Galaxies and the Universe

Figures + Tables for Lecture 10 on Tu Feb 26
SB profiles for E and Spirals
de Vaucouleurs profile also used to fit outer SB profiles of E galaxies (except for core)

B-band SB profiles for five Es: NGC 720, 1199, 1209, 1395, 1426
Half light radius $r_e$ and average SB from de Vaucouleurs fits to E and Bulges
de Vaucouleurs profile also used to fit surface Brightness profile of cD galaxies, except for their extended outer envelope.

Figure 4.29 The cD NGC 4881 is located near the center of the Coma cluster and is surrounded by a swarm of much less luminous galaxies. [Figure courtesy of STScI]
For Spirals and S0s galaxies (Bulge + Disk) can be fitted by:
- a de Vaucouleurs + an exponential profile
- a general Sersic + an exponential profile

Diamonds, Triangles = observed B-band surface brightness profiles of 2 spirals
Dotted curve = Exponential fits to disk
Dashed curve = De Vaucouleurs fit to bulge
Solid curve = Exp + de Vauc fit
For disk components fitted with exponential fits

1) larger Rd correlate with lower Io
   larger disks have lower central SB

2) Central SB have a narrow range clusters around 21.5 aka Freeman’s law

Figure 4.52 The distribution of 66 disk galaxies in analogs of the lower left panel of Figure 4.43. The left panel shows the surface-brightnesses and effective radii of the bulges, while the right panel shows the corresponding disk parameters. Different symbols correspond to galaxies of different Hubble types: S0 (crosses); Sa–Sab (open triangles); Sb (filled triangles); Sbc (open squares); Sc–Scd (filled squares). If the ellipticals of Figure 4.43 were to be plotted in the left-hand panel, they would cluster around the dashed line. [From data published by Kent (1985), who adopts $H_0 = 100 \text{ km s}^{-1} \text{ Mpc}^{-1}$.]
Figure 4.18 Dwarf and giant galaxies occupy different regions in a plot of absolute V-magnitude and measured central surface brightness; because of ‘seeing’, the true peak brightness may be higher. At left, luminous elliptical galaxies and the bulges of disk systems have very high surface brightness at their centers. The rightmost of the ‘dE’ points (filled circles) represent what this text calls dwarf spheroidals; open circles mark irregular and dwarf irregular galaxies. Disks of spiral galaxies are marked ‘S’. Malin 1 is a low-surface-brightness galaxy; see Section 5.1 – B. Binggeli.

Note that E+ bulges follow a different Luminosity-SB relation from Spirals, dIrr dE