RADIAL DISTRIBUTIONS OF SOME CONSTITUENTS IN M31, THE GALAXY AND M33

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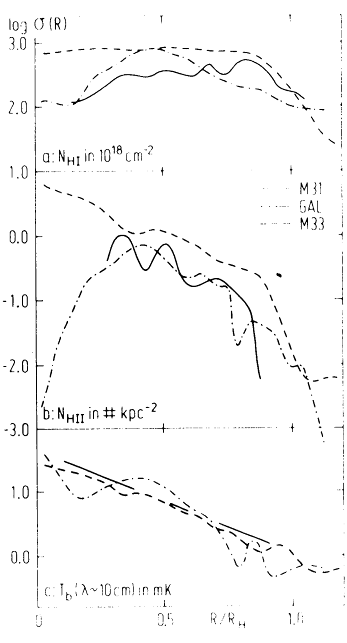
The Figure shows the distributions perpendicular to the planes of the galaxies of: (a) the surface density of HI, $\sigma_{HI}(R)$, (b) the surface density of HII regions, $\sigma_{HII}(R)$, and (c) the radio brightness temperature, $\sigma_{TB}(R)$. Details may be found in Berkhuijsen (A.A. 57, 9, 1977; Proc. IAU Symp. 77, 1978); here $\sigma_{HI}(R)$ of the Galaxy was taken from Gordon and Burton (Ap.J. 208, 346, 1976) and $\sigma_{TB}(R)$ of M31 has been revised. Distances to the centre are scaled with the Holmberg radius R_H (21, 15 and 7.8 kpc for M31, Galaxy, M33).

M31 is of Hubble type Sb, M33 of type Scd and the Galaxy of type Sbc (de Vaucouleurs, this Volume). $\sigma_{HI}(R)$ of the Galaxy is intermediate between that of M31 and that of M33. $\sigma_{HII}(R)$ is typical for the disk component which decreases roughly exponentially from its maximum outwards. Note that only in M31 $\sigma_{HII}(R)$ and $\sigma_{HI}(R)$ peak at the same distance from the centre. It will be intriguing to see whether the difference between $\sigma_{HII}(R)$ and $\sigma_{HI}(R)$ in these galaxies is related to the distribution of CO.



In both M31 and M33 $\sigma_{TB}(R)$ of the disk component is similar in shape to $\sigma_{HII}(R)$ but slightly flatter. Assuming that this also holds for our Galaxy a normalised scale length $L/R_H \simeq 0.3$ may be expected for σ_{TB} ($4.5 < R < 10$ kpc). Subtraction of the thermal contribution to $\sigma_{TB}(R)$ in M33 indicates that the distribution of the nonthermal emission is much flatter than $\sigma_{HII}(R)$ (Berkhuijsen, Proc. IAU Symp. 77, 1978). Therefore we may speculate that also in our Galaxy the nonthermal emission has a flatter distribution than $\sigma_{HII}(R)$ and may have $L/R_H \simeq 0.5$. Supernova remnants may then not be the only sources of relativistic electrons in the Galaxy (van der Kruit, Proc. IAU Symp. 77, 1978).

W. B. Burton (ed.), The Large-Scale Characteristics of the Galaxy, 427.

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