M31 vs. Milky Way: Dwarf Galaxy Masses

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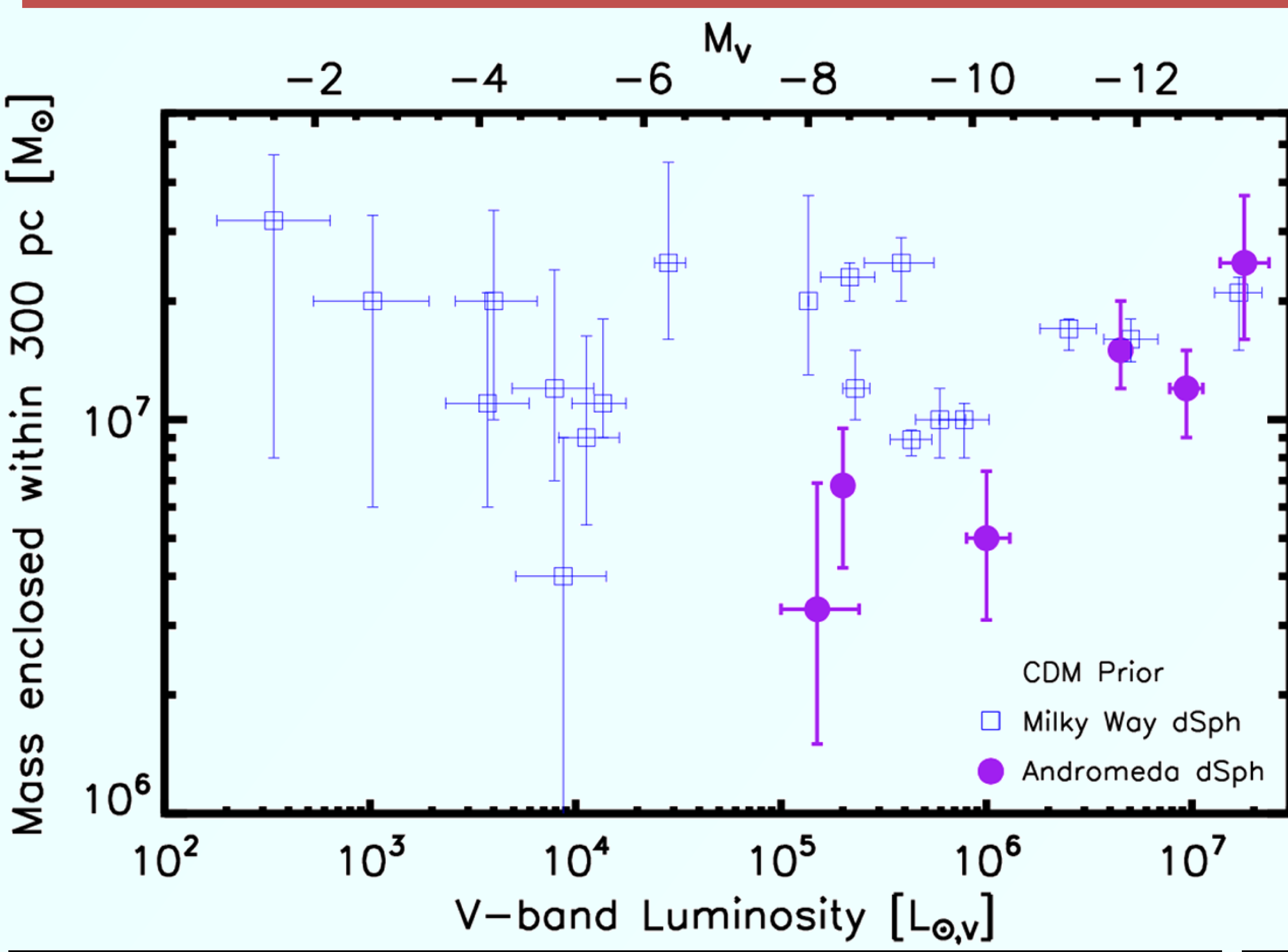
