APERTURE SYNTHESIS OBSERVATIONS OF THE SUPERNOVA REMNANT G73.9+0.9

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ABSTRACT: Radio continuum observations, obtained with the DRAO Synthesis Telescope, are presented of the new supernova remnant (SNR) G73.9+0.9. Our map at 1420 MHz shows indications of spatially resolved knots of emission in the brightest part of the remnant. The 408 MHz map, although of lower resolution, shows the same general morphology. The spectral index α ($S_\nu \propto \nu^{-\alpha}$) between 1420 and 408 MHz is about 0.5, a value typical for shell type SNRs. The morphology however is more suggestive of a filled centre SNR.

I. INTRODUCTION

G73.9+0.9 is a new SNR recently identified by Reich *et al.* (1986). Their best resolution map (HPBW = 2.4 arcmin) is a 4750 MHz map obtained with the 100-m Effelsberg telescope.

Here we report observations obtained with the DRAO Synthesis Telescope (Roger *et al.* 1973) at 1420 and 408 MHz. The resolution of the telescope (arcmin EW x NS) at the declination of the source is 1.0 x 1.7 and 3.5 x 5.9 respectively. Our observations included all spacings from 13 to 605 m. The resultant maps were corrected for the polar diagram of the 9 m paraboloids. Data for spacings shorter than 13 m were derived from the measurements of Kennedy (1975) at 1420 MHz and Haslam *et al.* (1982) at 408 MHz and were added to the Synthesis Telescope maps. The rms noise near the map centre is approximately 0.4 K at 1420 MHz and 5 K at 408 MHz. The sensitivity, particularly at the lower frequency, has been severely affected by the limited dynamic range of the instrument and the near proximity of Cygnus A.

II. RESULTS

Figure 1 shows the part of our map at 1420 MHz which includes the SNR. Although the radio emission from this object is rather smooth, there are nonetheless indications of spatially resolved knots of emission near the centre of the remnant. The object is elongated with the long axis nearly perpendicular to lines of constant galactic latitude. Reich *et al.* (1986) note that the northernmost point source appearing within the outline of the remnant coincides with an IRAS source.

Figure 2 shows the SNR and the area surrounding it to the north-east. A number of interesting sources can be seen, the properties of which are summarized

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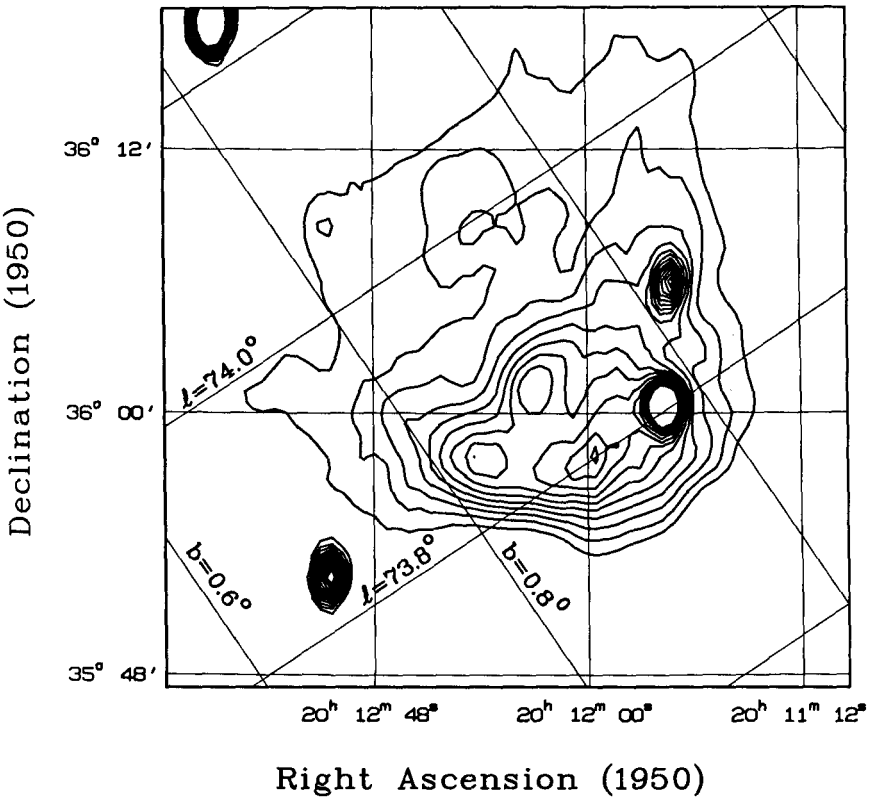

Figure 1. DRAO 1420 MHz continuum map of G73.9+0.9. Resolution is 1 x 1.7 arcmin. Contour steps are 1 K in brightness temperature. The first contour is at 9 K.

in Table 1. The spectral index α ($S_\nu \propto \nu^{-\alpha}$) between 1420 and 408 MHz is derived from our two continuum maps. For G73.9+0.9, we obtain α on the order of 0.5. Although this value is typical for shell type SNRs, the morphology of the object is however more suggestive of a filled centre SNR.

