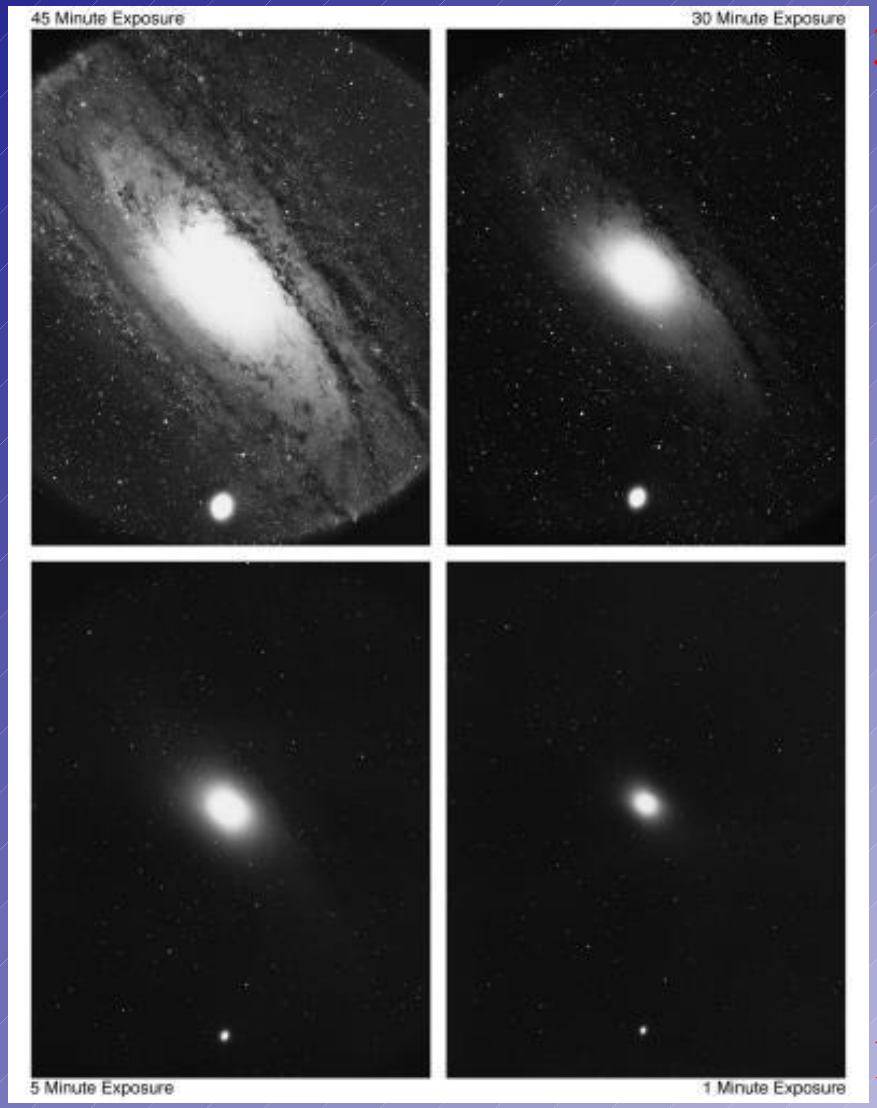
Misleading image display: time exposure

45min



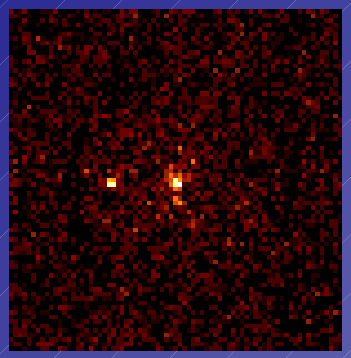
30min

Andromeda (M31)

