STRUCTURE OF EXTENDED RADIO EMISSION IN W50 AND ITS RELATION TO SS 433

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The association of SS 433 with SNR W50 suggests several interesting scenerios for the complex emission features observed in W50. Since W50 lies close to galactic plane ($b = -2^{\circ}.5$), it is possible some of these features are just chance superpositions. Several of these are seen in association with diffuse X-rays (Seward et al. 1982) and optical filaments (Zeally et al. 1980). At radio wavelengths W50 has been well studied, at 11 cm (Velusamy and Kundu, 1974; Geldzahler et al. 1980) and at 18 cm (Downes et al. 1981; 1982). In this paper we present new observations at 92 cm (327 MHz).

The observations at 327 MHz were made during June-July 1982, using the partially completed Ooty Synthesis Radio Telescope (OSRT). We have mapped a $3^{\circ} \times 2^{\circ}$ region containing SNR W50 and SS 433, using 3 antennas of OSRT, with maximum spacing of 1.2km. The primary beam of the largest antenna (ORT) is 170'x8' ; while that of others is 360'x360'. With the usual observing procedure we can map a field of view of only 170'x8'. However, we have overcome this limitation by using a technique of rapid switching in declination in order to derive the complex visibility corresponding to a much larger field in the North-South direction (120' in the case of W50). Maps are produced by standard techniques of Fourier inversion and cleaning. The shortest spacing available was 100 wavelengths. We have added the visibility close to u=0, using the total power scans across W50 made with the ORT.

In Fig.1 is shown the 327 MHz map of W50. The restoring beam used for this map was 7'.5x7'.5 which is the same as for the 1.7 GHz map of Downes et al. (1982). The overall structure of W50 is similar at these wavelengths. At 327 MHz a weak radio shell is seen at a radius of 20'-30' from SS 433. It should be noted that the broader components

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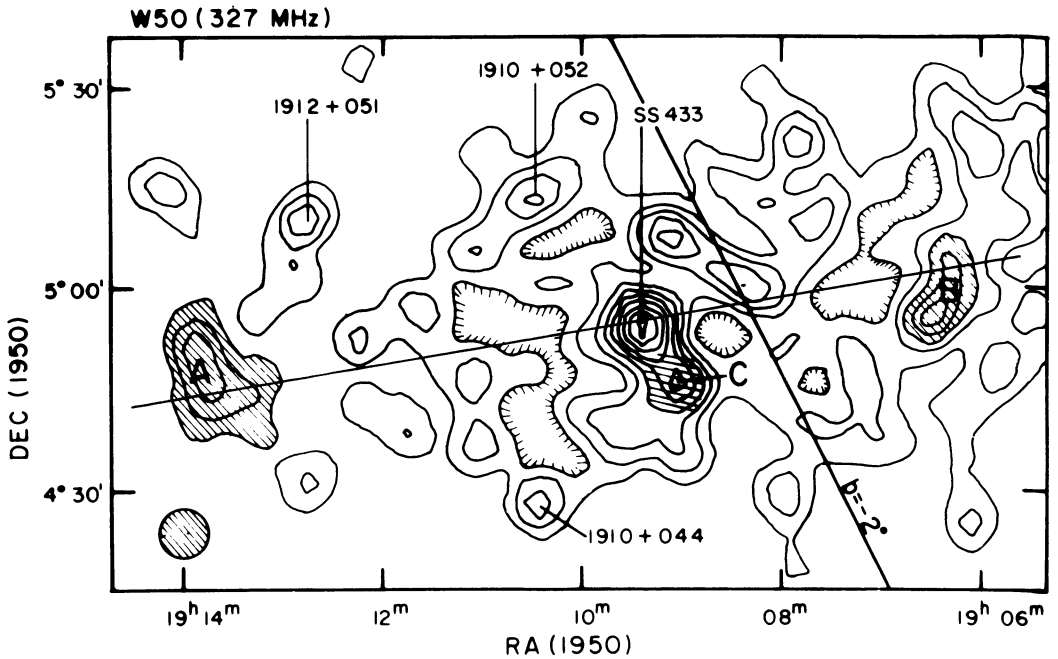

Fig.1. Map of W50 at 327 MHz. Restoring beam is 7'.5x7'.5. Contour interval is 0.15 Jy/beam. The axis of the jet is also marked.

of this shell are not seen prominently in this map, as they suffer from the effects of missing spacings from u ~ 10 to 100 wavelengths. In the west, the map is confused by the steep gradients in the galactic emission close to the plane. A comparison of the 92cm map with the centimeter maps shows that at meterwavelength the emission is less pronounced over the parts of the shell where linear polarization is minimum (e.g. along the northern shell) indicating considerable mixture of thermal and nonthermal emission over W50 complex.

The hatched areas marked 'A' and 'B' in Fig.1, lie along the jet axis at PA 100° (Hjellming and Johnston, 1981), and are separated by 2°. Their apparent resemblance to 'Double lobes' in extragalactic sources is remarkable. It is conceivable that these lobes are indeed parts of the shell which have acquired excess expansion velocities due to the dynamical effects of the beams. In X-ray also a double lobe structure is seen (Seward et al.1980). However the X-ray lobes are separated only by 70'. The sharp outer boundaries of the X-ray emission suggest that the beams do not propagate beyond about 40' from SS 433. This implies that the radio lobes are no longer being accelerated by the beams.

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Another interesting feature near the center is the jet-like extension (C in Fig.1) towards the southwest direction. This feature is also clearly seen in the 11 and 18 cm maps (Downes et al. 1982). In our highest resolution (3'x6') map also, it appears to be connected to SS 433. It seems to have a relatively steeper spectrum than SS 433. It is unlikely that this extension is the result of the relativistic beams from SS 433, since existence of the feature 'A' and 'B' imply the beams have been well collimated and stable. It could have resulted from transient activity in SS 433. Clearly, observations with still higher resolution will be needed to confirm its association with SS 433.

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