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3D Observations of the nebula N30 in the LMC

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N30 is a 80x330 pc nebula, seen in projection to the North of the LMC. At the position of the nebula, the neutral HI gas is distributed within two layers, with respective heliocentric velocities of 303 km s^{-1} for the major disk component, and 285 km s^{-1} for the low-velocity component (Luks & Rohlf 1992). The respective positions of the HI components along the line of sight are not known, nor is the distance between the HI layers, nor their thickness. N30 has been observed with the "survey Hα" equipment of the Observatoire de Marseille (see Rosado et al, and Marcelin et al.,this meeting), giving a 38' square field (spatial resolution of 9"x9") and using two scanning Fabry-Perot interferometers, the first one having a spectral sampling step of 15.7 km s^{-1}, and the second one of 4.8 km s^{-1}. No splitting of the line profile is visible, excluding large inner motions. The main emissions measured in N30 and also in all its 8 nearby bright and faint nebulae have heliocentric velocities in the range 302-315 km s^{-1}.Such a velocity shows that all the nebulae are situated inside the HI disk component, following their exciting stars.

The line profiles observed for the nebula N30 are not simple, even at the bright boundaries of the shells DEM 105 and 106. They can be fitted by the sum of two Gaussians, having different amplitudes and a FWHM of 24 km s^{-1}, which is almost the maximum value considered as normal inside HII regions. The first velocity component has a heliocentric velocity of 305-310 km s^{-1}, and is seen with a S/N ratio between 1.5 and 7; the second component has a velocity of 285-290 km s^{-1}, and a S/N ratio between 1 and 4.5.

Since the second HII velocity component is the best detected when superimposed to the bright parts of N30, it cannot be interpreted as caused by expanding motions. The HII 285 km s^{-1} component is most probably some part of the HI low-velocity component; it seems likely that some UV flux escapes from the blue supergiants of N30, and contributes to the ionization.

Therefore the two HI layers are not at a great distance from each other. As the nebulae look less filamentary than other large shells (N51, etc), the gas should be mainly homogeneous inside both HI layers. The dimensions of DEM105, 106, and 107 are respectively 140x120 pc, 80x61 pc and 139x120 pc for a distance of 50 kpc of the LMC. This suggests that the thickness of the HI disk component, at the position of N30, should be comprised between the minimum dimension 60 pc and the biggest dimension of N30, 330 pc.

References

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