SPECTRAL LINE OBSERVATIONS OF THE GALACTIC CENTRE REGION

R. D. Davies and R. J. Cohen

University of Manchester, Nuffield Radio Astronomy Laboratories
Jodrell Bank, Macclesfield, Cheshire U.K.

An investigation of the central regions of the Galaxy has been made with an angular resolution of ~10 arcmin with the radio telescopes at Jodrell Bank using the spectral lines of HI (λ21 cm), OH (λ18 cm) and H_2CO (λ6 cm). Observations of radio recombination lines in the range (λ21 to 125 cm) have also been taken. These data taken together provide information on the velocity field and gas distribution in the galactic centre region. A continuing programme of spectral line observations of the galactic centre is being pursued at Jodrell Bank.

An expansion component is seen which extends from the "3 kpc arm" at R = 4 kpc through a number of HI and molecular line features to R = 70 pc where an expanding feature has been identified in recombination line emission by Dr. A. Pedlar and co-authors. The so-called "molecular rings" are clearly seen in neutral hydrogen emission where they appear to have a more continuous structure than in the molecular lines. Dr. K. O. Grape has used the observed run of neutral hydrogen maximum (and minimum) velocities as a function of longitude to obtain the expansion and rotation field of the distributed gas from R = 1 to 7 kpc; this is in substantial agreement with the velocities of individual "expanding" features found by us (Cohen & Davies 1976).

Another characteristic of the gas lying inside the "3 kpc arm" is its tilt relative to the galactic plane defined by the outer spiral structure. This tilt extends in to the "molecular rings" and the nuclear disk. The pole of this inclined distribution is at $\ell = 124^\circ$, $b = 81^\circ$.

Kinematic timescales for the various features in the central regions of the Galaxy are in the range 10^6 to 10^8 yrs. Whether these motions are the result of central explosions or a bar-like mass distribution is not yet clear. Either phenomenon could produce the shocks which may be responsible for the high rate of star formation implied by the thermal radio emission and IR radiation within several

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hundred parsecs of the centre.

Neutral hydrogen observations of the inner $\pm 1^{\circ}$ of the Galaxy lead to two possible interpretations of the nuclear disc. One is the conventional picture in which the gas is distributed in a rotating disk inclined to the galactic plane. The alternative view is that a substantial fraction of the emission normally identified as the nuclear disk is in fact emission from a pair of spiral gas (and dust) arms which run into the galactic nucleus; similar arms are well-known in M31.

Cohen, R. J. and Davies, R. D., 1976. Mon.Not.R.astr.Soc., 175, 1.

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