The Basic Structure of Present-Day Galaxies

1) Basic description of galaxy stellar ‘components’

– bulge, disk, bars,

2) Parameter Relations in Galaxies

– Tully-Fisher, the ‘Fundamental Plane’ and the Kormendy relations

– Morphology, mass vs. kinematics

– Stellar mass vs. halo mass

3) Population properties

– Galaxy mass functions

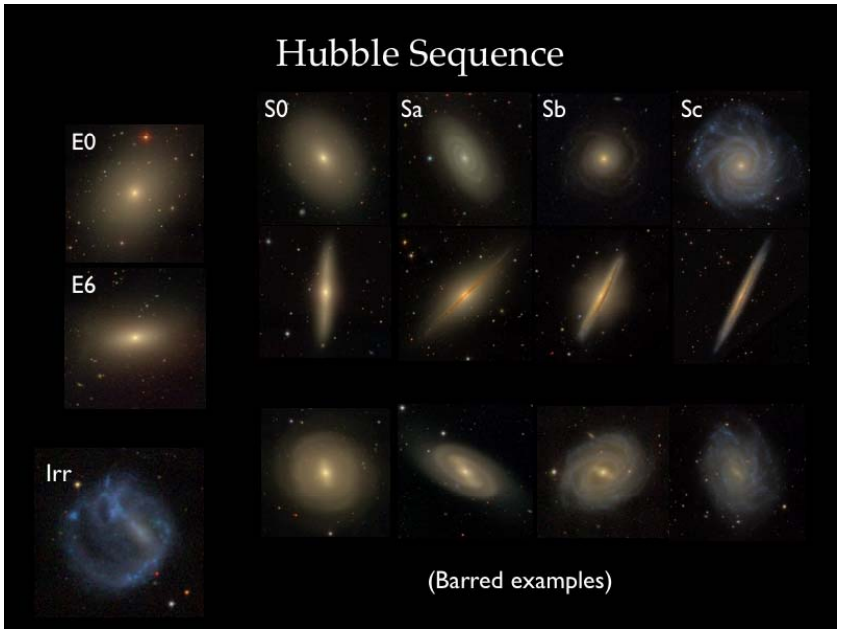
– SFR functions

– Galaxy clustering

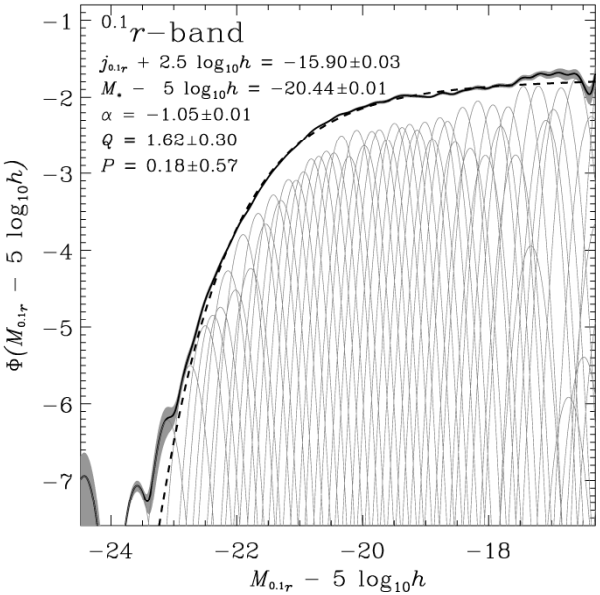
The present-day galaxy population

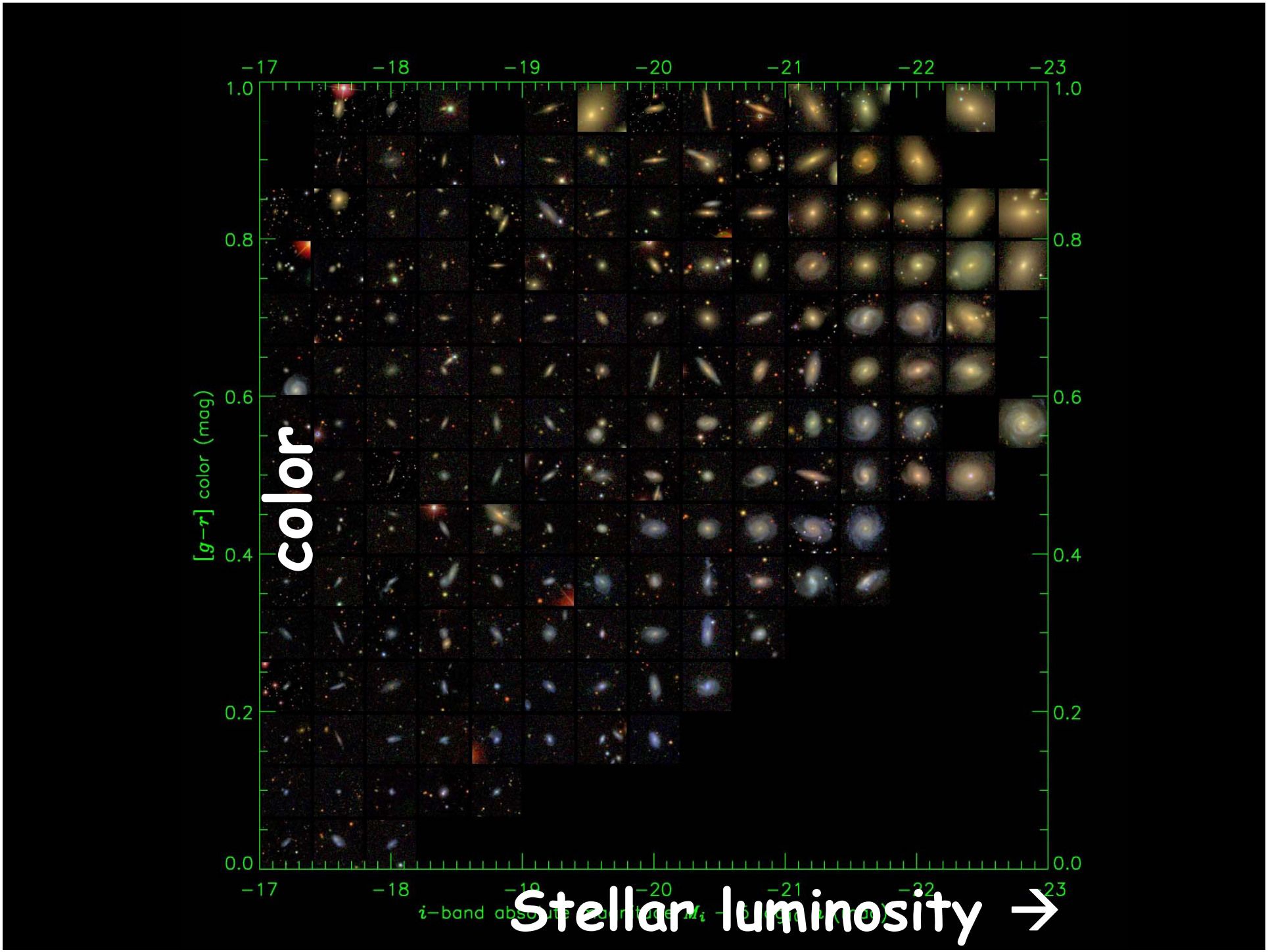
- How to describe galaxies?

