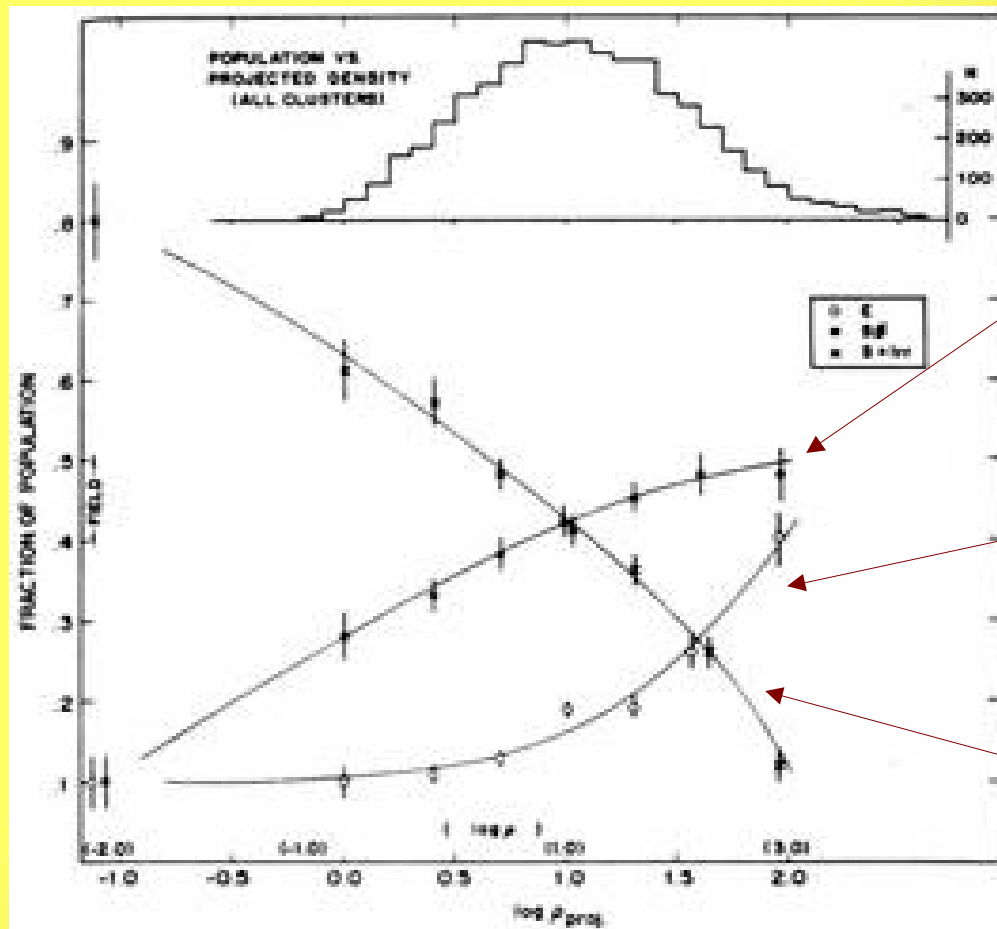


# The morphology-density relation

Fraction of population



Lenticulars

Ellipticals

Spirals

cluster outskirts

cluster center

Log(projected density)

(Dressler 1980)

