

THE KINEMATICS OF THE PLANETARY NEBULAE IN THE LARGE MAGELLANIC CLOUD

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ABSTRACT. The radial velocities of a total of 94 Planetary Nebulae (PN) in the Large Magellanic Cloud (LMC) have been determined. The kinematics of the population of planetary nebulae is compared with the H I data in the context of a re-analysis of the survey by Rohlfs *et al.* (1984), taking into account the transverse velocity of the LMC. We find that the best solution for this transverse velocity is $275 \pm 65 \text{ km s}^{-1}$, and that the LMC is near perigalacticon. This is consistent with a maximum Galactic mass of order $4.5 \times 10^{11} M_{\odot}$ out to 51 kpc. The rotation curve obtained after correction for this velocity implies a mass of $(4.6 \times 0.3) \times 10^9 M_{\odot}$ within a radius of 3 degrees, or about $6 \times 10^9 M_{\odot}$, total. The rotation solution for the PN population is essentially identical with that of the H I, but the vertical velocity dispersion of 19.1 km s^{-1} is much greater than the value of 5.4 km s^{-1} found for the H I. This increase in velocity dispersion is consistent with it being the result of orbital heating and diffusion operating in the LMC in a manner essentially identical with that found for the solar neighbourhood.