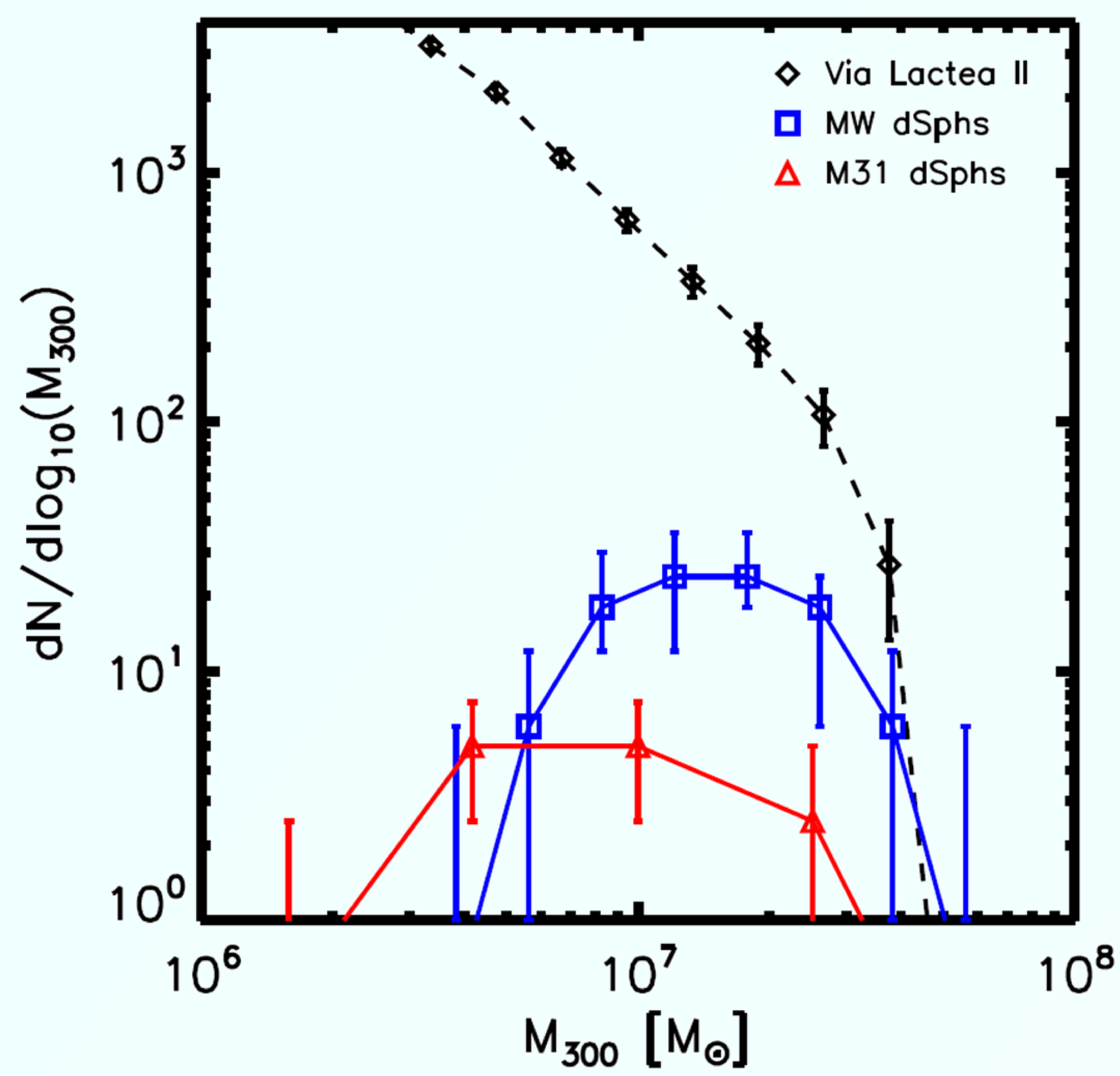
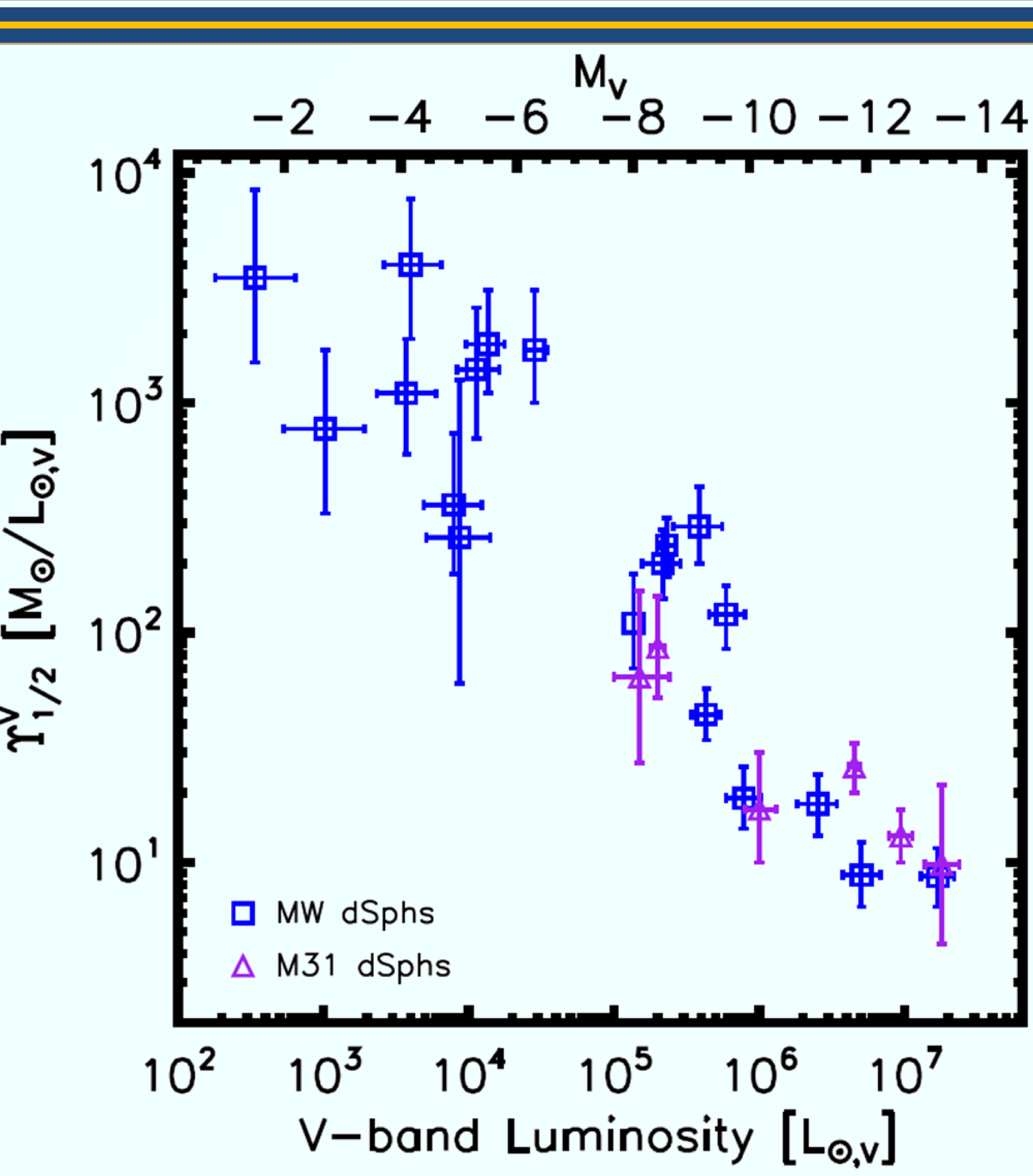
Abstract: We systematically analyze the Milky Way (MW) and M31 dSph population and show differences in their mass profiles. These results pose a challenge to theoretical models that focus solely on the MW dSph population.