# Morph. vs. density or vs. radius?

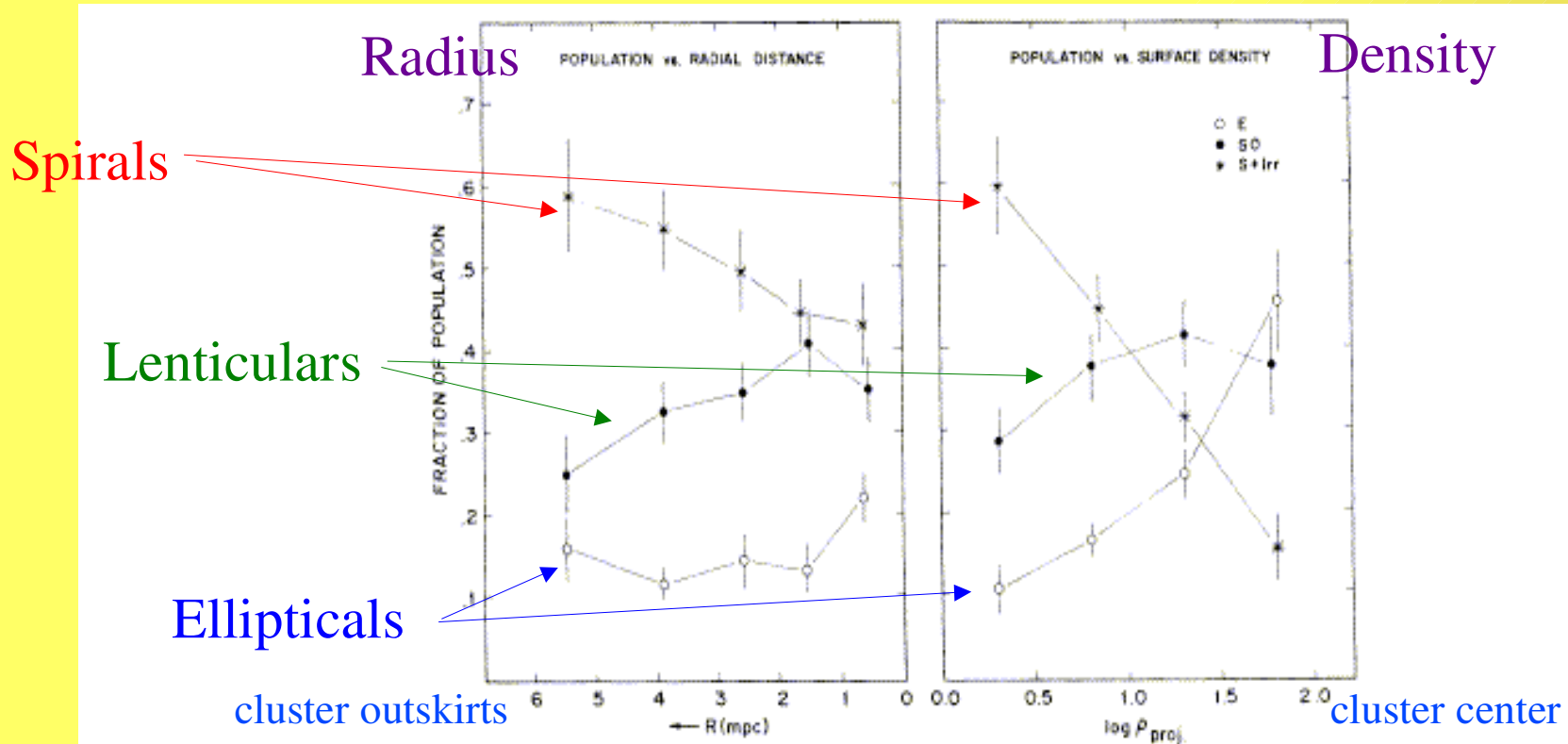


FIG. 5.—Population gradients in 6 moderately irregular clusters (A754, A993, A1736, A1983, 0326–53, 0559–40) as a function of radial distance from the cluster centroid and as a function of local surface density, showing the advantage of density as the free parameter.

