DISTRIBUTION AND MOTIONS OF CO IN M51

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We present results (partly preliminary) of an extensive map (73 positions) of CO (J=1-0) emission in M51 (Fig. 1). The spectra were obtained with the Onsala 20-m antenna (beam size 33"), equipped with a cooled mixer and a 512x1 MHz multichannel receiver. The data are not yet fully analyzed but our preliminary results are as follows:

1. A small central minimum in the CO emission is apparent (Fig. 2). The average radial CO distribution shows a maximum at ∿ 15" (corresponding to 0.7 kpc, for an assumed distance of 9.6 Mpc).
2. The above minimum results from what seems to be an oval ridge structure in the emission intensity around the center, with an extent of about 30" by 40" (Fig. 3). This could be the markings of an elongated hole or the beginning of the spiral arms. (The ridges are fairly well correlated with the innermost parts of the spiral arms as delineated by continuum observations by Segalowitz, 1976.)
3. It seems that a central oval velocity pattern is needed to explain a dip at 450 km s^{-1} in the central spectrum. (The dip is present in all and independent parts of our data.)
4. The outer parts of the galaxy have only been covered in strips (Fig. 1). Clearly there is structure in these strips, i.e. not only a radial decrease. The "on-arm" spectrum (88", 0") has for example a greater integrated and peak intensity than the "interarm" spectrum (77", 0"). Such arm-interarm contrast is not always clear, though. Observations covering a larger section of an arm-interarm region, where contrast has been seen, are being planned for the next observing season.
5. We also note that the observed apparent velocity differences between CO and ionized gas, reported by Rydbeck et al. (1983), persist. A fully convincing argument on this point (taking into account the finite beam etc.) requires some further model work, however.

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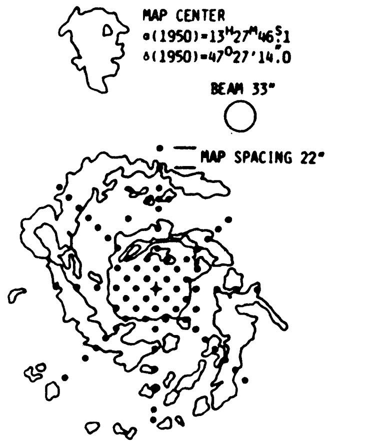

Figure 1. Observed positions in M51.

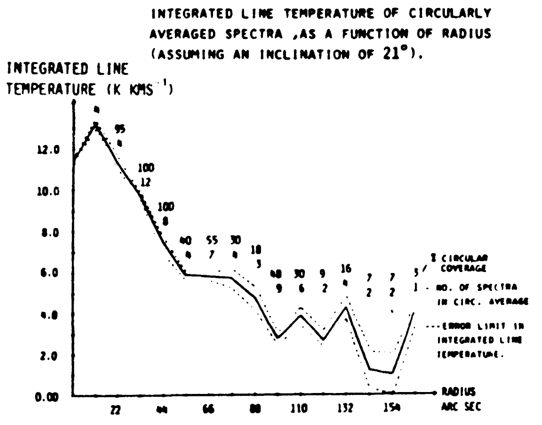

Figure 2. Radial CO distribution in M51.

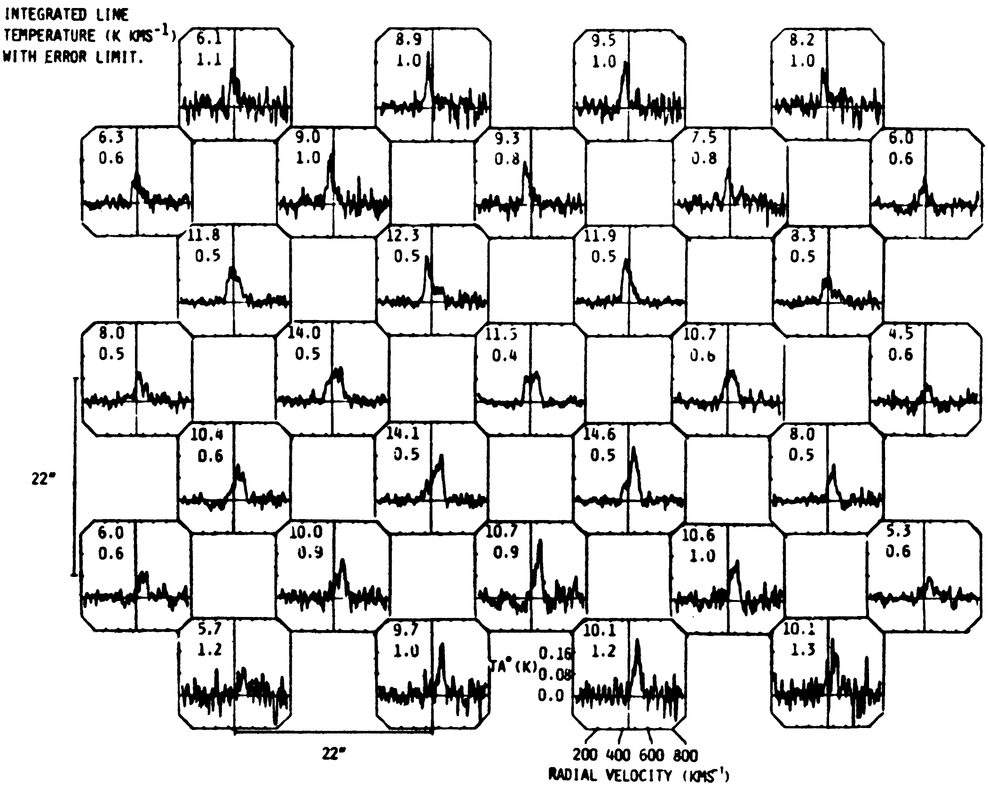

Figure 3. Spectra of J=1→0 transition of CO taken towards the central region of M51 (cf. Figure 1).

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