



Polarisation observations with the GMRT at 610 MHz

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Abstract. We briefly describe some spectropolarimetric observations made with the Giant Metrewave Radio Telescope (GMRT) at 610 MHz. We show that the telescope can be used for wide-field spectropolarimetry, and present results from observations of the Grus Quartet of galaxies.

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Here we describe polarisation observations made with the Giant Metrewave Radio Telescope (GMRT; see, for example, Pramesh Rao 2002) at 610 MHz. The GMRT consists of thirty 45-m antennas. Observations were made in 2010 of two southern compact group fields (the Grus Quartet and USCG S063), using a bandwidth of 16 MHz divided into 256 narrow channels. Frequent observations of calibrator sources over a wide range of parallactic angles were made, in order to determine the polarisation characteristics of each antenna. In addition 3C138 was observed in order to set the absolute polarisation angle. Although some antennas of the GMRT had high polarisation leakages during these observations, and were excluded from the analysis, most showed reasonably good polarisation characteristics, with less than $\sim 10\%$ leakages. The off-axis polarisation characteristics of the telescope were investigated using scans in azimuth and elevation, and at $\pm 45^\circ$ in between. Images were synthesised, from the narrow channel data, allowing Rotation Measure synthesis to be performed (e.g. Brentjens & de Bruyn 2005). Figure 1 shows an example of the polarisation results obtained, showing polarised emission from J2317.9–4213 in the field of the Grus Quartet of galaxies at a particular Faraday depth.

This case study has shown that the GMRT can be used for spectropolarimetric observations at 610-MHz. More details of the methods used to calibrate and analyse the GMRT polarisation observations are given in Farnes (2012) and Farnes, Green & Kantharia (2014a), with some other GMRT polarisation observations, including of M51, being presented in Farnes, Green & Kantharia (2014b).

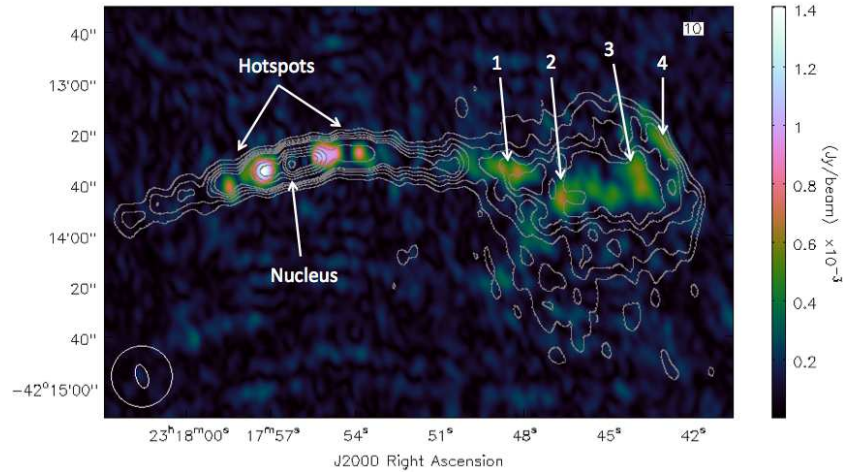


Figure 1. Stokes I contours at 610 MHz overlaid on the polarised intensity image at a Faraday depth of 10 rad m^{-2} for the Fanaroff–Riley class I source J2317.9–4213 in the field of the Grus Quartet. The colour-scale is in units of mJy beam^{-1} . The contours are at $(-2, -1, 1, 2, 3, 4, 5, 10, 14, 18, 22, 28) \times$ the off-source 3σ level, where σ is $185 \mu\text{Jy beam}^{-1}$. The Stokes I contours are at full resolution of $9''.5 \times 4''.6$ with a PA of 16° . The polarisation image has a resolution of 24 arcsec, and has not been corrected for the effects of the primary beam or for Rician bias. The synthesised beams are shown in the bottom left. Polarised emission is not detected from the central active galactic nucleus but from several locations along the jet.

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