The object labelled B on Figure 2 may be of particular interest. Its morphology, consisting of a central source surrounded by two lobes of extended emission, is reminiscent of a double radio source. It is very likely that this object is indeed a distant extragalactic radio source consisting of a flat spectrum central component and steep spectrum lobes. One would thus expect the composite spectral index for the entire source to have an intermediate value and this is indeed what we determine from our maps. However, because the spectral index is close to the one derived for the SNR, one could speculate on the possibility that it and G73.9+0.9 are in fact two parts of a single remnant. We note that object A, which lies between G73.9+0.9 and object B, has a spectral index of 1.0.

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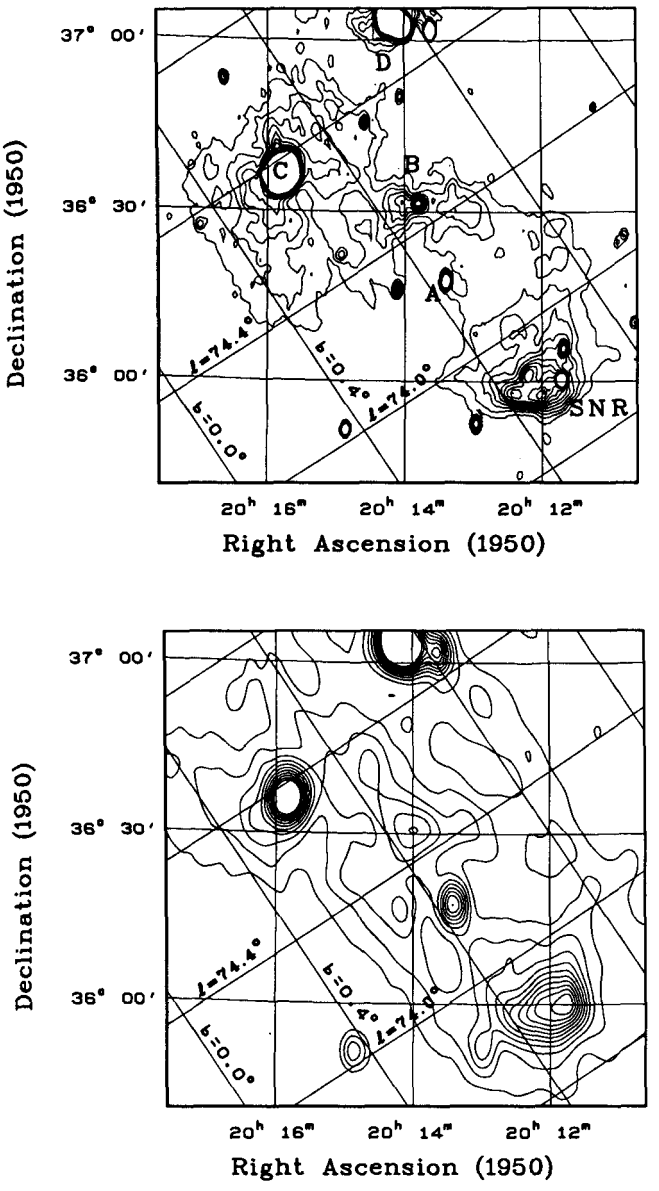

Figure 2. DRAO continuum maps of G73.9+0.9 and of its immediate vicinity. Top: 1420 MHz map with resolution 1 x 1.7 arcmin. Contour steps are 1 K in brightness temperature. The first contour is at 8 K. Bottom: 408 MHz map with resolution 3.5 x 5.9 arcmin. Contour steps are 20 K in brightness temperature. The first contour is at 160 K.

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Table 1

Properties of Sources near G73.9+0.9

Spectral Index	Object	Identification	Notes
0.5	SNR	---	(1)
0.6	SNR	---	(2)
1.0	A	---	(2)
0.6-0.7	B	---	(3)
0.1	C	S 104	(2)
0.4	D	CTB 87	(2)

Notes to Table:
(1) From integrated flux
(2) From TT-plot
(3) From TT-plot; derived value of spectral index very sensitive to area used

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