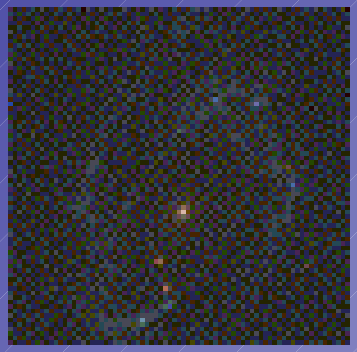
5min

1min

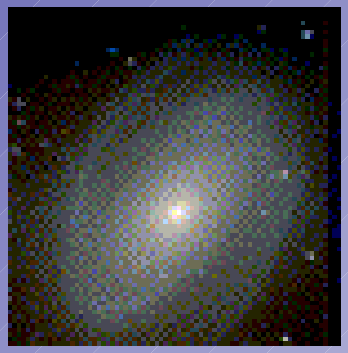
Dependence on the band
e.g. M81



X-ray

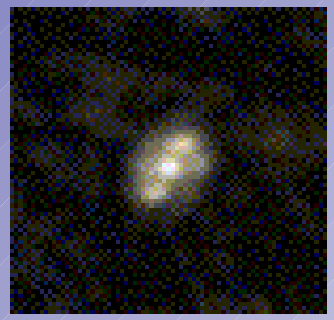


UV



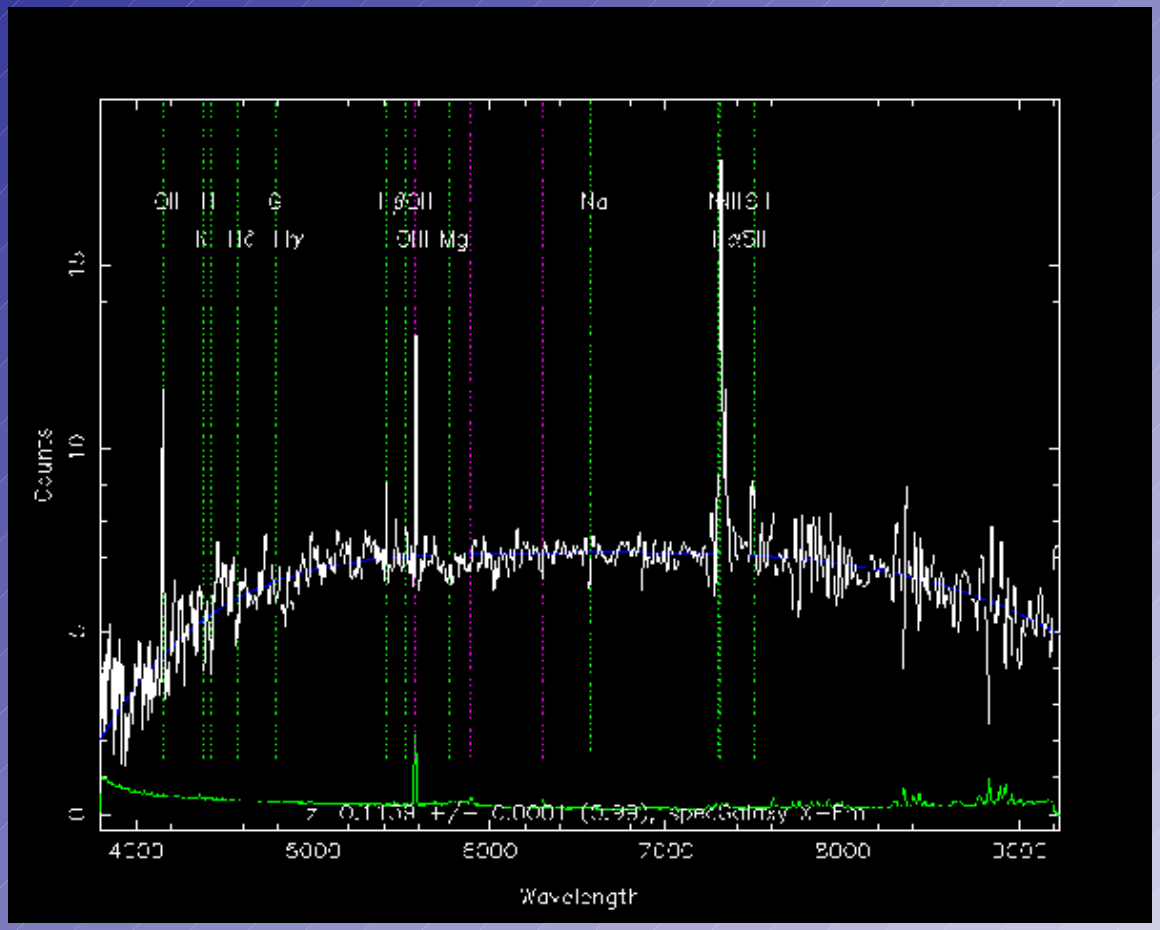
V

NIR



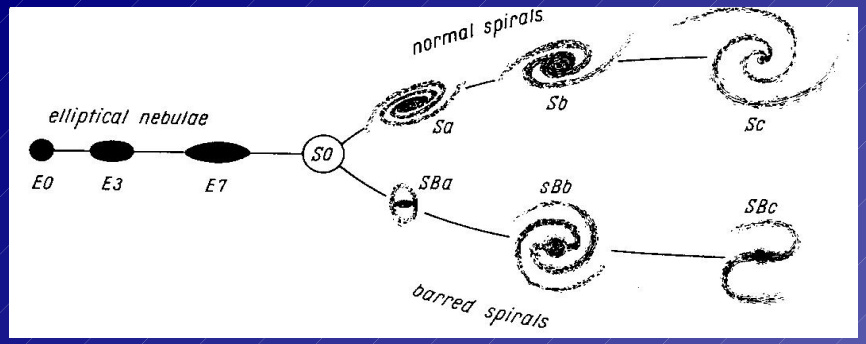
FIR

An emission-line galaxy



counts

wavelength



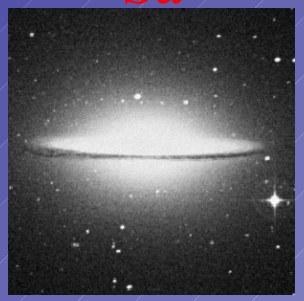
HUBBLE TUNING-FORK DIAGRAM

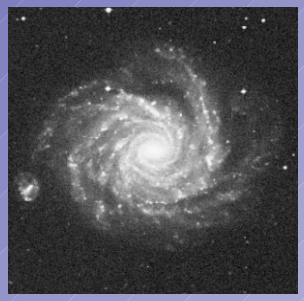
Sa

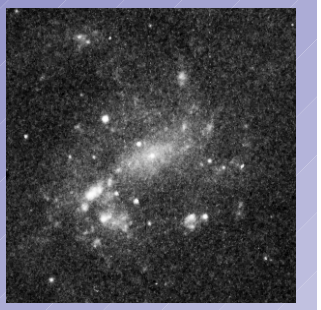
Sb

Sc

Sd







Early-type galaxies

E0/E1

E6

S0/SB0

M104(NGC4594)

M81 (NGC3031)

NGC1232

NGC4395

M87(NGC4486)

NGC3377

NGC7332

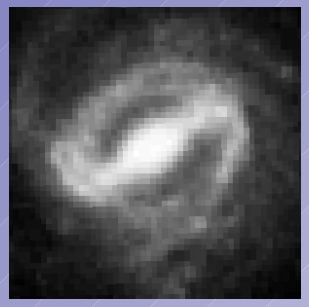
Late-type galaxies

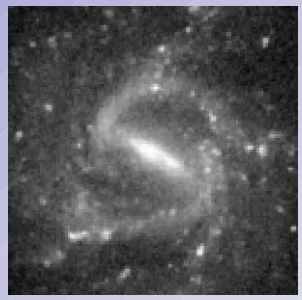
NGC175

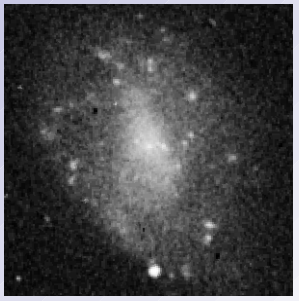
NGC1300

NGC1073

NGC4242







Lenticulars

SBa

SBb

SBc

SBd

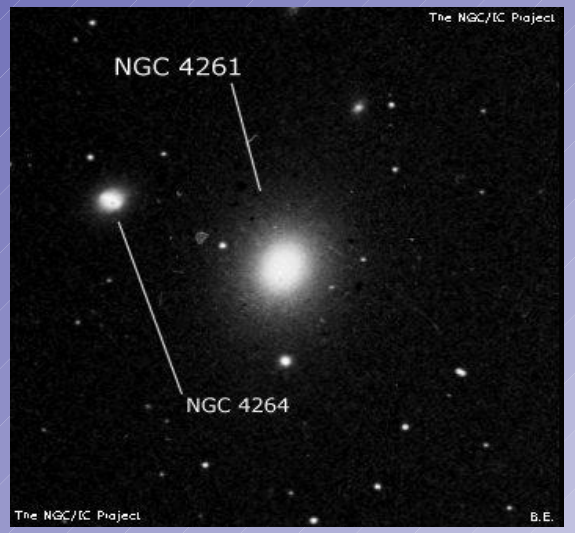
Elliptical Galaxies

En: n = 10(1-b/a)

M49(NGC4472) E1

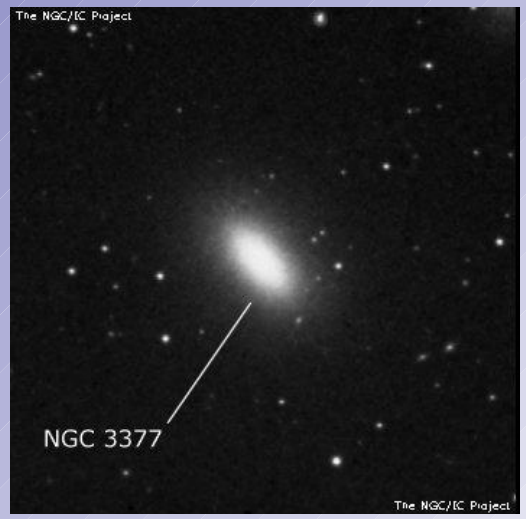
M32(NGC221) dE2

NGC4261 E3



M59 (NGC4621) E5

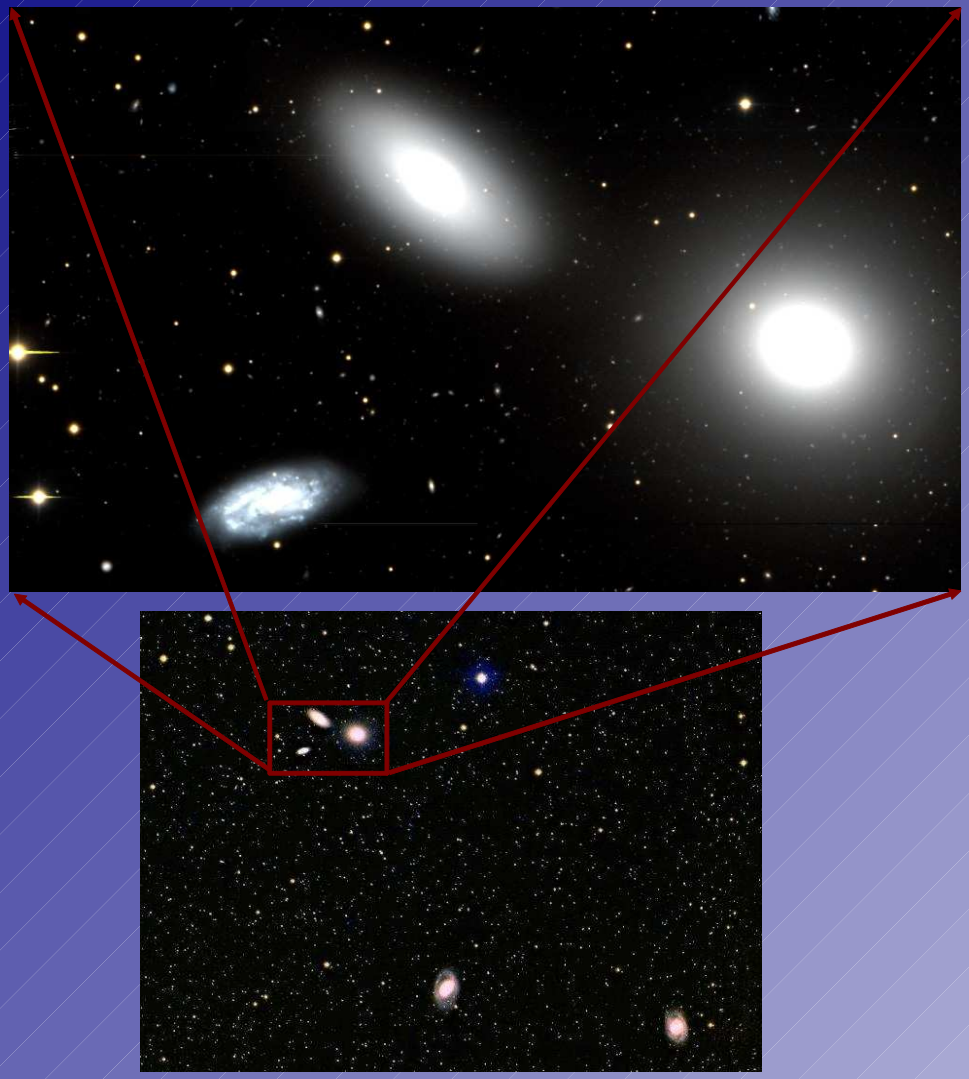
NGC3377 E6



M87 (NGC 4486)

- M87 is an E0/E1 cD galaxy.
- M87 is at the center of the Virgo cluster.
- Globular clusters are visible as bright spots around the galaxy.