# HI (5x enlarged) maps of galaxies in Virgo

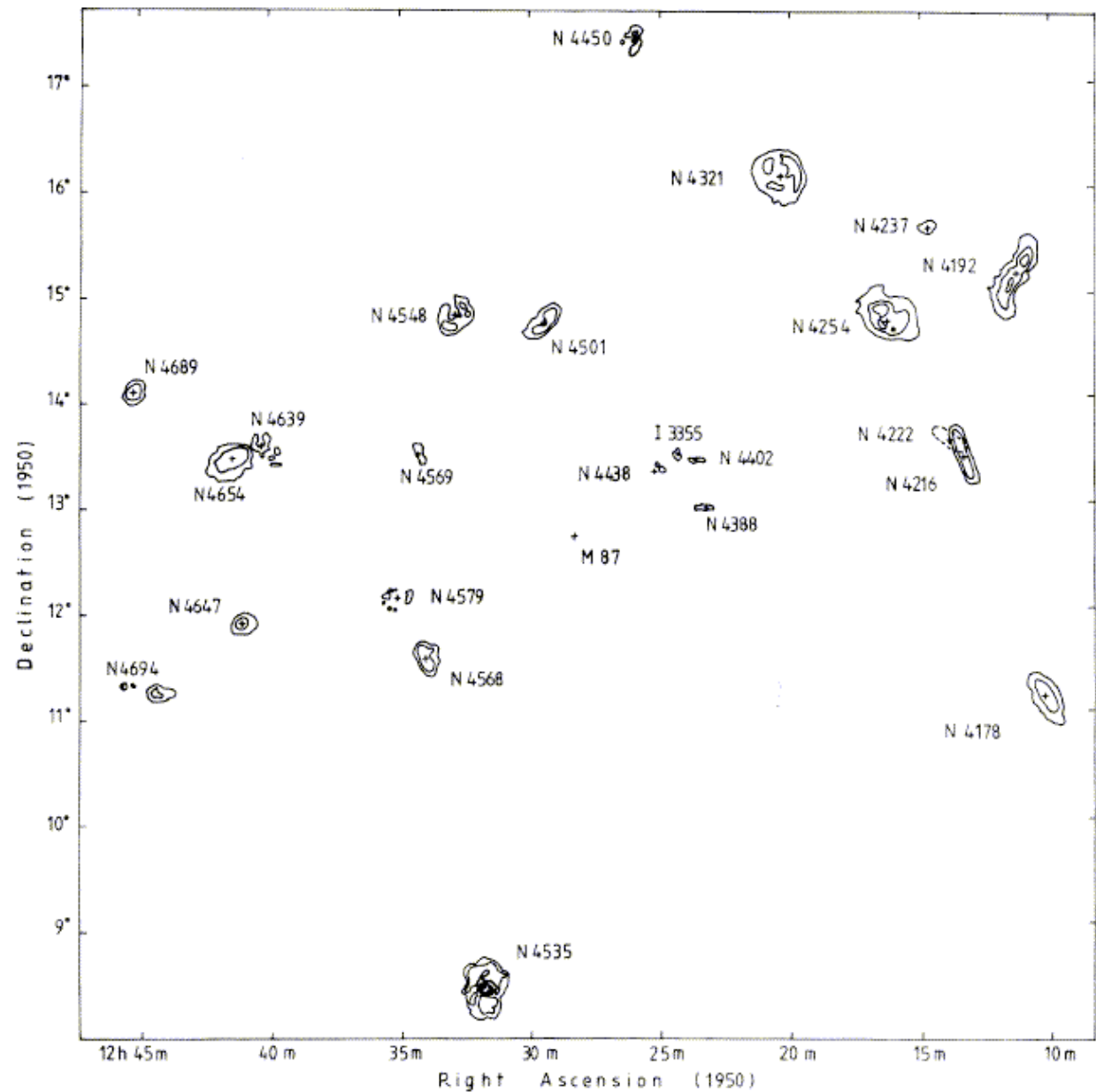


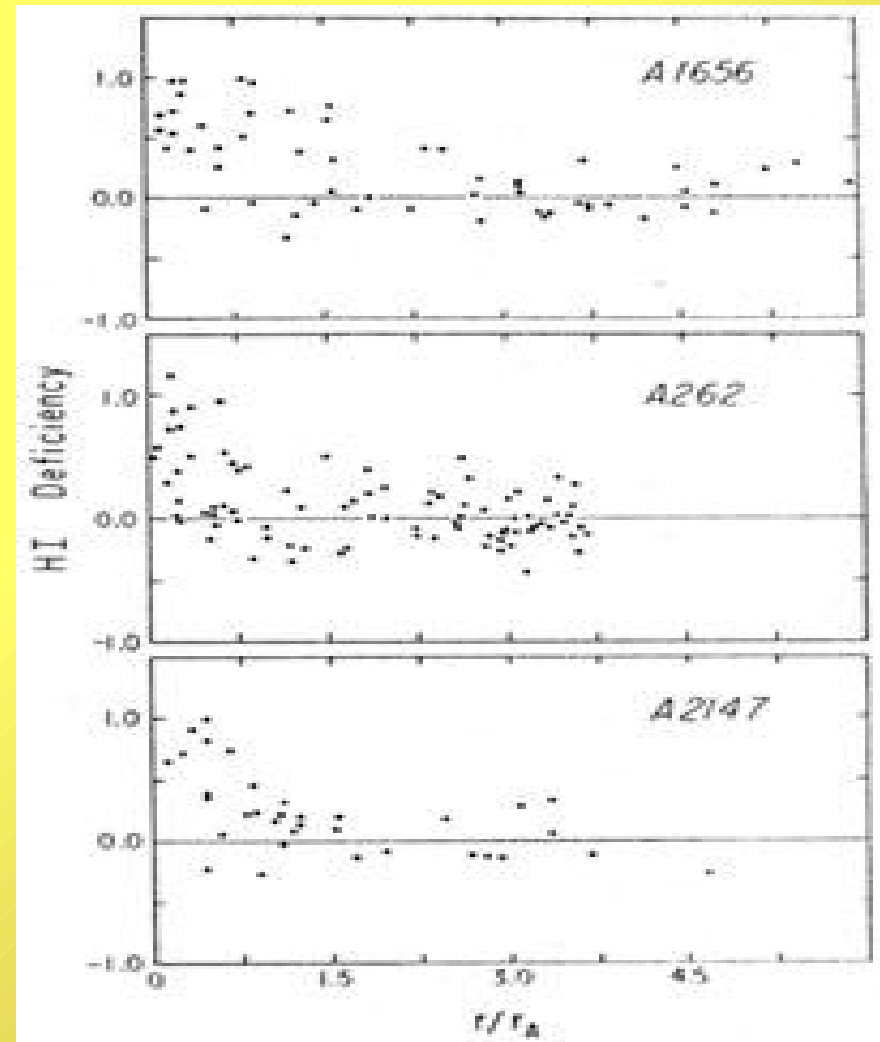
FIG. 23. Integrated neutral hydrogen maps of the brightest spirals in the Virgo Cluster center. Each map has been drawn at the galaxy position indicated by a cross and magnified by a factor of 5 compared with the scale in right ascension and declination. The first contour in each map corresponds approximately to a column density of  $10^{20}$  atoms  $\text{cm}^{-2}$  (even if it is not the case in the maps published in Figs. 1–22 especially for NGC 4388, 4450, 4569, 4694).

