A NEW 21-CM LINE SURVEY OF THE LMC

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The measurements were made in Feb. 1982 with the Parkes 64 m telescope using a corrugated waveguide horn with total half-power beam width of 15', the first sidelobes being 19 dB down, resulting in an aperture efficiency η_A=o.53±o.oo7, a main beam efficiency of η_{mb}=o.8o±o.oo5 and a ratio of source flux to antenna temperature of Γ=o.62±o.1 K/Jy (Murray, priv. comm.). A cooled two channel FET frontend used in the frequency switching mode with $\Delta\nu$ = 2 MHz resulted in a system noise temperature at zenith of T_{syst} = 4o K for one channel and T_{syst} = 5o K for the other. Each frontend channel received a single polarization mode, and this radiation was then further analysed in a 2 x 512 channel autocorrelation spectrometer set at a channel separation of 3.9o6 KHz corresponding to a velocity resolution of V = o.824 km s^{-1}. Hanning smoothed this resulted in a σ_T = o.o5 K for the average of both polarization.
A field of $-2\overset{\circ}{.}8 \leq X \leq 3\overset{\circ}{.}4$, $-2\overset{\circ}{.}6 \leq Y \leq 4\overset{\circ}{.}o$ in the standard tangential coordinates of the LMC (Isserstedt 1975) corresponding to roughly $4^h54 \leq \alpha \leq 6^h00^m$, $-72^o12' \leq \delta \leq -65^o48'$ have been sampled with a grid spacing of $o\overset{\circ}{.}2$ both in α and in δ. Some results of this survey are shown in Fig. 1 to Fig. 4. Fig. 1 gives the distribution of N_{HI}, while Fig. 2 shows the velocity field in the gas. All radial velocities in this diagram have been referred to the galactic center using a rotational velocity for the LSR of 225 km s^{-1}. The position angle for the major axis of the system as shown by both the velocity field and by the distribution of the gas in the individual channel maps is 28° in contrast to 168° as given by Feitzinger (198o). A transversal velocity can change the kinematical value at most by 1o° - 15°.
Many of the profiles are double peaked or strongly asymmetric, Fig. 3 shows the distribution of $V_{mean}-V_{mode}$, where V_{mean} is the average radial velocity of a line profile, while V_{mode} is the velocity for the largest peak. $V_{mean}-V_{mode}$ is clearly oriented to the geometry of the system. Fig. 4 finally shows the velocity field (V_{mean}) along the major axis. In the central region a velocity perturbation probably caused by the bar is clearly visible.

References:

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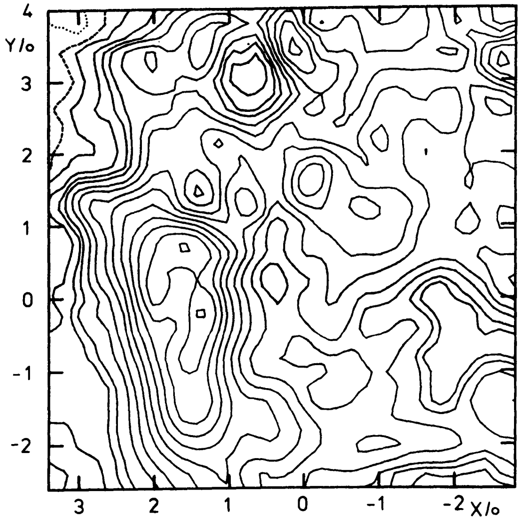

Fig. 1 The distribution of total neutral hydrogen over the LMC. Contour levels at .3,.5,1,2,3,4,6, 8,1o,12,15,2o,3o x $1o^{21}$ atoms/cm^2.

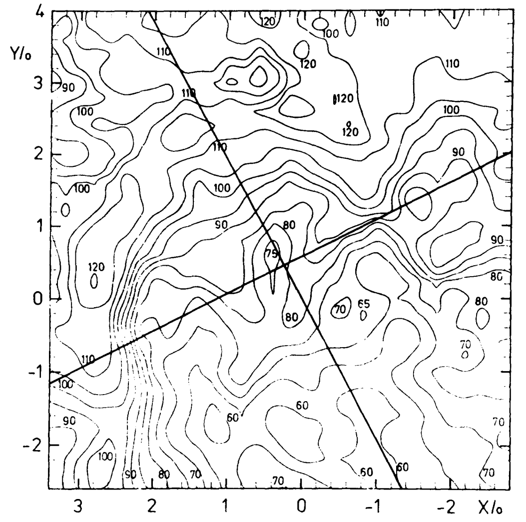

Fig. 2 Iso-velocity contours of LMC. The major axis at Φ = 28^o and the minor axis at Φ = 118^o (NESW) are indicated.

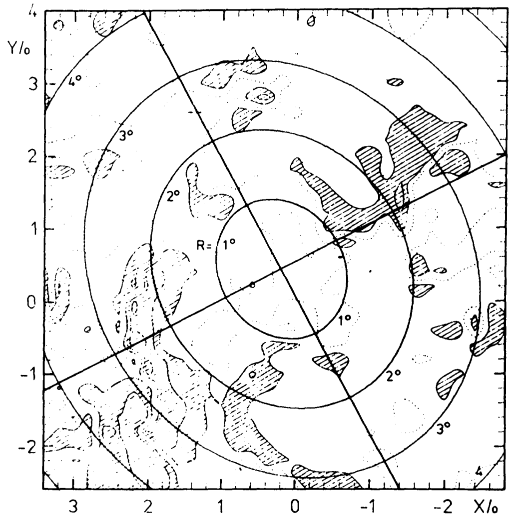

Fig. 3 Colour line of equal V_{mean}-V_{mode} and circles of r = const. from the kinematical center in the plane of the system (i = 33^o).

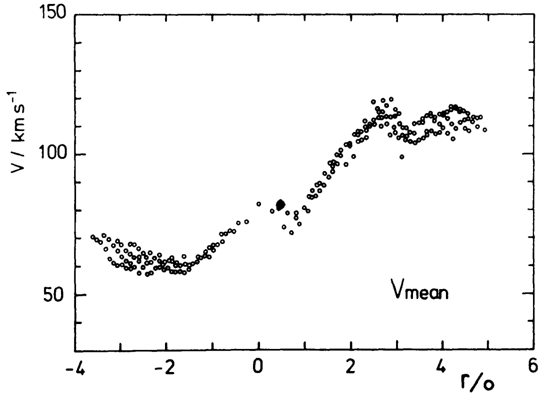

Fig. 4 The velocity field along the major axis, the kinematical center is marked.

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