

CO(2-1) AND λ 20 CM RADIO CONTINUUM OBSERVATIONS OF NGC3628

H.-P. REUTER, M. KRAUSE, R. WIELEBINSKI
Max-Planck-Institut für Radioastronomie
Auf dem Hügel 69, 5300 Bonn, FRG

H. LESCH
Landessternwarte Heidelberg, Königstuhl, 6900 Heidelberg, FRG

We have mapped the edge-on galaxy NGC3628 in the $^{12}\text{CO}(2-1)$ and $^{13}\text{CO}(2-1)$ lines with the IRAM 30m MRT and in radio continuum at λ 20 cm with the VLA. The $^{12}\text{CO}(2-1)$ spectra were obtained out to a distance of 3 kpc east and 2 kpc west of the edge-on galaxy (resolution 0.4 kpc) with supplementary spectra \simeq 9 kpc east and west (1 arcmin \simeq 2 kpc at a distance of 6.7 Mpc). The resulting map shows a central peak of CO emission but also a multiple peaked structure from which we deduce a ringlike enhancement of molecular gas with a diameter of \simeq 400 pc and two outer maxima likely indicating spiral arms of the galaxy. The view of a molecular "ring" is supported by the fact that the maxima of the CO intensity are located close to the turnover radius where rigid rotation passes into differential rotation. Lesch et al. (1990) found for a number of galaxies with molecular rings that these rings can be formed by viscous accretion of molecular gas even at these radii. We find for the rigid rotating disk a molecular mass of $m \simeq 10^8 M_{\odot}$ assuming a conventional conversion factor. From our channelmaps we were able to distinguish between six unresolved clumps in the central region with comparable CO emissivity and masses of $\simeq 10^6 M_{\odot}$.

We have also observed the $^{13}\text{CO}(2-1)$ line at 12 points close to the center and find for the intensity distribution a clearly peaked structure coincident with the radio peak at λ 20cm. The ratio $^{12}\text{CO}(2-1)/^{13}\text{CO}(2-1)$ varies from values of \simeq 7 in the center to \simeq 15 at distances of 500 pc from the center. The low value at the central position may indicate either a strong variation of the optical depth or an enhancement of ^{13}CO gas due to fractionation or mass loss from massive stars (Audouze et al., 1975).

We have also observed the CS(3-2) line towards the $^{13}\text{CO}(2-1)$ peak where we expected dense molecular gas and we found an upper limit of 20 mK T_{mb} giving a ratio $^{12}\text{CO}(2-1)/\text{CS}(3-2) \geq 80$.

Our λ 20cm map has been obtained by combining two observing sessions with the B- and C-configuration of the VLA. The total intensity map shows an extended structure up to $z \simeq 3.5$ kpc perpendicular to the plane of the galaxy and a pronounced spur. This spur indicates the presence of a galactic wind and supports the view that NGC3628 is a starburst galaxy. We also report the detection of polarized radio emission which could be traced up to 3.5 kpc above and below the plane. The degree of polarization increases with increasing distance from the galactic plane reaching values of \simeq 15% at $z \simeq 3$ kpc.

REFERENCES

- Audouze, J., Lequeux, J., Vigroux, L.: 1975, *Astron. Astrophys.* 43,71
Lesch, H., Biermann, P.L., Crusius, A., Reuter, H.-P., Dahlem, M., Barteldrees, A., Wielebinski, R.: 1990, *Mon. Not. R. astr. Soc.* 242,194