Cayatte et al 1990

HI deficiency =

$$\frac{\langle \text{HI} \rangle - \text{HI}}{\langle \text{HI} \rangle}$$

for spirals only!



cluster center

cluster outskirts

(Haynes, Giovanelli & Chincarini 1984)

# The Schechter Luminosity Function

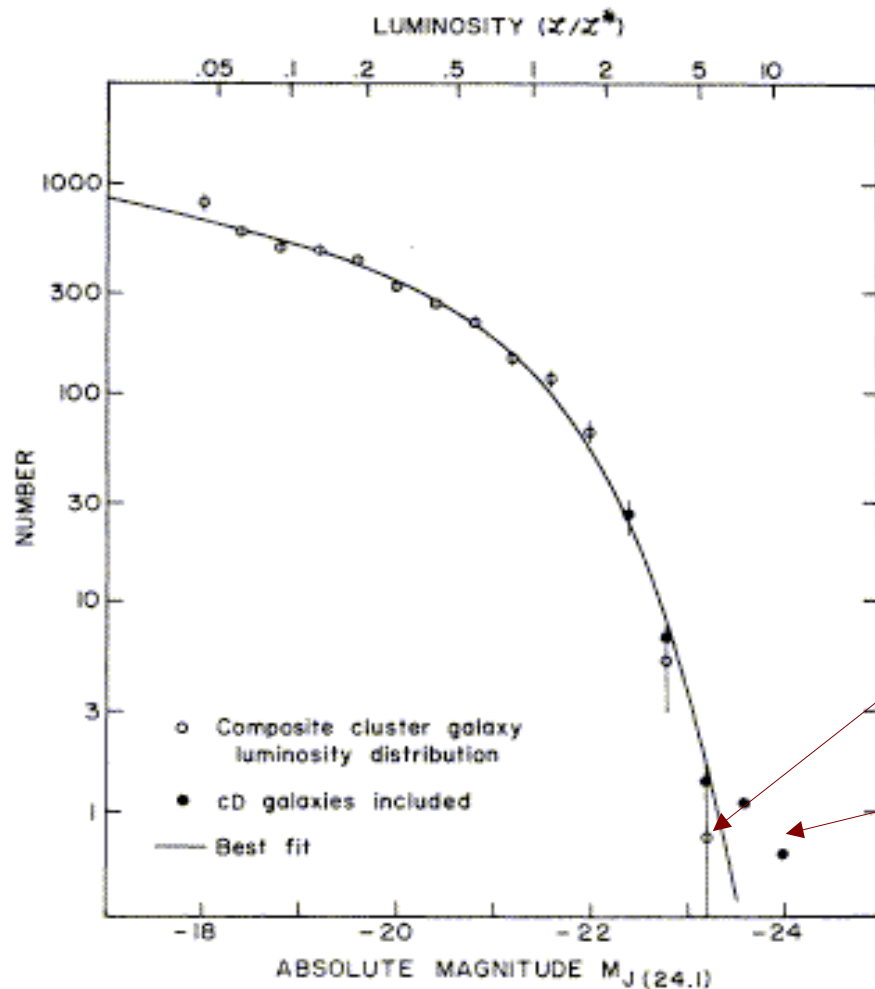


FIG. 2.—Best fit of analytic expression to observed composite cluster galaxy luminosity distribution. Filled circles show the effect of including cD galaxies in composite.