M105 and the Leo I group



- M105 (NGC 3379) is an E0/E1 elliptical.
- The top galaxy is the lenticular NGC 3384.
- The bottom left galaxy is the spiral NGC 3389.

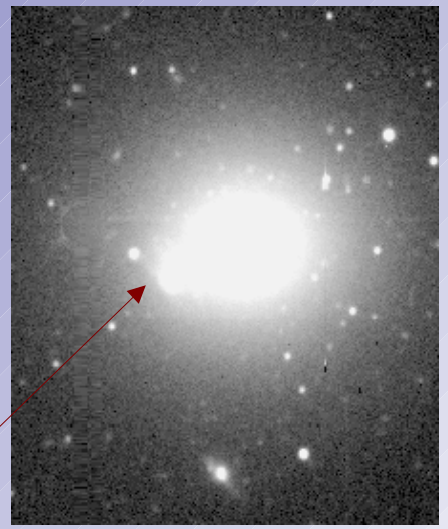
Dwarf Ellipticals

NGC147: dE5

NGC185: dE3

M110 (NGC205): dE6

NGC3115dw

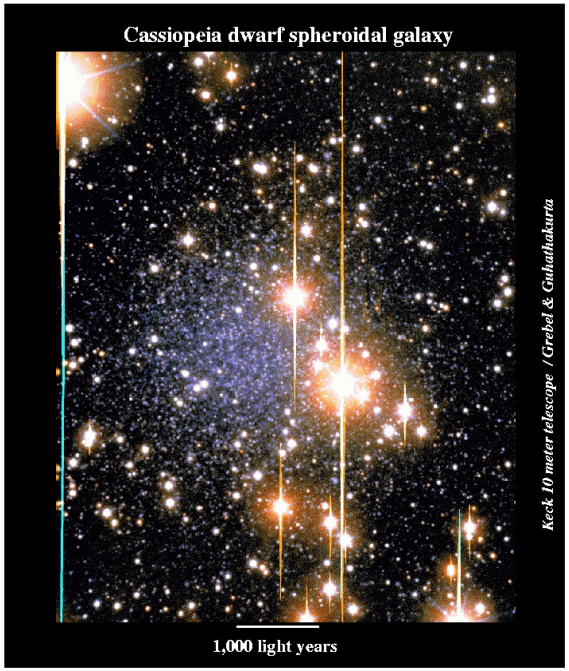


background spiral

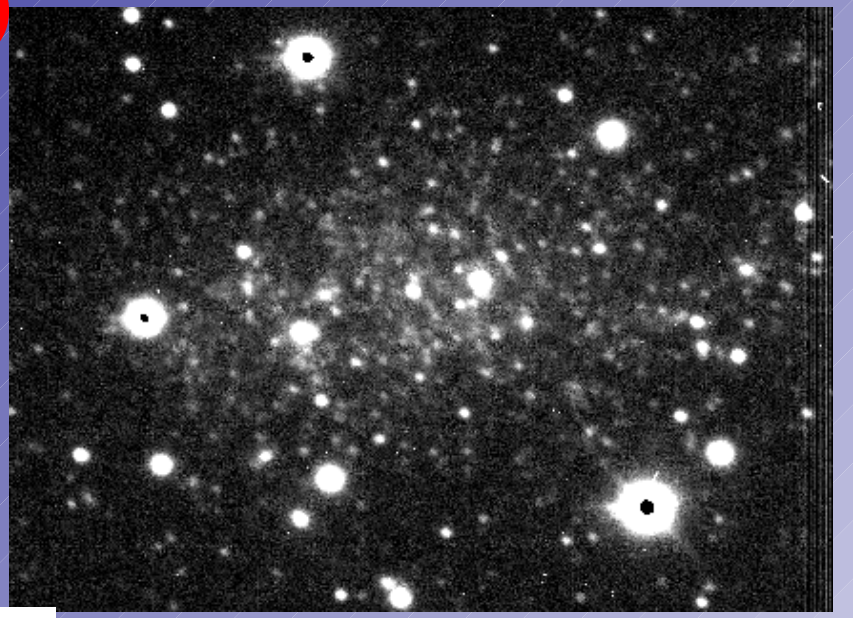
Dwarf Spheroidals (dSph)

Pegasus
(And VI)

Cassiopeia
(And VII)



Sagittarius (E7)



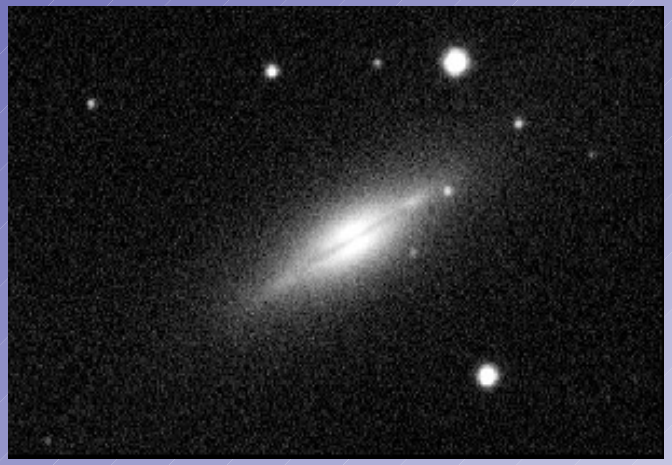
Leo I (E3)

Lenticulars

NGC4762 $S0_1$

NGC 4111 $S0_2$

NGC 5866 (M102) $S0_3$

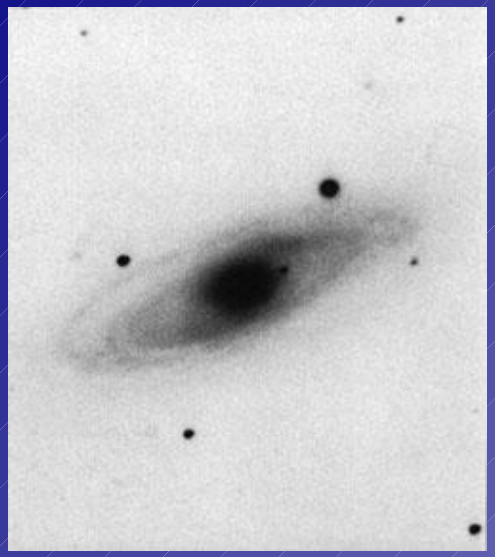


NGC3115 $S0_1$

M86 (NGC4406)

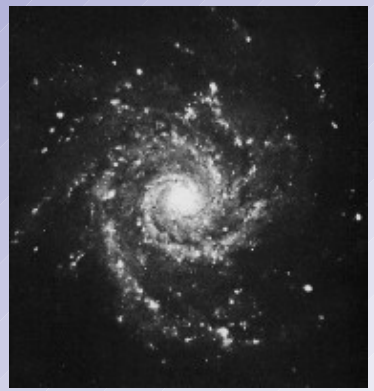
Spirals

NGC2811 Sa



NGC7793 Sd

NGC628 (M74) Sc



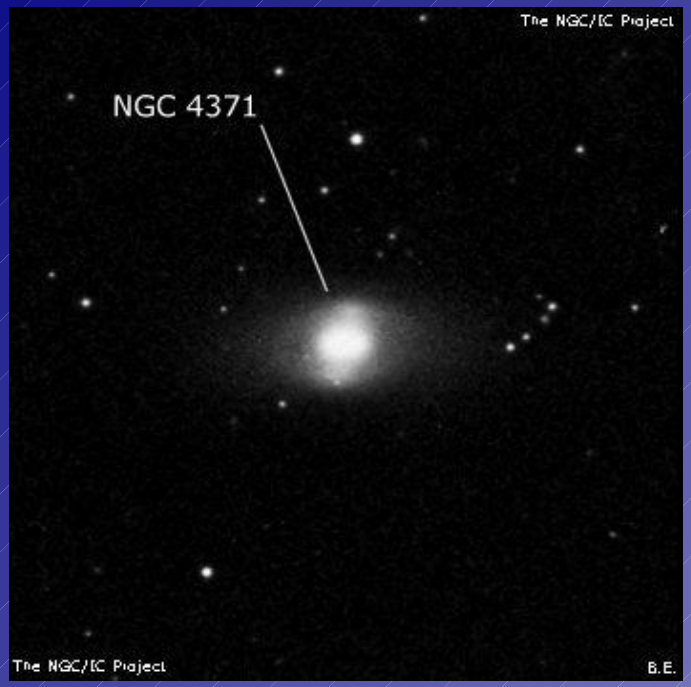
NGC2841 Sb

M100: Sc (in Virgo cluster)

