An HI Mosaic of the Large Magellanic Cloud

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Abstract

The parameters of a new Australia Telescope Compact Array (ATCA) mosaic of the Large Magellanic Cloud (LMC) in the 21-cm line of neutral hydrogen are described. A preliminary peak-brightness-temperature image of the whole of the LMC, and a detailed image of the region around the supergiant shells LMC 4 and 5 is shown.

Keywords: galaxies: ISM – galaxies: individual: LMC

1 Introduction

The LMC is the nearest internally bound galaxy to the Milky Way, and is an important laboratory for the study of gas dynamics and star formation in young galaxies. Previous HI observations (e.g. Luks & Rohlfs 1992) have been limited by the spatial resolution of the Parkes telescope at 21 cm (220 pc at the distance of the LMC). However, the ATCA permits much higher spatial resolution to be obtained. In this paper, we describe the very first results of a new survey.

2 Observations

The Large Magellanic Cloud has been surveyed in neutral hydrogen emission with the ATCA. The mosaic consists of 1344 separate pointings of the 750-m array (4 configurations) covering a field of $10° \times 12°$ with an angular resolution of $60''$ ($\sim$ 15 pc) and a velocity resolution of 1.6 km s^{-1}. The images show the detailed spatial structure of the neutral interstellar gas in the LMC for the first time. Figure 1 is a close-up of the HI in a 10 square-degree region in the north of the LMC containing the supergiant shells LMC 4 and 5 (Meaburn 1980). Figure 2 is an HI image of the whole LMC. Both figures are peak-brightness-temperature images. On small-to-medium scales, the combined action of numerous shells and supershells dominates the structures and motions of the HI in the LMC. On large scales, the LMC is remarkably symmetric in appearance compared

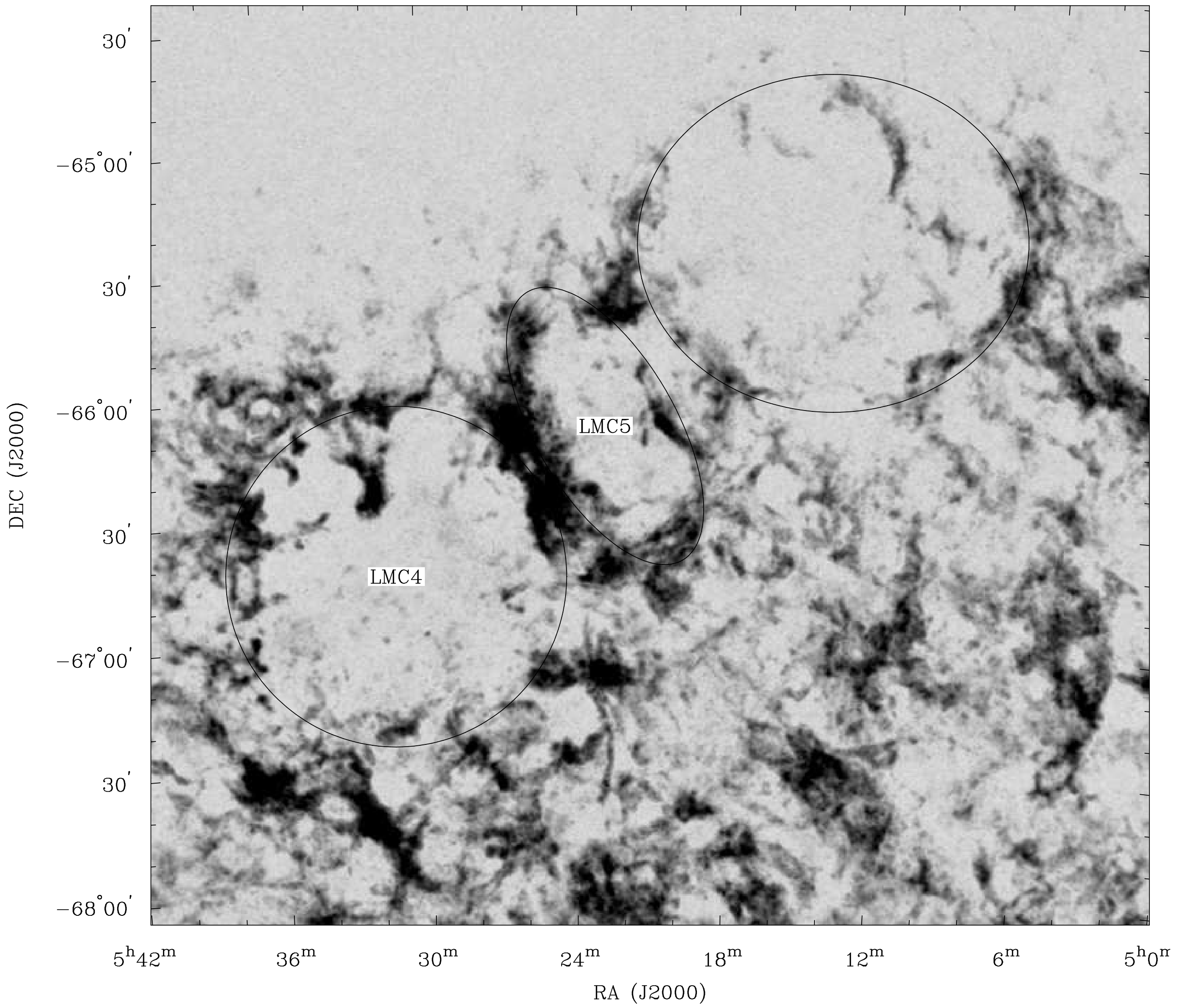

Figure 1: The peak HI brightness temperature around the supergiant shells, LMC 4 and 5 (see Meaburn 1980). The newly found supershell next to the LMC 5 has a diameter of about 1.4 kpc.