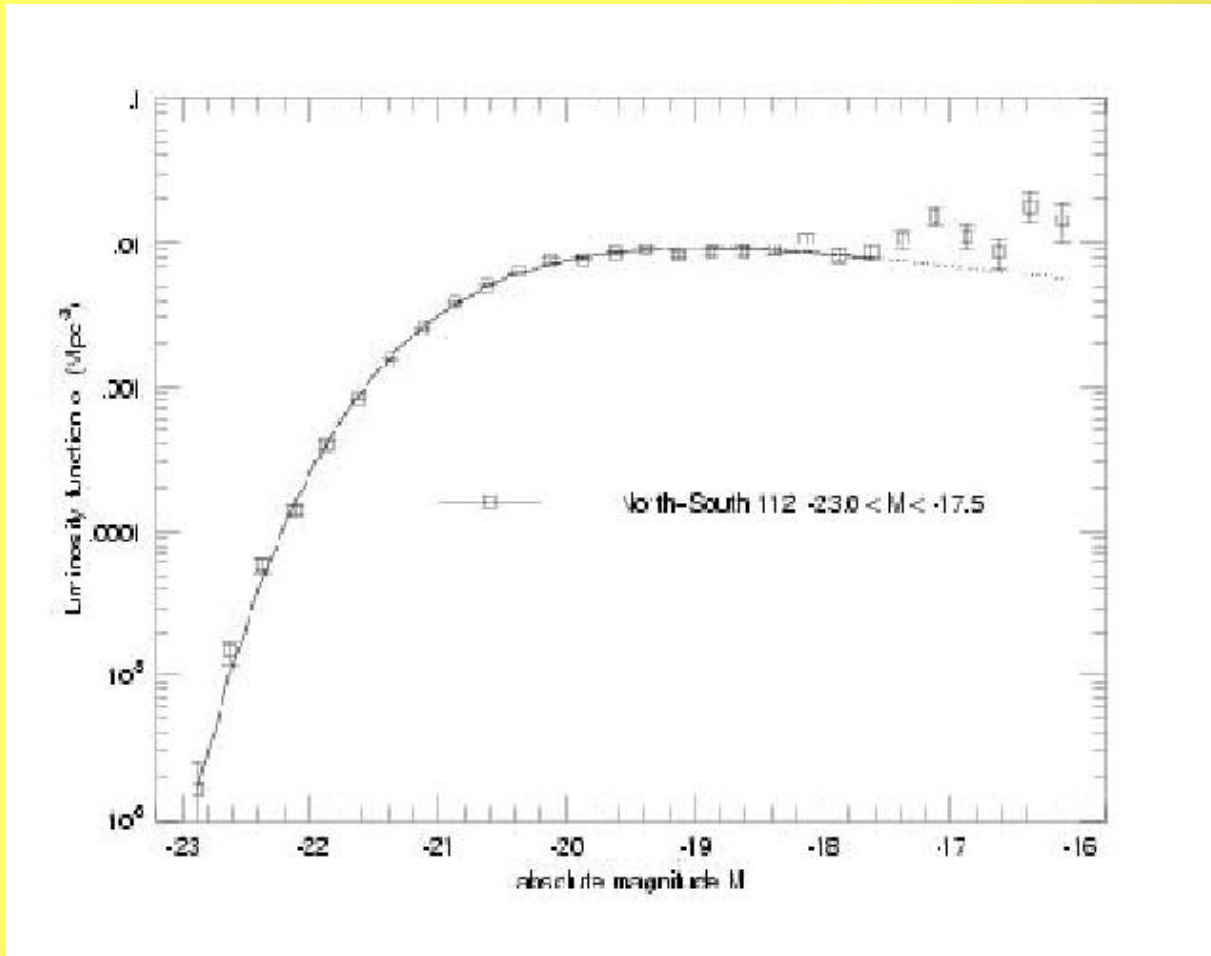
excluding cD galaxies

including cD galaxies

(Schechter 1976)

# Luminosity Function

Luminosity function ( $\text{Mpc}^{-3}$ )



bright

Absolute Magnitude ( $M_R$ )

