A 10-GHZ RADIO-CONTINUUM SURVEY OF THE GALACTIC-PLANE REGION AT THE NOBEYAMA RADIO OBSERVATORY - A COMPLEX REGION AT $\ell = 22^\circ - 25^\circ$

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ABSTRACT. Preliminary results of a 10-GHz radio-continuum survey of the galactic-plane region using the 45-m telescope at NRO are presented. An extensive study of a complex region at $22^\circ \leq \ell \leq 25^\circ$, $|b| \lesssim 1^\circ$ has been made.

Figure 1 shows the distribution of brightness temperature at 10.2 GHz of the region. A comparative study with the Bonn 5-GHz survey (Altenhoff et al., 1978) has shown some remarkable features as below:

1. A Crab-like SNR?: Dashed circles in Fig. 1 show SNRs known so far (Milne, 1979). Among them the SNR G24.7+0.6 (arrowed) has an irregular shape. The peak-flux spectrum between 5 and 10 GHz is flat. These facts suggest that this object may be a new candidate for a Crab-like SNR.
2. HII Rings: Two apparently ring-like orientations of HII regions are found as indicated with full lines in Fig. 1. As the radial velocities of the HII regions in individual rings are similar to each other (80-100 km/s for the ring centred on G23.2+0.2 and 90 - 110 km/s for G24.6+0.0 (Downes et al., 1980)), there may be physical associations on rings or shells of diameter of about 100 pc. SNR-shock-enhanced star formation may be suggested for the formation of such HII rings.
3. Compact Nonthermal Sources: A comparison with the Bonn 5-GHz survey reveals a number of steep-spectrum compact sources of $S_{10GHz} = 0.1 - 0.3$ Jy or less (crosses in Fig. 1). From their distribution around the galactic plane (Fig. 2) the majority of the sources may be galactic. Possible origins of the compact sources are: (a) small-size, low-surface-brightness SNRs which do not satisfy the surface brightness-diameter relation; (b) very-short-period pulsars which have not been found because of the short period and high dispersion near the galactic plane; (c) active stars like cataclysmic variables; (d) background fluctuations due to irregularities of magnetic fields and cosmic-ray distributions.

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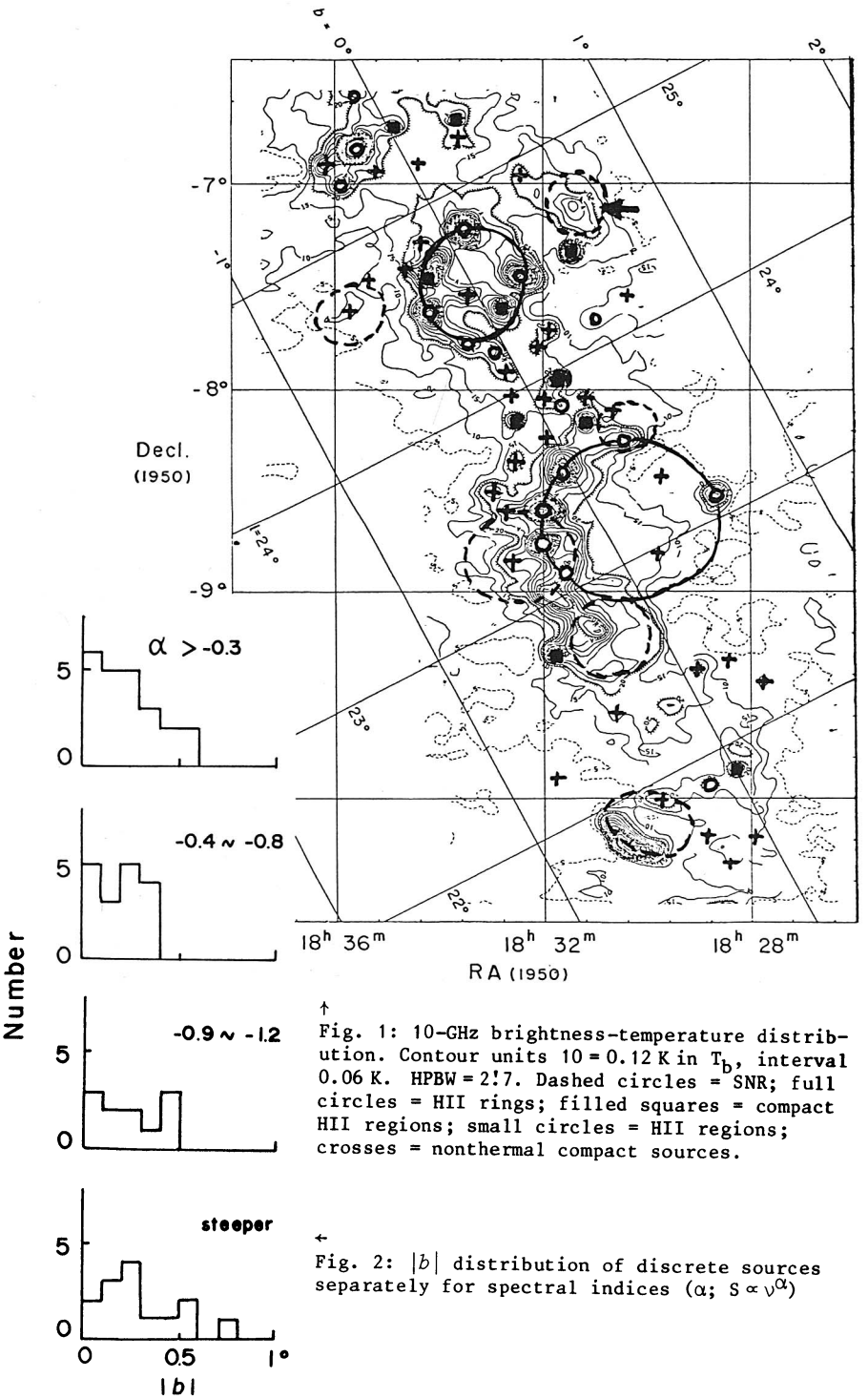

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Fig. 1: 10-GHz brightness-temperature distribution. Contour units 10 = 0.12 K in T_b, interval 0.06 K. HPBW = 2!7. Dashed circles = SNR; full circles = HII rings; filled squares = compact HII regions; small circles = HII regions; crosses = nonthermal compact sources.

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Fig. 2: $|b|$ distribution of discrete sources separately for spectral indices (α; $S \propto \nu^{\alpha}$)