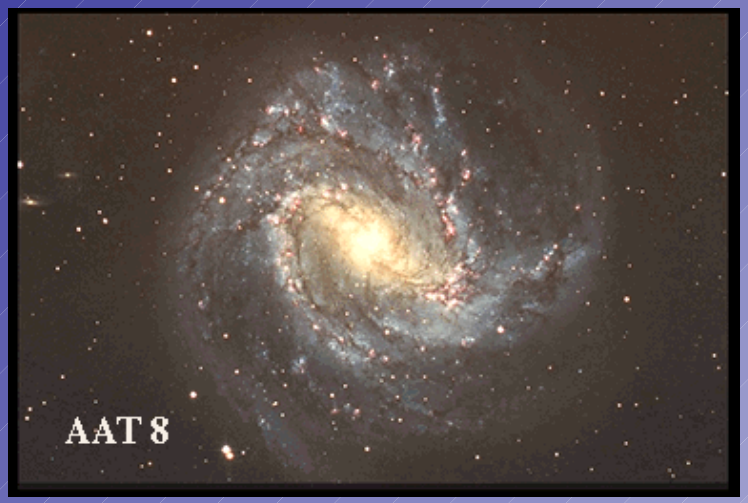
M101: Sc

Barred galaxies

NGC4371 SB0



M83 NGC5236 SBa



NGC1365 SBc

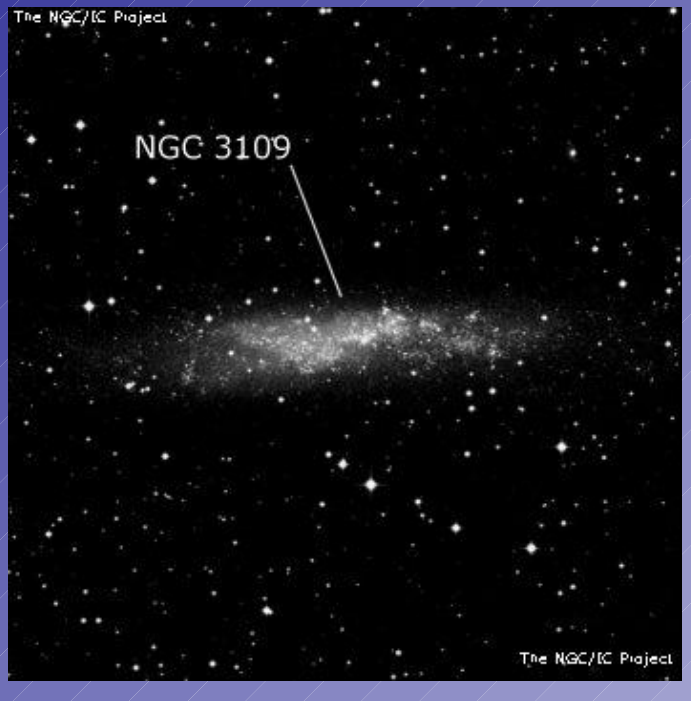
M61 SBb

M95 SBb

Irregulars

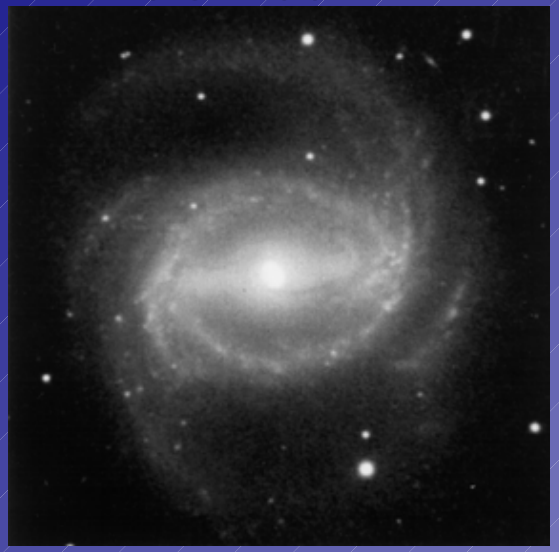
Large and Small Magellanic Cloud (LMC, SMC)

M82

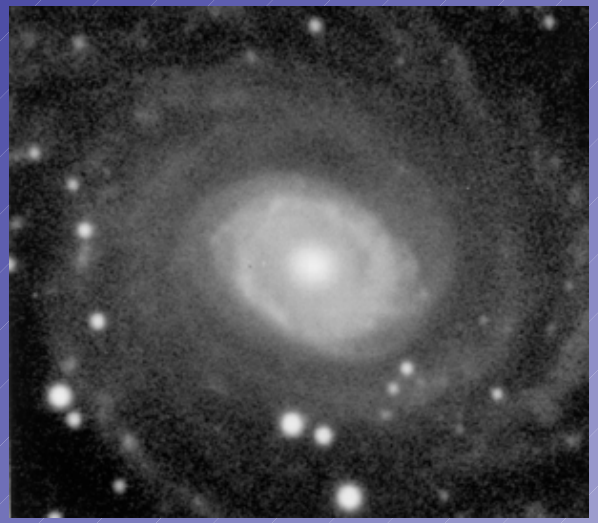


Ringed Galaxies

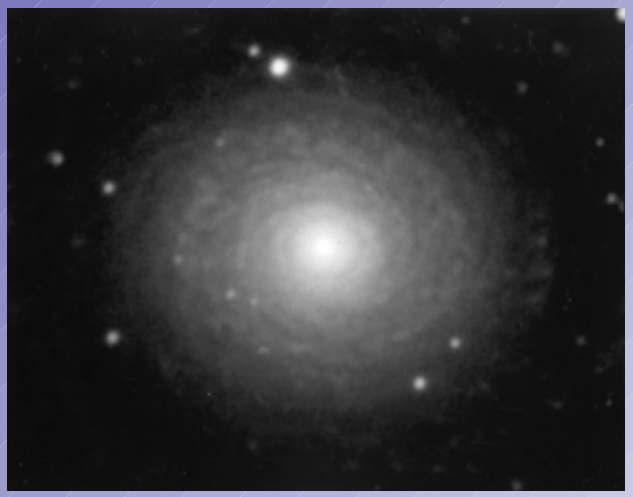
NGC1433



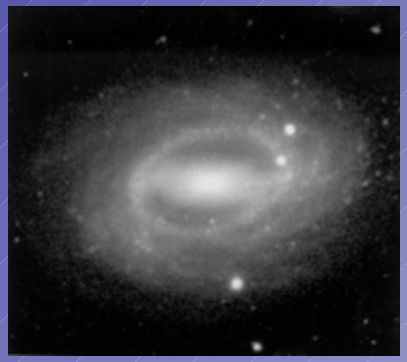
NGC6902



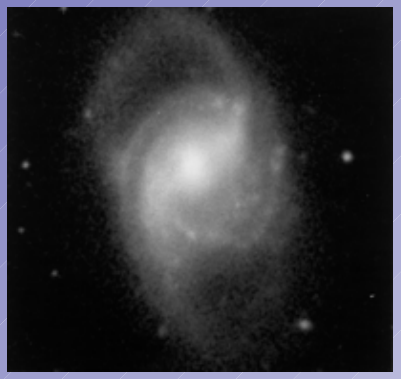
NGC7217



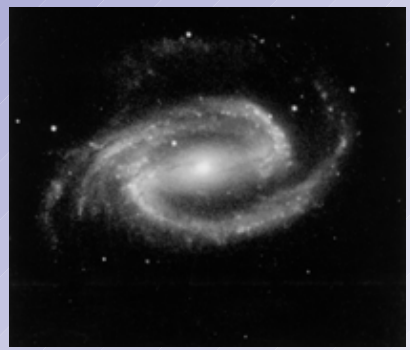
IC 5240 SB(r)



ESO 153-20 SB(rs)

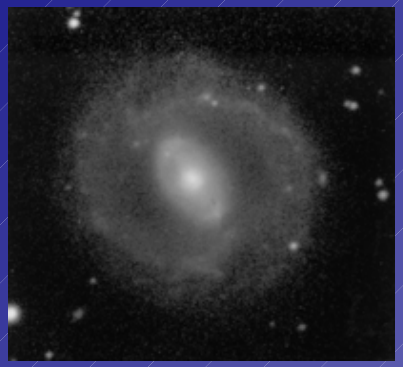


NGC1300 SB(s)

