AUSTRALIAN JOURNAL OF PHYSICS ASTROPHYSICAL SUPPLEMENT

NUMBER 14, JULY 1970

Galactic radio sources. I. High resolution 5000 MHz observations. By W. M. Goss and P. A. Shaver

Abstract. Contour maps of 63 regions in the galactic plane are presented. The half-power beam-width was 4′ arc at 5000 MHz. Positions and composite flux densities are given for 206 sources.

Galactic radio sources. II. High resolution 408 MHz observations. By P. A. Shaver and W. M. Goss

Abstract. Contour maps of 58 regions are presented showing 408 MHz radioisophotes for over 200 galactic radio sources. Positions and integrated flux densities are listed for all the sources.

Galactic radio sources. III. Spectra and physical characteristics. By P. A. Shaver and W. M. Goss

Abstract. Spectral indices for over 250 galactic radio sources have been determined from high resolution observations at 408 and 5000 MHz. About 14% of the sources have nonthermal spectra. A comparison with results from an H109α line survey shows that the line-to-continuum temperature ratios for thermal sources are greater than about 2·5%, and no recombination line above the detectable threshold has been found in a nonthermal source. A search for optical emission from the vicinity of the thermal and nonthermal radio sources resulted in positive identifications for one-third of them. In 16 cases the radio contours are shown superimposed on optical photographs.

Electron temperatures have been determined directly from the 408 MHz brightness distribution for 50 thermal sources and are found to be consistent with values obtained from H109α recombination line work, indicating that any departures from local thermodynamic equilibrium, and their effects on the recombination lines, are small. Physical properties of the thermal sources have been computed assuming a spherical HII region model. It is shown that HII regions have a strong tendency to cluster, and that the cluster sizes are comparable with those of open star clusters. No HII regions were found with turnover frequencies greater than 1400 MHz, indicating that high density sources ($N_e > 5\times 10^3$ cm^{-3} over a region $> 0\cdot 1$ pc in extent) are very rare. The largest, least dense HII regions have shell structure which is consistent with current ideas about the dynamical effects of radiation pressure on the dust within HII regions.

Fifteen new supernova remnants have been identified and distances and physical properties computed for them. For the well-resolved supernova remnants the shell thickness is a constant fraction of the diameter. It is shown that supernova remnants are frequently located in OB associations.