faint

(LCRS: Lin et al 1996)

# The LF of galaxies of different morph. type

Faint end

Galaxy population:

Ellipticals

dE

S0

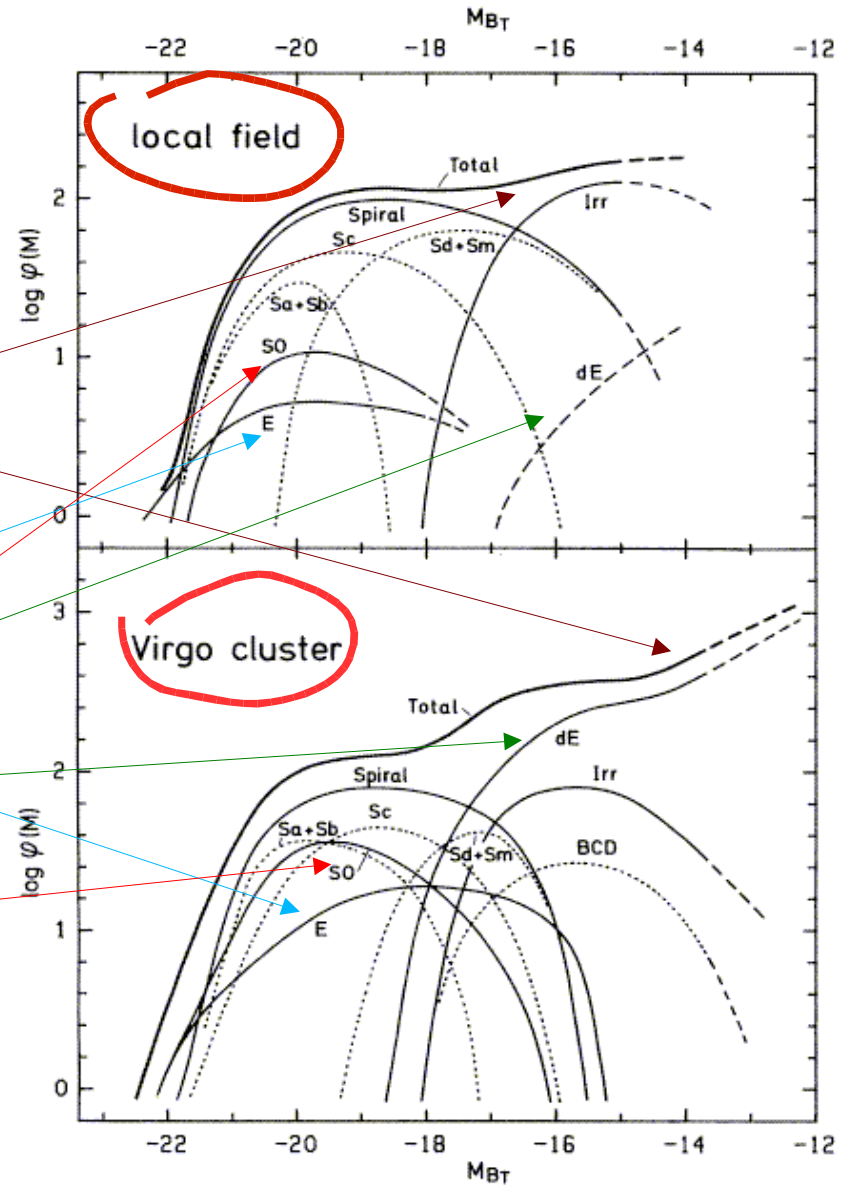
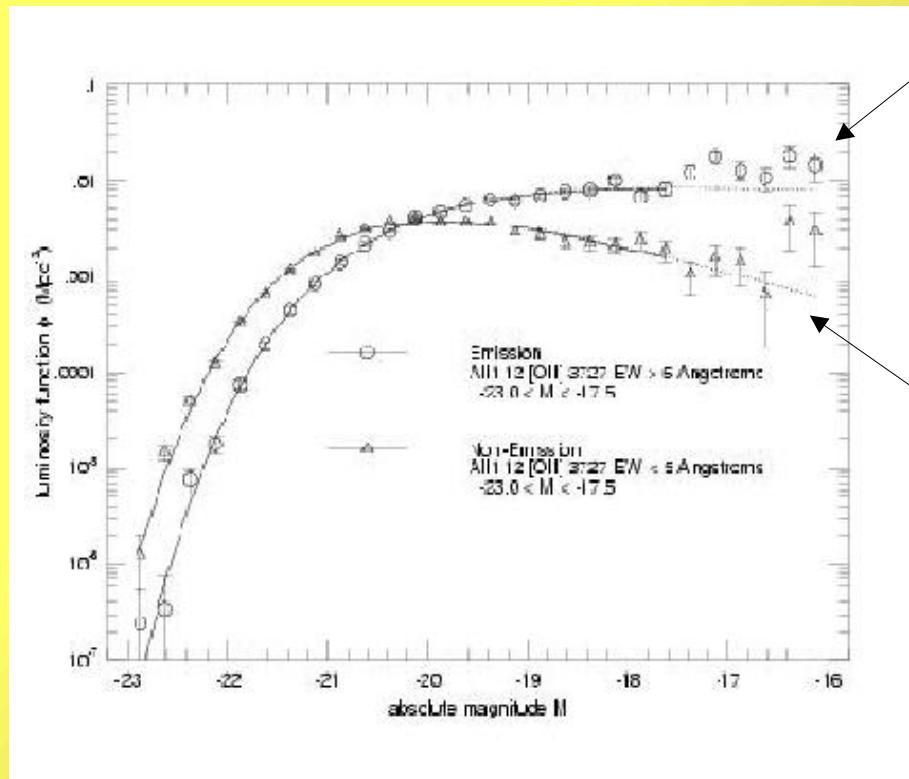


