SYSTEMATICS OF BULGE-TO-DISK RATIOS

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The main results of a new analysis of the spheroidal (I) and disk (II) components of 98 lenticular and spiral galaxies are :

(i) on the average, the magnitude difference between spheroid and total luminosity, $\Delta m_I = B_T(I) - B_T$, varies smoothly along the Hubble sequence from early lenticulars to late-type spirals (Fig. 1);

(ii) the trend of Δm_I confirms the concept of the lenticular class as intermediate between E and S classes, not as a parallel sequence;

(iii) the large scatter at any given type, $\sigma(\Delta m_I) \simeq 0.7$ mag, is still dominated by measuring and decomposition errors;

(iv) The effective surface brightness of the spheroid, $\mu_e^c(I)$, corrected for galactic extinction A_B, decreases by $\sim$2 mag from early to late types, but with a large range ($\sim$ 3 mag) at T = const. (Fig. 2a).

(v) The effective surface brightness of the disks, corrected for galactic extinction and inclination, $\mu_e^c(II) = \mu_e(II) - A_B + 3 \log R_{25}$, is almost independent of type, with $\langle\mu_e^c(II)\rangle \simeq 23.5$ for spirals. This implies a corrected central surface brightness $\mu^c(0) = \mu_e^c - 1.82 \simeq 21.7$, in good agreement with the Freeman rule, but with a large scatter. However, the disks of lenticulars (T< 0) tend to be $\sim$ 0.5 mag fainter than the disks of spirals (Fig. 2b).

(vi) The linear effective radii of the spheroidal components are largest, $\langle r_e(I)\rangle \gtrsim 1$ kpc, among the early type spirals, in agreement with the Hubble classification criterion. The spheroid of lenticulars and late-type spirals tend to be smaller, $\langle r_e(I)\rangle \simeq 0.5$ kpc, but with a large scatter (Fig. 3a). There is no indication of systematic difference between ordinary (SA) and barred (SB) spirals.

(vii) The linear effective radii of the disk components are largest $\langle r_e(II)\rangle \gtrsim 5$ kpc, among intermediate type spirals. The disks of lenticular and late type spirals tend to be smaller (Fig. 3b).

(viii) The mean absolute magnitudes of the disk and spheroidal components depend on type (Fig. 4). On the average the disks are brighter ($M_{II} \simeq -19.5$) among types Sb-Sbc, spheroids ($M_I \simeq -19$) among types L^+ to Sa, but, again, with a large scatter. Disks and spheroids are about equally bright ($M_I \simeq M_{II} \simeq -19$) at stage S0/a (T = 0).

Applications to the systematics of rotation curves are in progress.

E. Athanassoula (ed.), Internal Kinematics and Dynamics of Galaxies, 375–376.

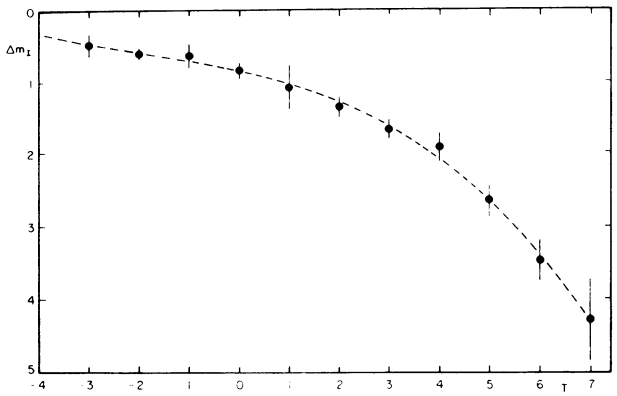

Figure 1. Fractional luminosity of spheroid

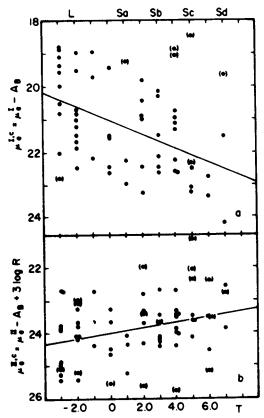

Figure 2

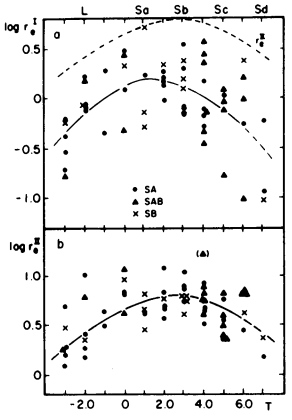

Figure 3

Effective surface brightness (μ_B) and radius (kpc)

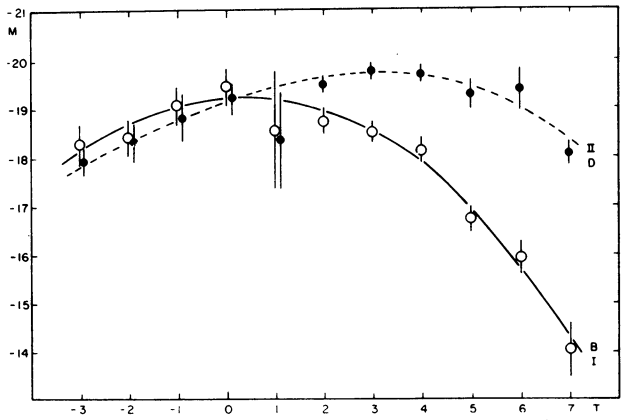

Figure 4. Mean absolute magnitudes of bulge and disk

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