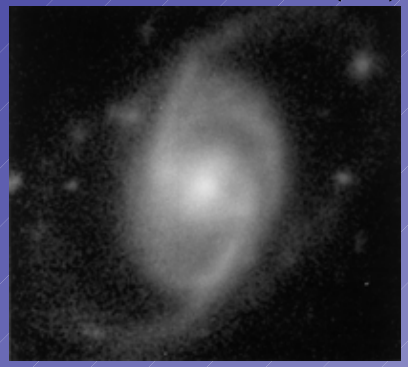


Ringed Galaxies (2)

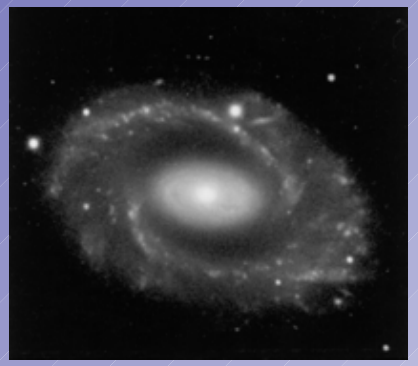
IC 1438 SAB(r)



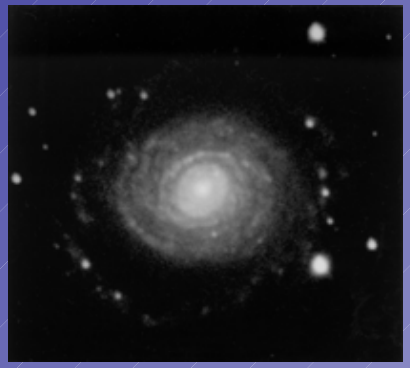
NGC 619 SAB(rs)



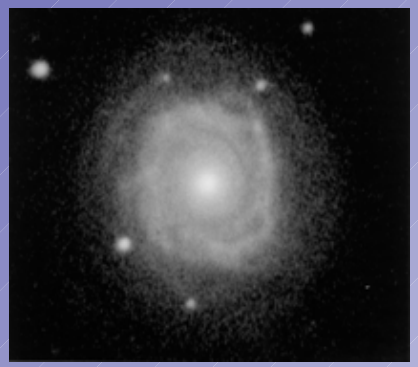
NGC 210 SAB(s)



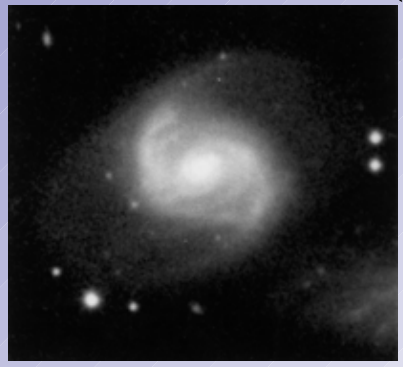
NGC6753 SA(r)



NGC 6935 SA(rs)

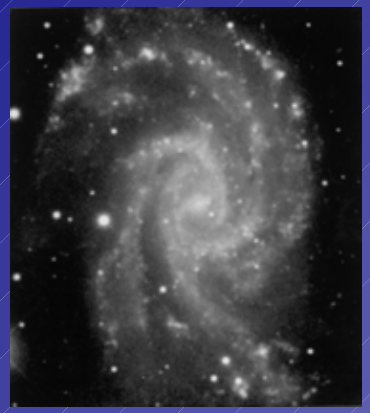


ESO 111-10 SA(s)

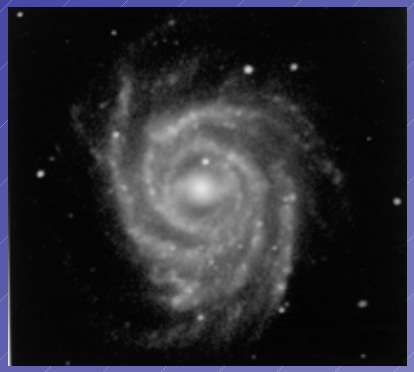


Ringed Galaxies (3)

NGC2835



NGC 3124

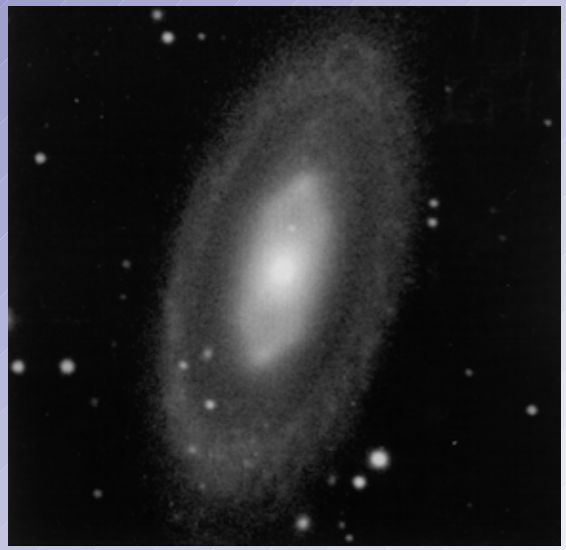


NGC 4553 S0(r)

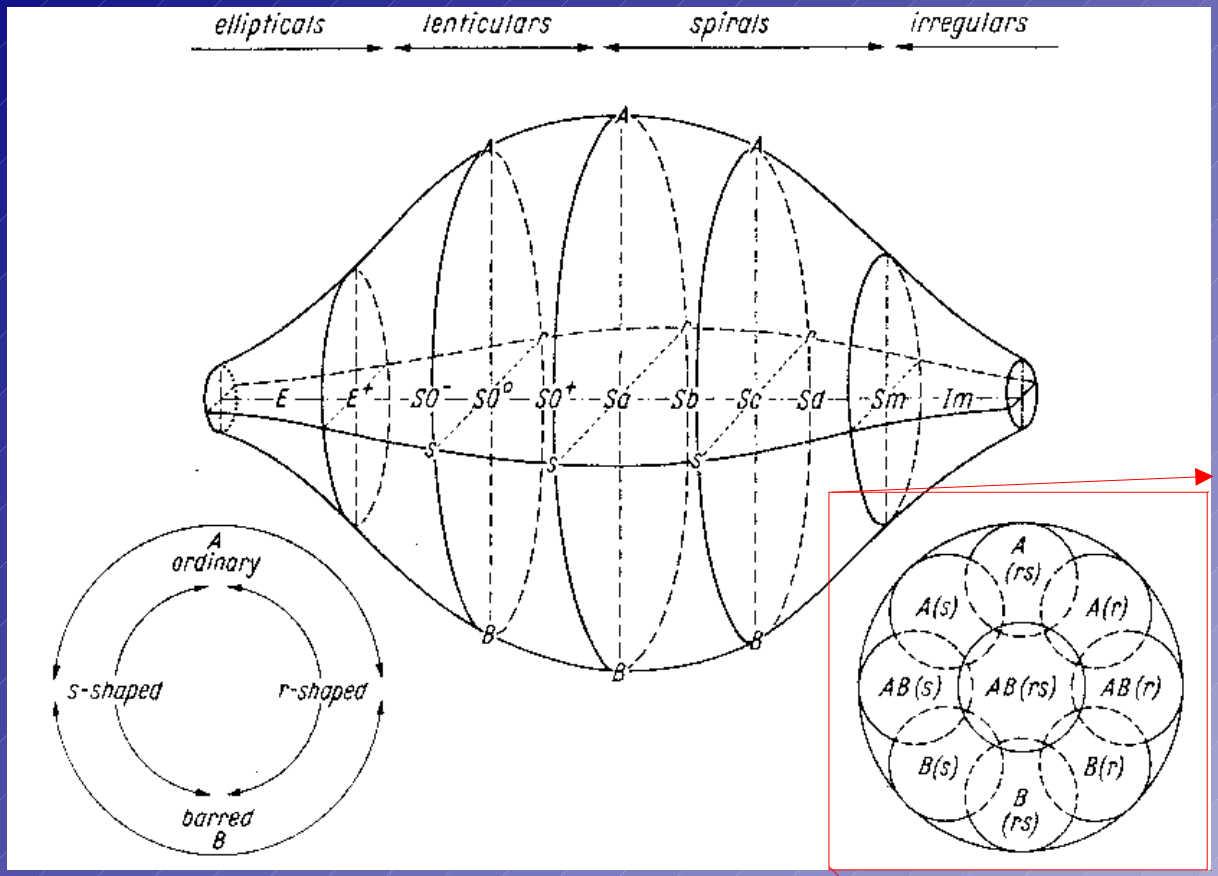
NGC 4429 S0(r)

