolution of $24'' \times 19''$ arcsec² (at PA of 61°). The scale is 0 to 120 mJy beam⁻¹ (using the ‘CUBEHELIX’ colour scheme of Green 2011). The peak emission is ≈ 2.1 Jy beam⁻¹, from the background source near the NE edge of the remnant, and the noise is ≈ 2.0 mJy beam⁻¹.

short baselines. The Cambridge Low-Frequency Synthesis Telescope (CLFST) – see Rees (1990) – was an (approximately) E–W synthesis telescope that provides good coverage of the uv -plane for the small baselines missed by the GMRT. The smoothed 151-MHz image of IC443, from observations made in 1983/84, as used in Green (1986), with a resolution of 5.4×2.1 arcmin² (NS×EW) covers baselines up to ~ 1 km at all position angles. Figure 1 shows the combined GMRT plus CLFST image of IC443 at 151 MHz. This includes emission on a wide range of scales from ≈ 20 arcsec to 45 arcmin. This was made using the IMERG task in AIPS which takes the larger/smaller scale structure from the CLFST/GMRT images respectively, gradually merging the contributions on the intermediate scales in both images.

Acknowledgements

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