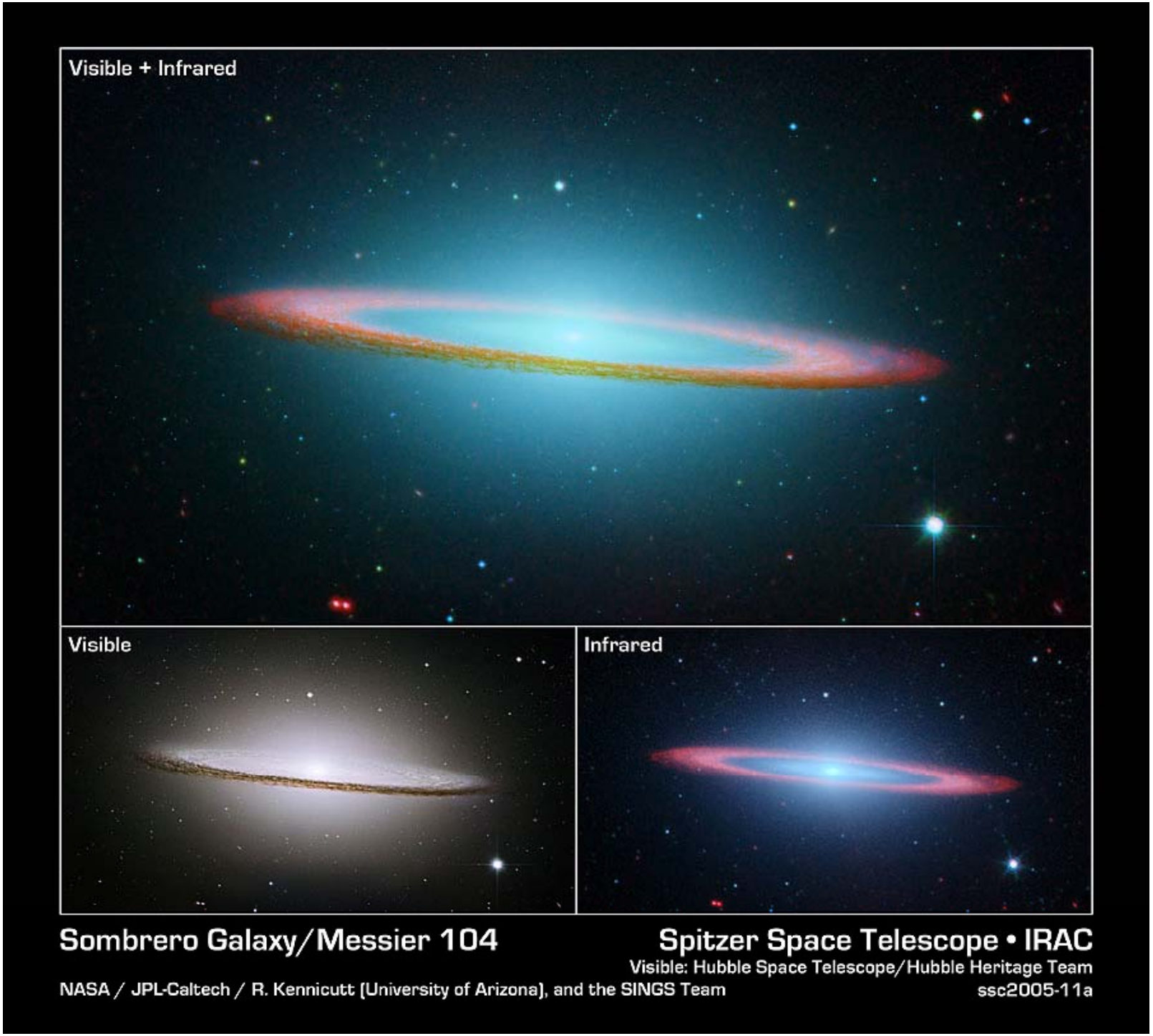
- (Volume)-abundance of
  - galaxy masses
  - star formation rates
- Spatial clustering
  - correlation functions
  - Which galaxies in which halos?
- Parameter correlations
  - Tully-Fisher/Fund.Plane
  - SFR vs M_*
  - sizes, concentrations, shapes
  - stellar mass as a function of M_*



Blanton et al. (2003) (astro-ph/0210215)




−17
−18
−19
−20
−21
−22
−23
1.0
0.8
0.6
0.4
0.2
0.0
[g−r] color (mag)
color
i−band absolute magnitude
Stellar luminosity →


