Galaxies AS7007, 2012 Lecture 4: Disks and Ellipticals









Disk galaxies		
	S0-Sa	Sd-Sm
Spiral arms:	Absent or tight	Open spiral
Bulges:	Big	Small
Color (B-V):	Red (0.7-0.9)	Blue (0.4-0.8)
Young stars:	Few	Many
HII-regions:	Few, faint	Many, bright
Surface brightness:	High	Low
Mass:	High	Low
Rotation:	Fast rising	Slow rising













































- From where does the density wave get its energy?
 - From the rotation of the disk?
 - From a companion galaxy?
 - Internal forces from a central bar?
- Spiral patterns remain mysterious...

Recent simulation results: Spiral pattern is transient (Grand et al. 2012)























Mass Determinations

- More difficult than for disk galaxies
- A few methods:
 - For gas-rich Es: HI rotation curves

 - X-ray gas: $M=f(\rho_{gas}, r, T)$ Virial theorem: $M=f(\sigma, r)$ with Stellar $\sigma(r)$ from absorption lines Stellar $\sigma(r)$ and v_{rot} from planetary nebula emission lines