with at other wavelengths and shows a pronounced spiral pattern. A southern spiral arm is seen for the first time. This arm extends out from the 'B3' stub tentatively identified by de Vaucouleurs and Freeman (1972).

References

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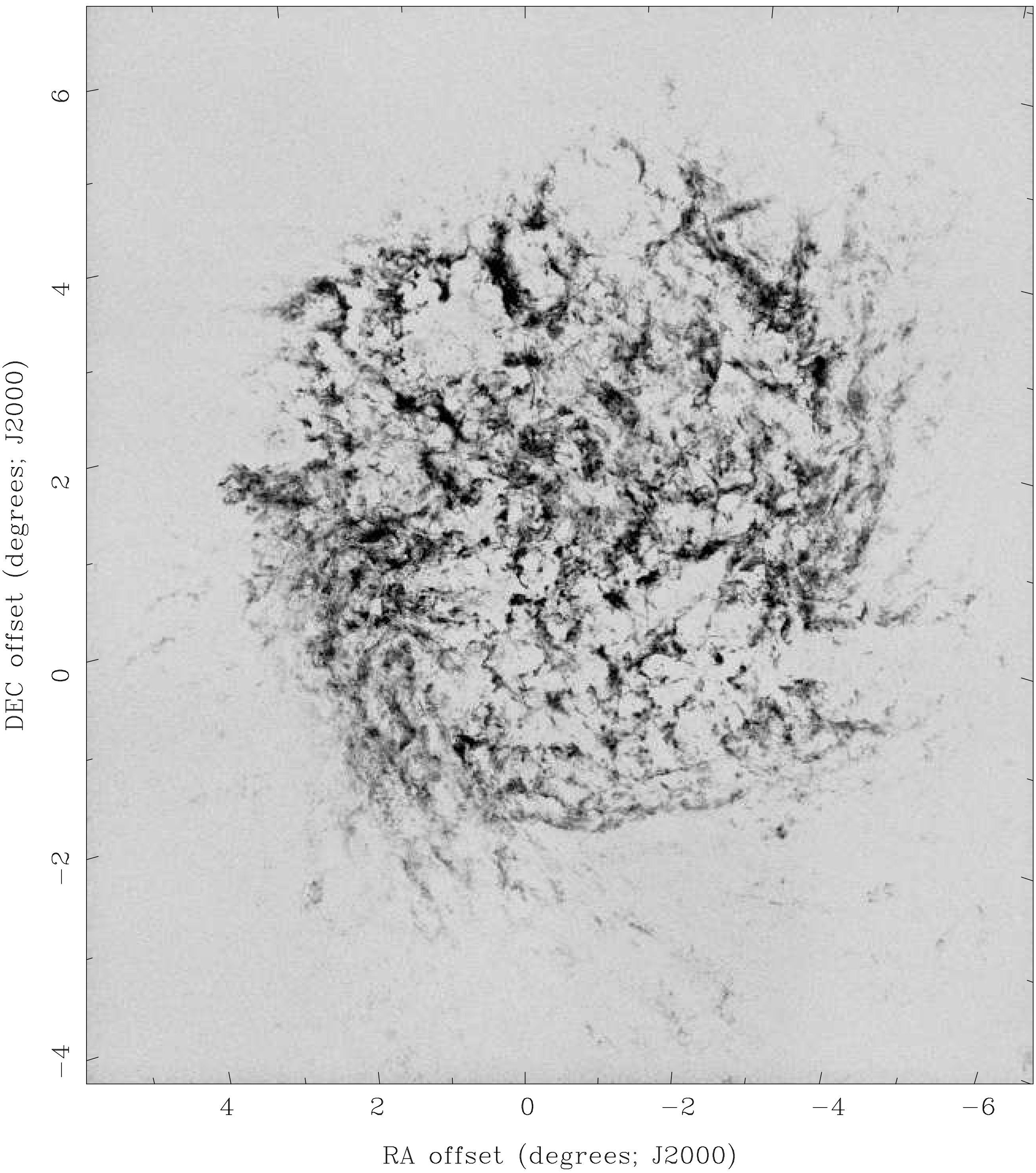

Figure 2: The peak HI brightness temperature image from the ATCA survey of the LMC. On the largest scales, the LMC shows remarkable symmetry in its structure compared with at other wavelengths. On smaller scales, the affect of numerous wind and supernova-blown shells is apparent. The highest brightness temperature in this image is 109 K.