Visible + Infrared
Visible
Infrared
Sombrero Galaxy/Messier 104
Spitzer Space Telescope • IRAC
Visible: Hubble Space Telescope/Hubble Heritage Team
NASA / JPL-Caltech / R. Kennicutt (University of Arizona), and the SINGS Team
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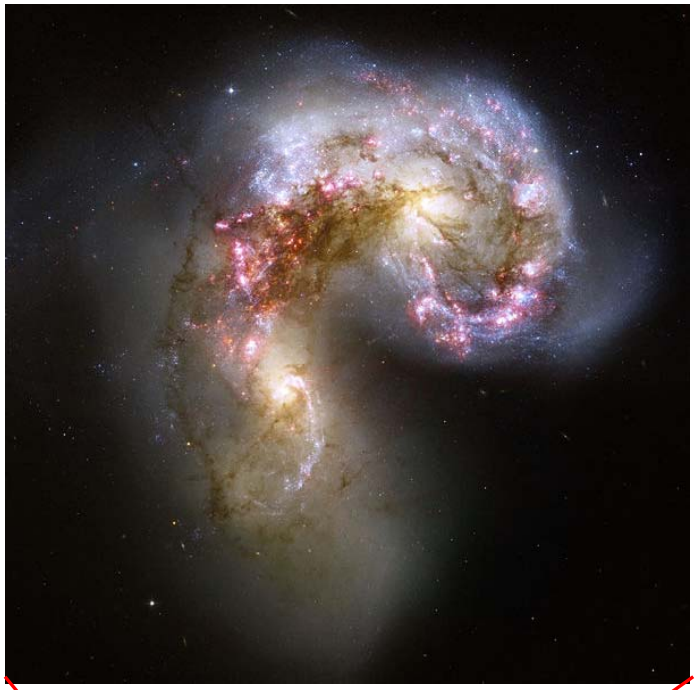
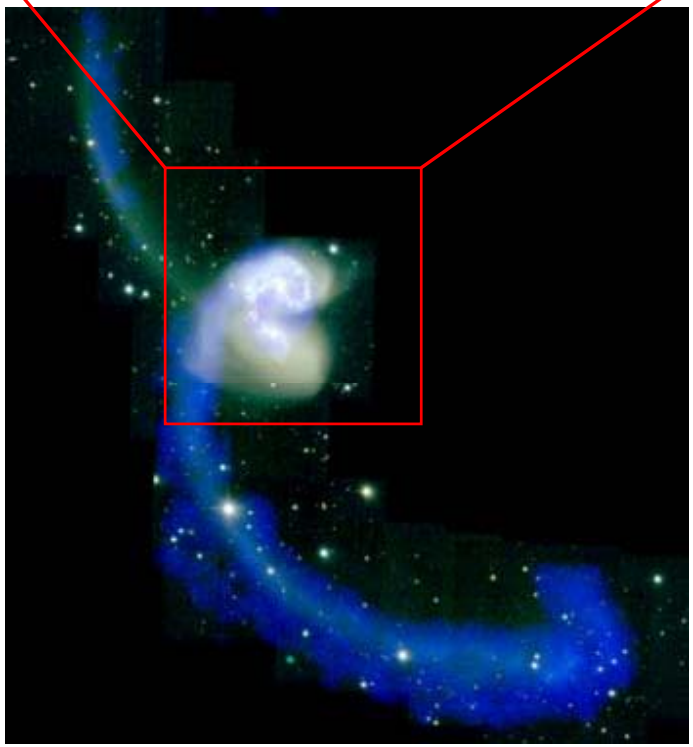
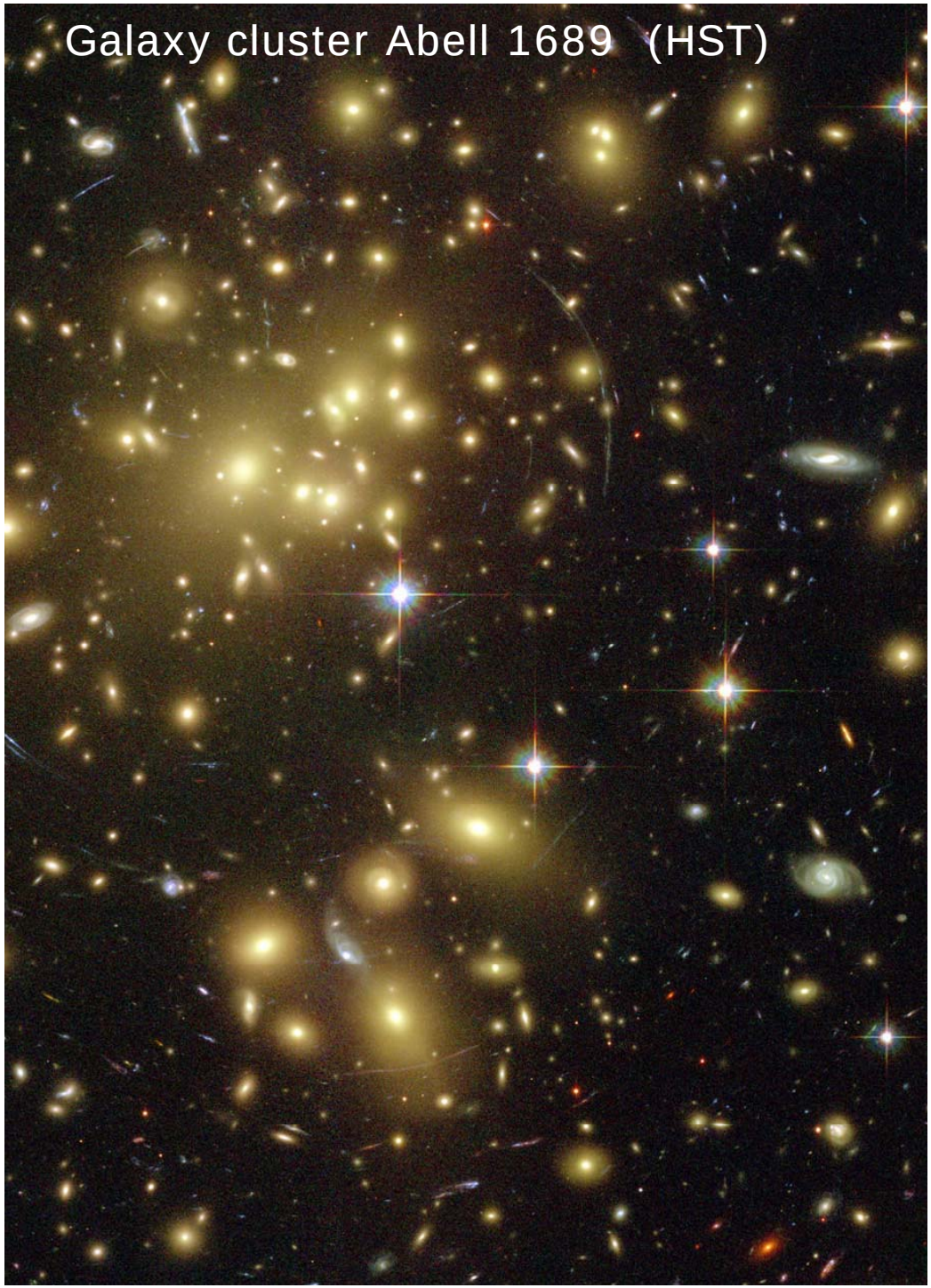
Interacting/merging galaxies

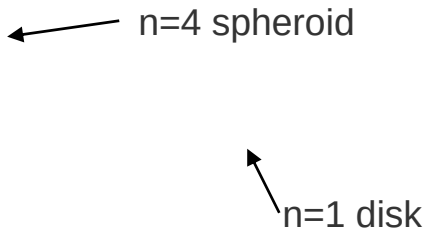





Galaxy cluster Abell 1689 (HST)

Basic Description of the Stellar Distribution

- For fairly massive galaxies a basic two-component description of the stellar distribution proves useful:
  - Bulges/spheroids
  - Disks
- Radial profile description
  Sersic (1968) profile



Disks: n~1 : 'exponential profile'

Spheroids : n ~ 2-5 (n = 4: de Vaucouleurs)

NB: $n_{spheroid} = f(L_{spheroid})$

Note: bulge/disk approach (3D shape → profile) not sensible for low-mass galaxies