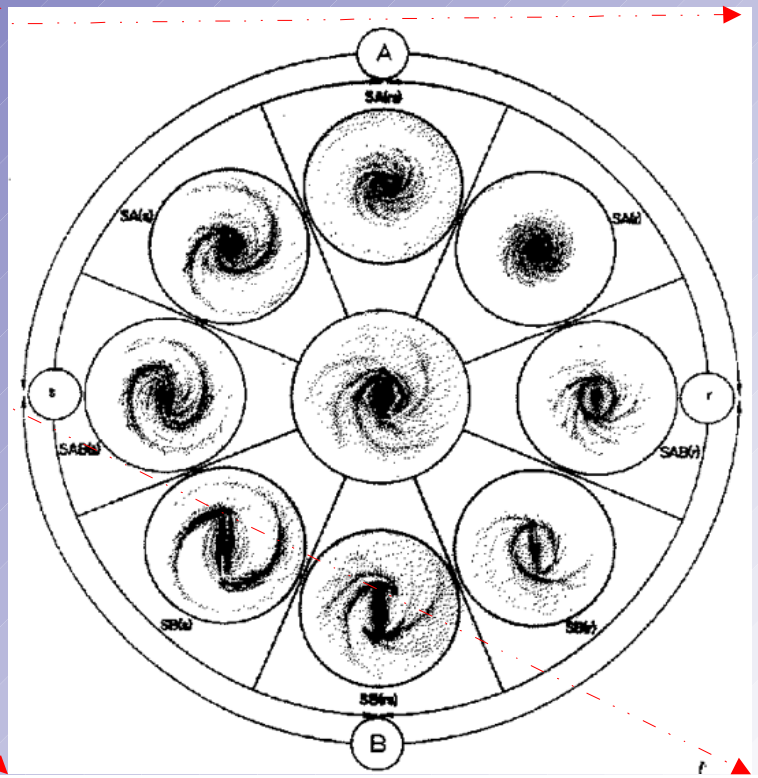
NGC7187
(R)SA(r)0+

NGC 7020



de Vaucouleurs 3D diagram





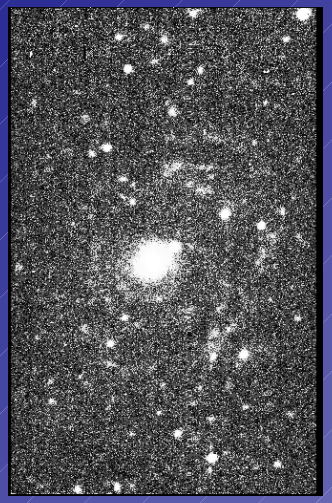
(Combes & Buta 1996)

Low Surface Brightness (LSB) Gals.

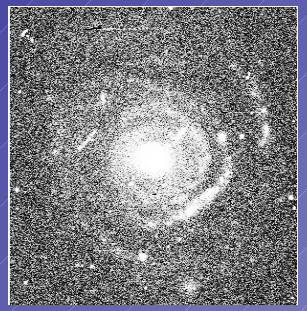
central $\mu_B \, ge \, 23 \, mag \, arcsec^{-2}$

SB distribution for HSB gals
peaks at ~21.5 (spirals)
~15 (ellipticals)

