IS THE RATIO OF DARK-TO-LUMINOUS MATTER A FUNCTION OF GALAXY MASS AND/OR LUMINOSITY?

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ABSTRACT. The study of the ratio of dark-to-luminous matter in spiral galaxies has been the subject of several recent studies (Bahcall 1983; Casertano 1983; Carignan and Freeman 1985; van Albada et al. 1985; Carignan 1985). These studies have been possible because of the large number of high sensitivity HI observations which became available in the last few years, allowing to probe the halo potential to very large galactocentric distances. In the case of NGC 3198 (van Albada et al. 1985), it was even possible to derive the rotation curve out to 11 disc scale lengths. One of the important questions, forming the motivation for this type of work, is whether the ratio of dark-to-luminous matter is a function of galaxy mass and/or luminosity.

Mass models for late-type spirals (NGC 6946, 3198, 300, 3109, UGC 2259) covering the luminosity range $-20 \leqslant M_B \leqslant -16$ are presented. The luminous disk is calculated using the luminosity profile with constant (M/L_B), except for UGC 2259 where an exponential disk was used since no surface photometry is yet available. The dark halo is represented by an isothermal sphere potential.

No real trend can be seen with ratios of dark-to-luminous matter varying from 0.6 to 1.8 ($M_H/M_D = 1.1 \pm 0.5$) at the Holmberg radius. This strengthens earlier suggestions (Carignan and Freeman 1985; Carignan 1985; Bahcall and Casertano 1985; Carignan et al. 1985) that the ratio of dark-to-luminous matter appears to be independent of galaxy mass and/or luminosity.

References

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