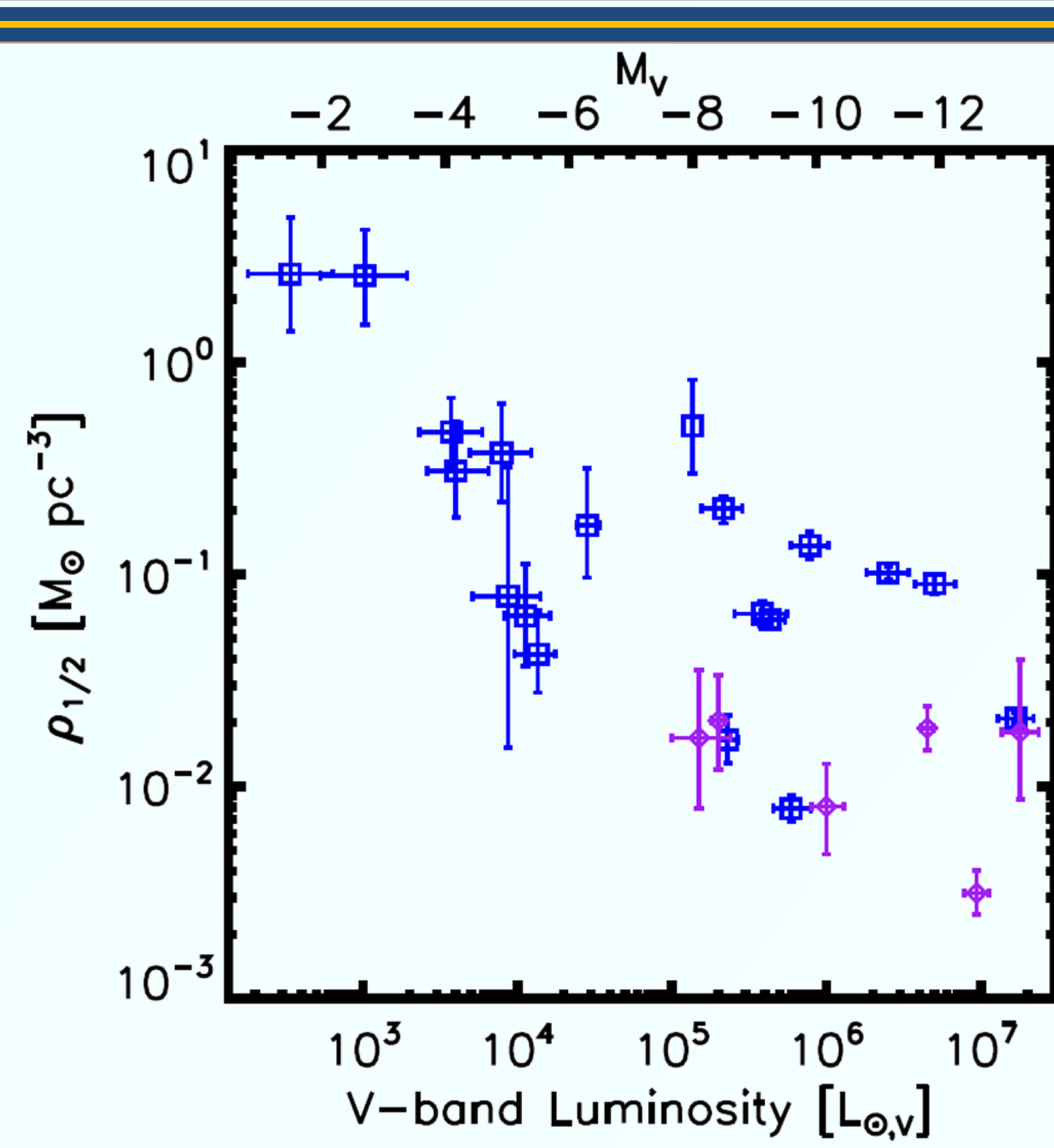
By adopting a ΛCDM-based prior in our spherical Jeans analysis, we show that the flat relation between the mass enclosed within 300 parsecs and luminosity for the MW dSphs does not hold for these M31 dSphs. Most semi-analytical models require a trend between mass and luminosity, which is statistically consistent only with the M31 dSph population.



The mass function for the observed local group dSphs. While this analysis was performed with only ~1/3 of the known M31 dSphs, it appears that the Missing Satellites Problem is worse for the M31 dSphs due to a flatter mass function. However, more kinematic data from more dSphs is needed to verify this claim.



Mass-to-light ratio within the deprojected half-light radius vs. luminosity. The M31 dSphs continue the trend, suggesting that this relation is universal.



Average density within the deprojected half-light radius vs. luminosity. The M31 dSphs sit low on average as a consequence of their large spatial extent and low masses.