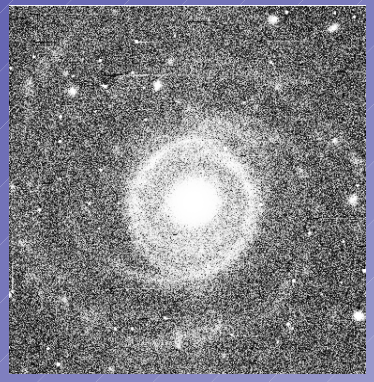
Malin 1



Malin 2

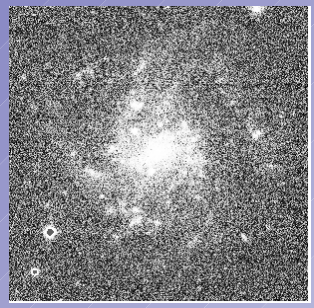


UGC6614



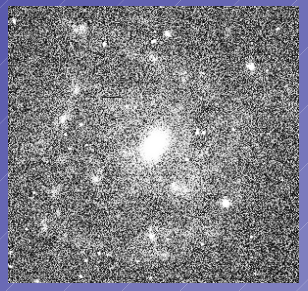
150 kpc

UGC 1230

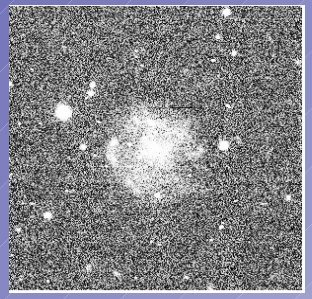


15 kpc

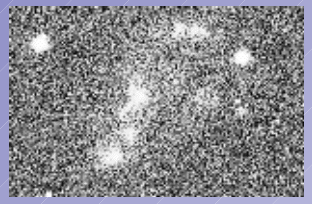
UGC9024



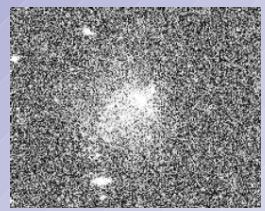
F561-1



F469-2

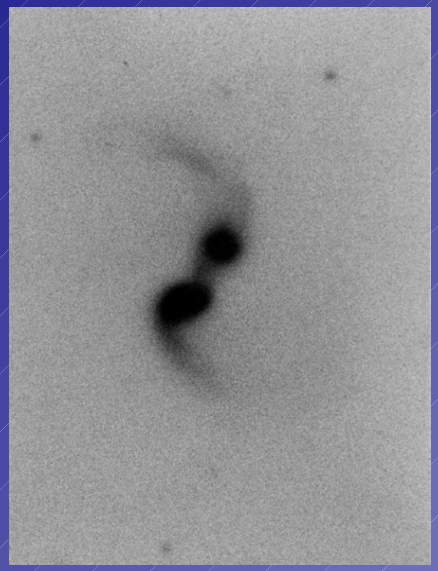


F611-1

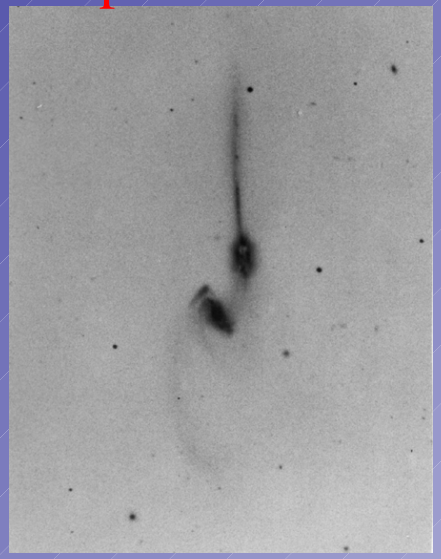


M51

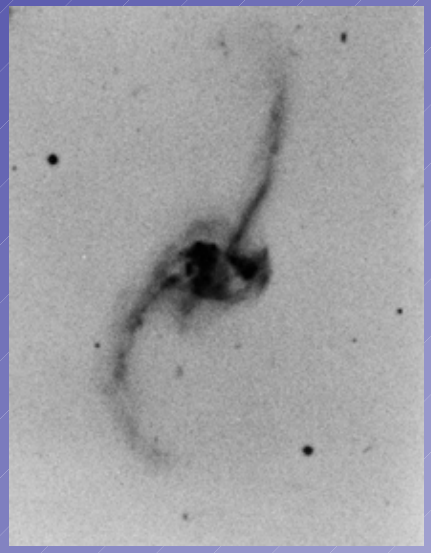
Arp 241



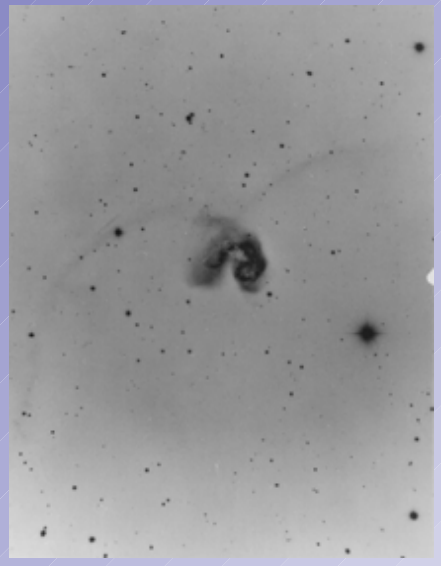
Arp 242



Arp 243



Arp 244



NGC 7252 -- Arp 226

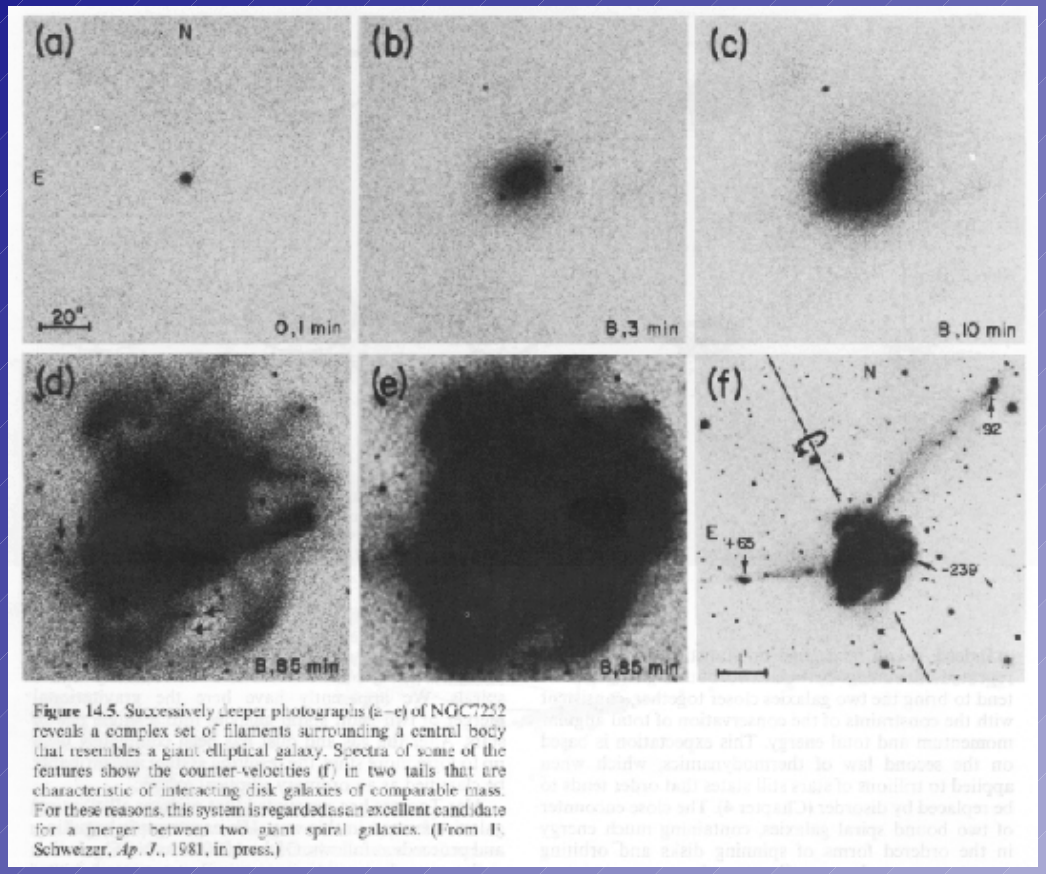
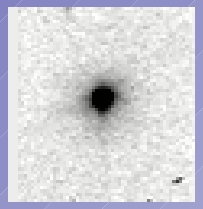
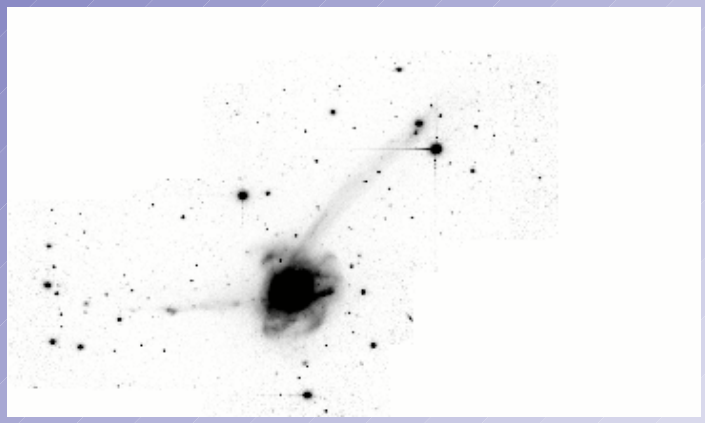


Figure 14.5. Successively deeper photographs (a–e) of NGC7252 reveals a complex set of filaments surrounding a central body that resembles a giant elliptical galaxy. Spectra of some of the features show the counter-velocities (f) in two tails that are characteristic of interacting disk galaxies of comparable mass. For these reasons, this system is regarded as an excellent candidate for a merger between two giant spiral galaxies. (From E. Schweizer, *Ap. J.*, 1981, in press.)



K-band

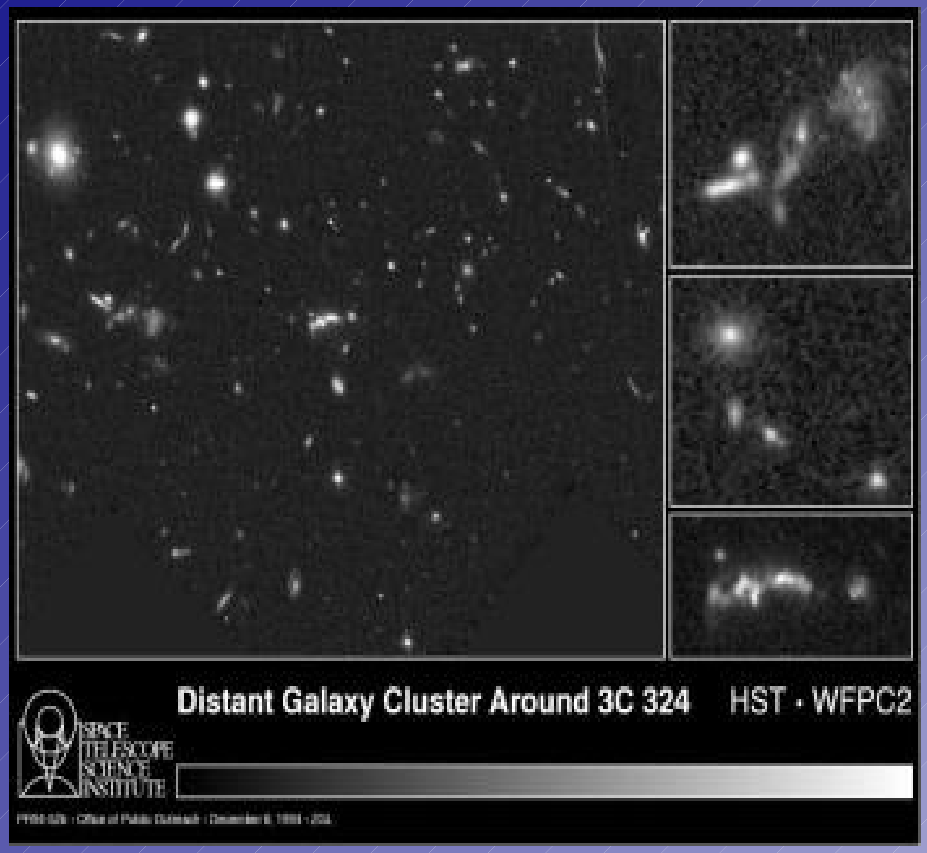


B-band

Successively deeper images (a-e)

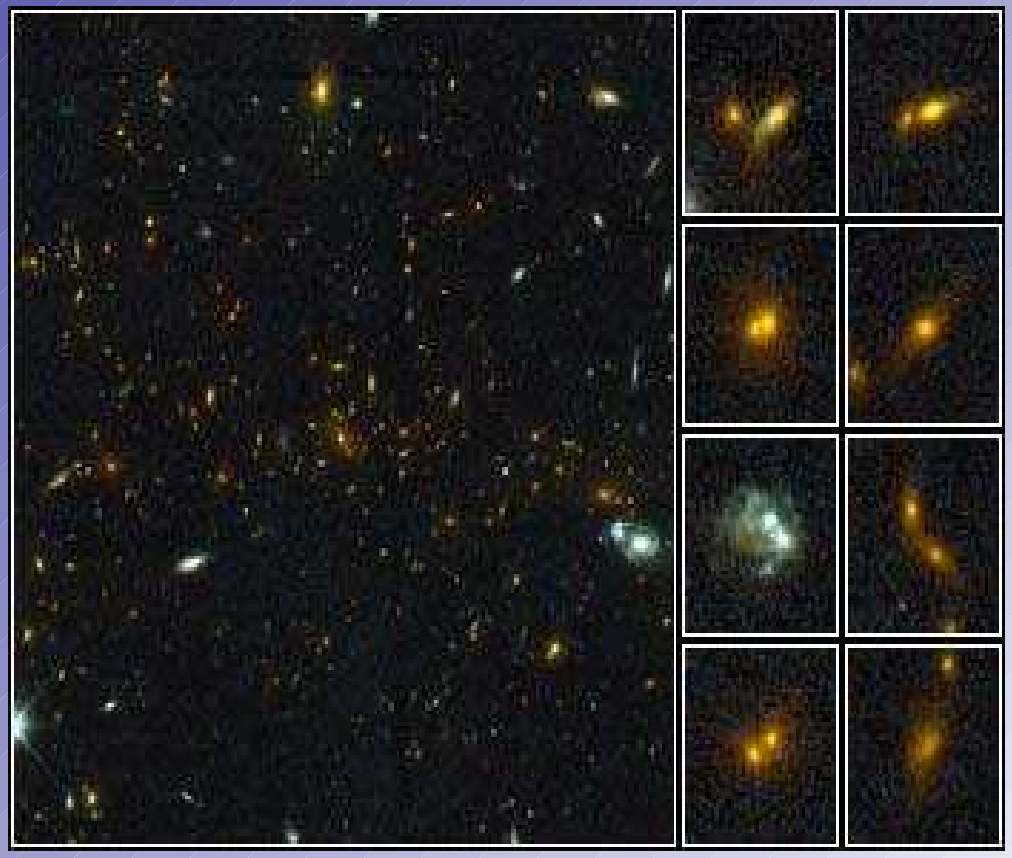
Morphology at high redshift

z=1.2

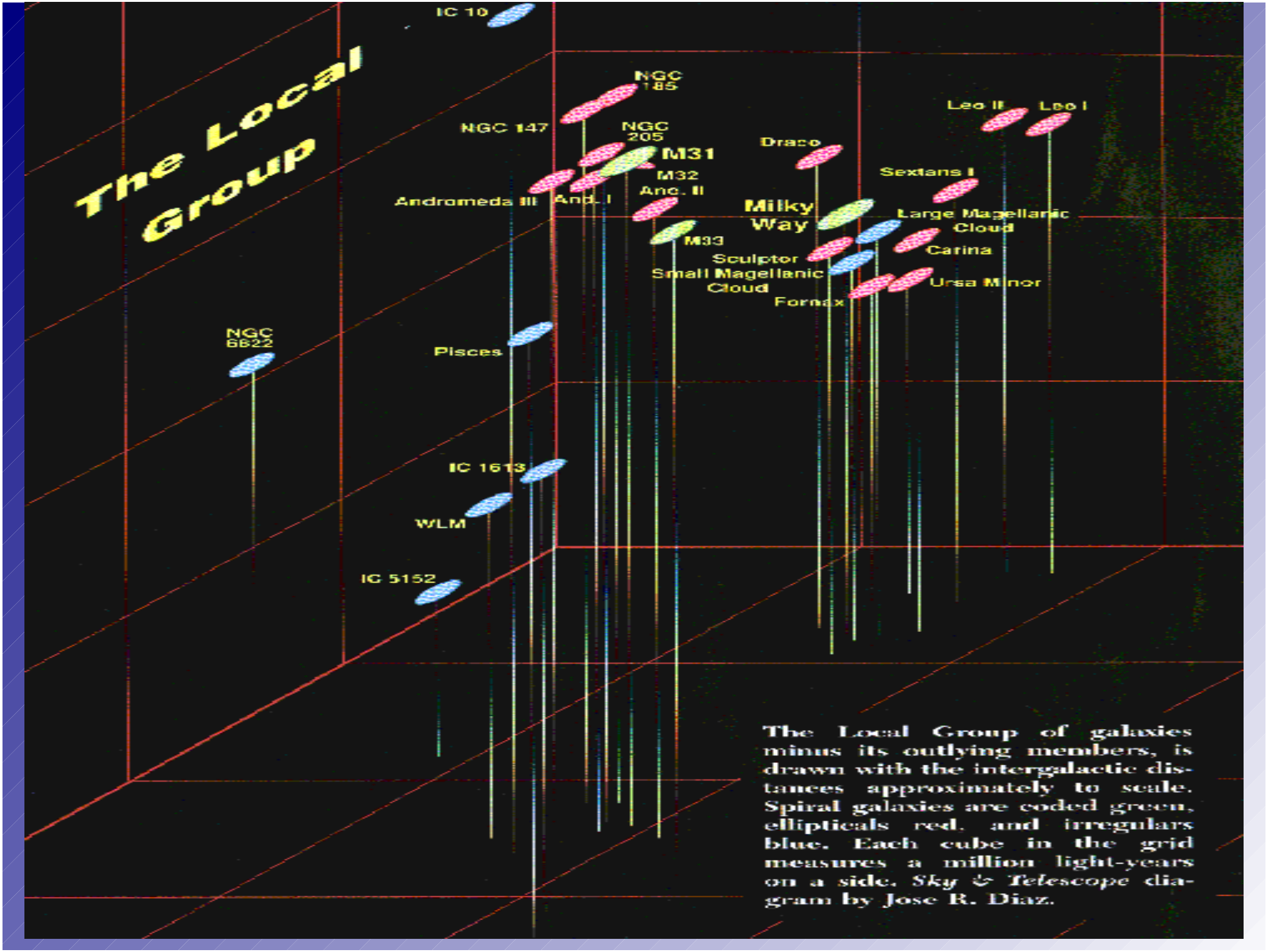


3C324

z=0.83

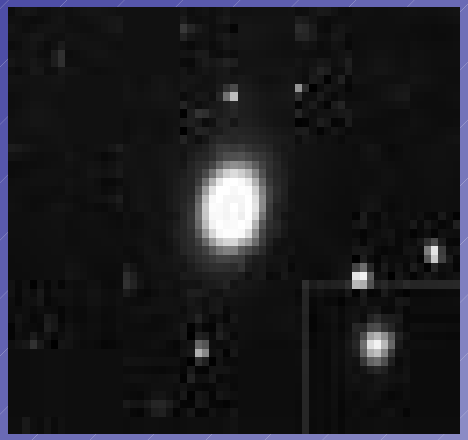


MS1054-03



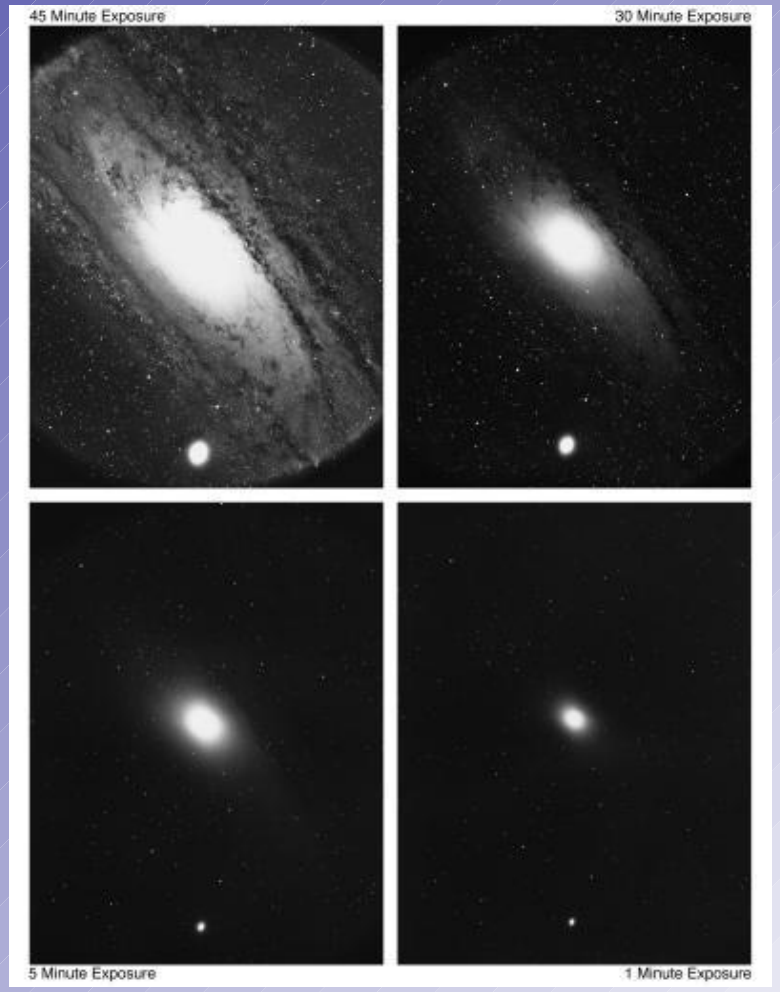
The Local Group of galaxies minus its outlying members, is drawn with the intergalactic distances approximately to scale. Spiral galaxies are coded green, ellipticals red, and irregulars blue. Each cube in the grid measures a million light-years on a side. *Sky & Telescope* diagram by Jose R. Diaz.

Misleading image display



M87

Andromeda
(M31)



Sizes

Andromeda and the moon