Figure 1 The LF of field galaxies (top) and Virgo cluster members (bottom). The zero point of  $\log \phi(M)$  is arbitrary. The LFs for individual galaxy types are shown. Extrapolations are marked by dashed lines. In addition to the LF of all spirals, the LFs of the subtypes Sa + Sb, Sc, and Sd + Sm are also shown as dotted curves. The LF of Irr galaxies comprises the Im and BCD galaxies; in the case of the Virgo cluster, the BCDs are also shown separately. The classes dS0 and "dE or Im" are not illustrated. They are, however, included in the total LF over all types (heavy line).

(Binggeli, Sandage & Tammann 1988)

# LF vs Spectral Properties

Luminosity function ( $\text{Mpc}^{-3}$ )



Emission line

OII 3727

Non-emission line

bright

Absolute Magnitude (R)

faint

(LCRS: Lin et al 1996)

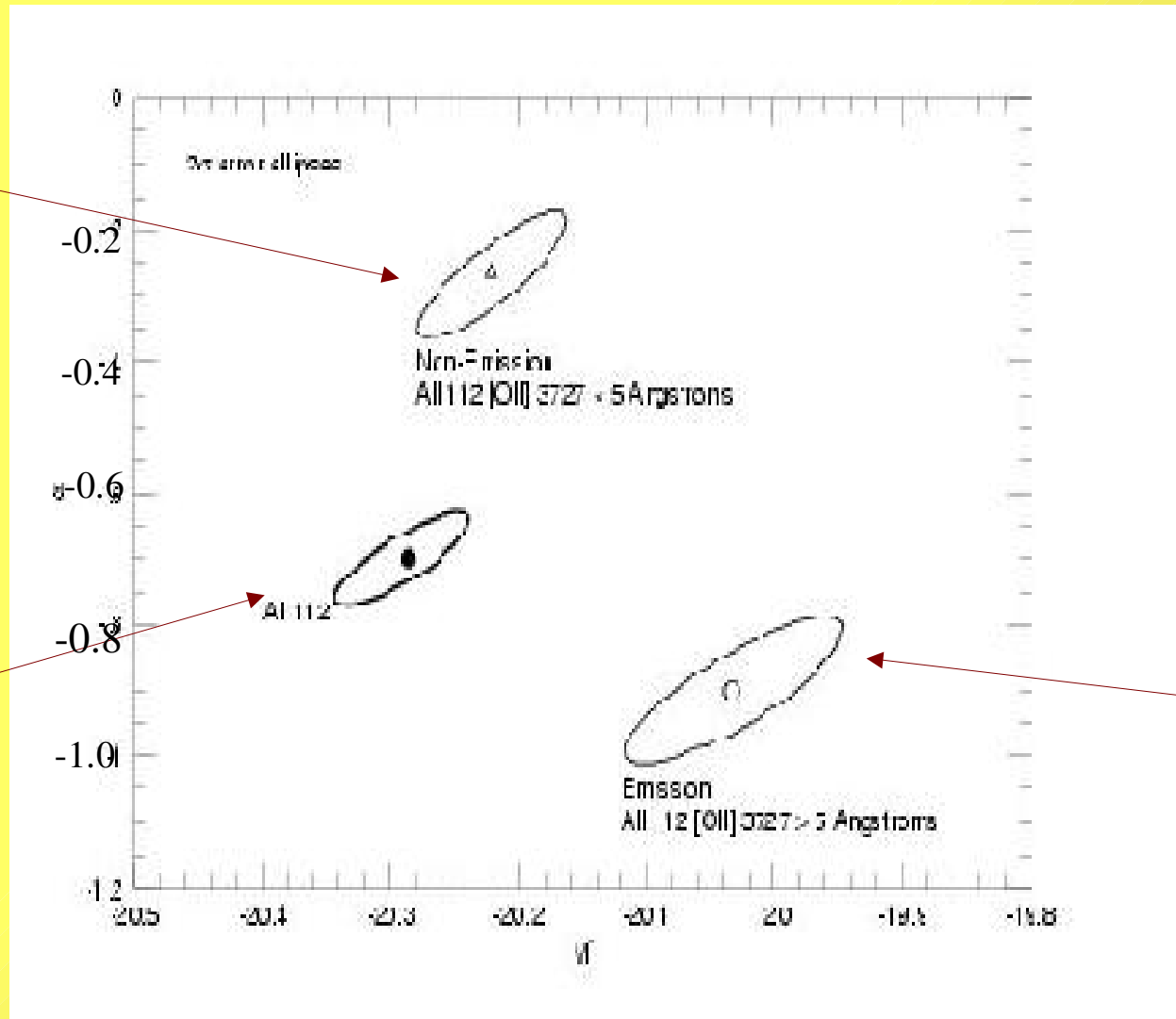


# LF Parameters

Non-Emission

alpha

Total sample



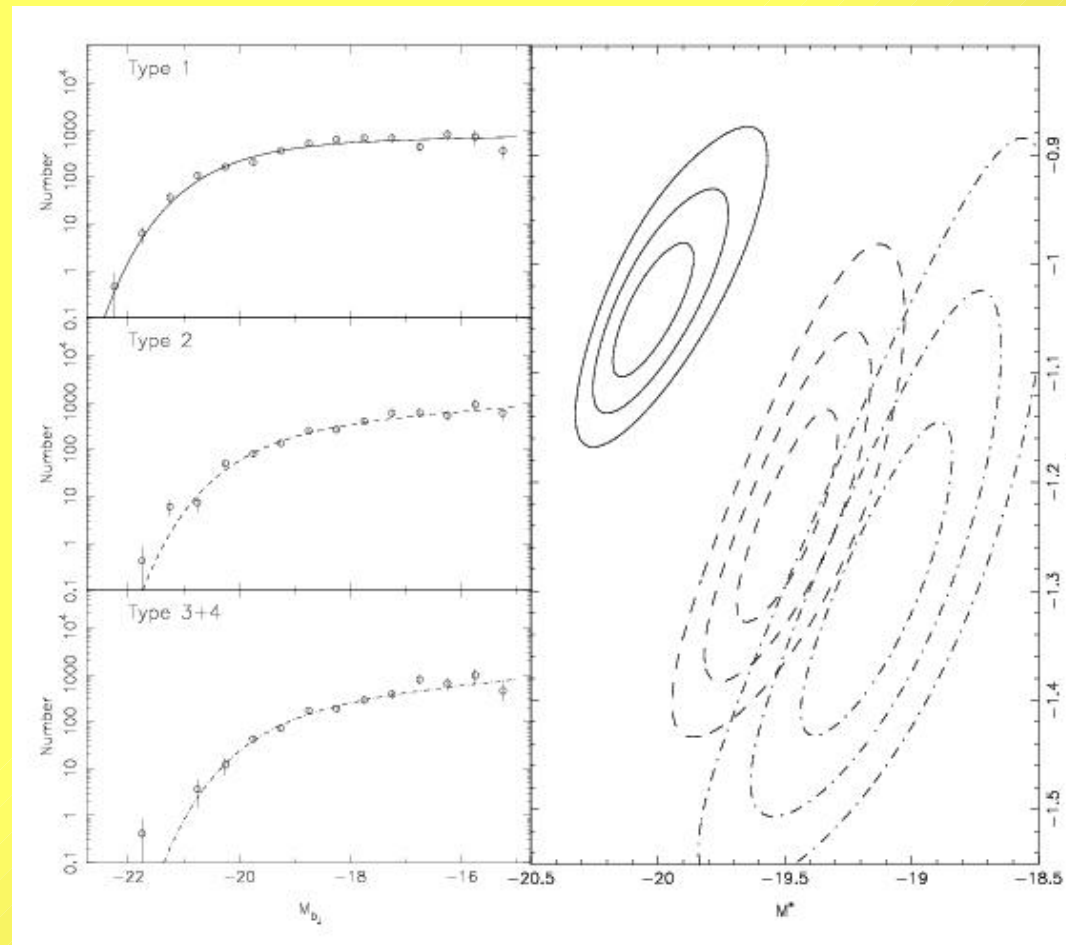
Emission

M\*

(LCRS: Lin et al 1996)

# LF vs Spectral type for cluster galaxies

Decreasing star formation rate



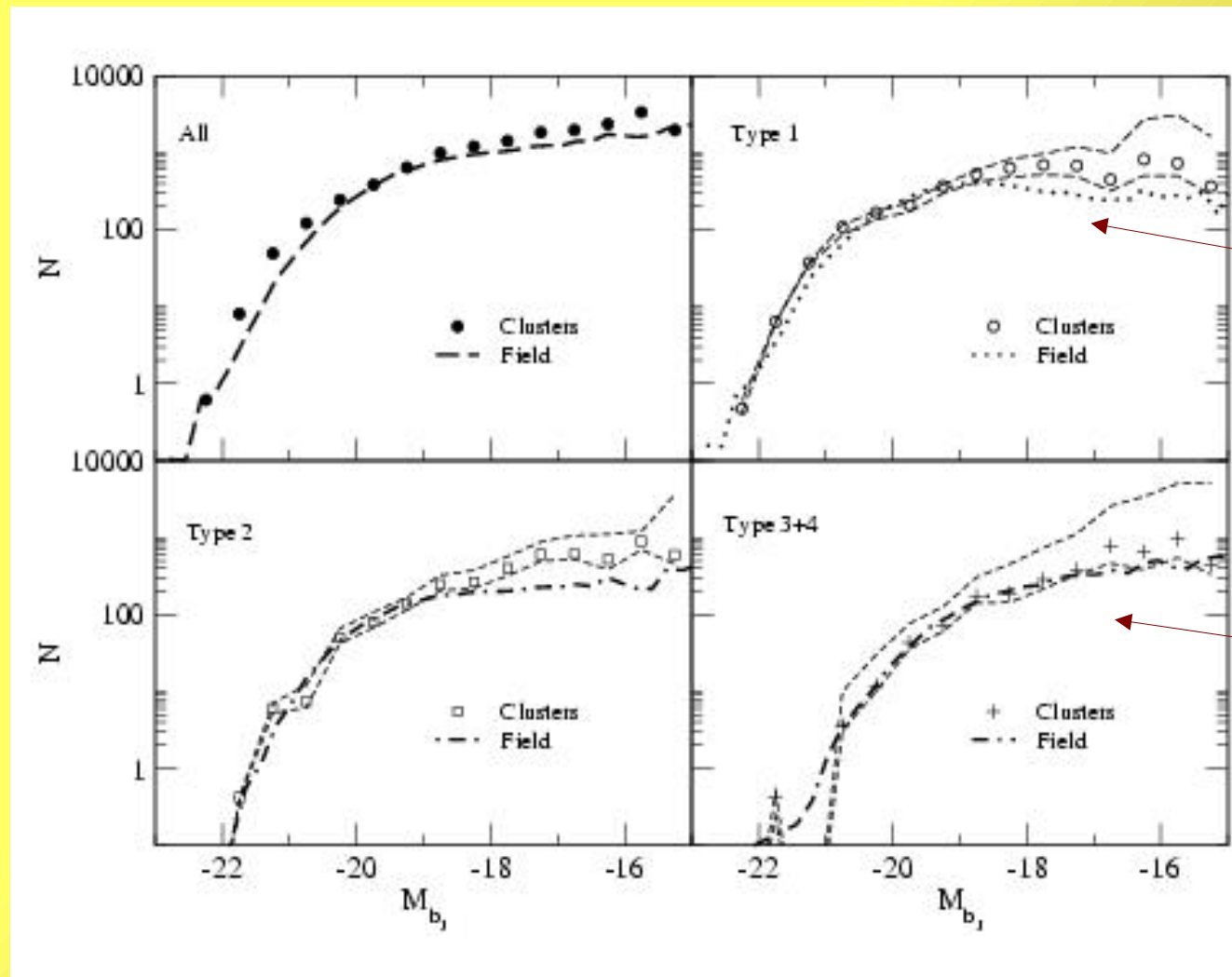
$M_{bj}$

$M_{bj}^*$

alpha

(2dF: de Propris et al 2002)

# Cluster vs. field galaxy LF

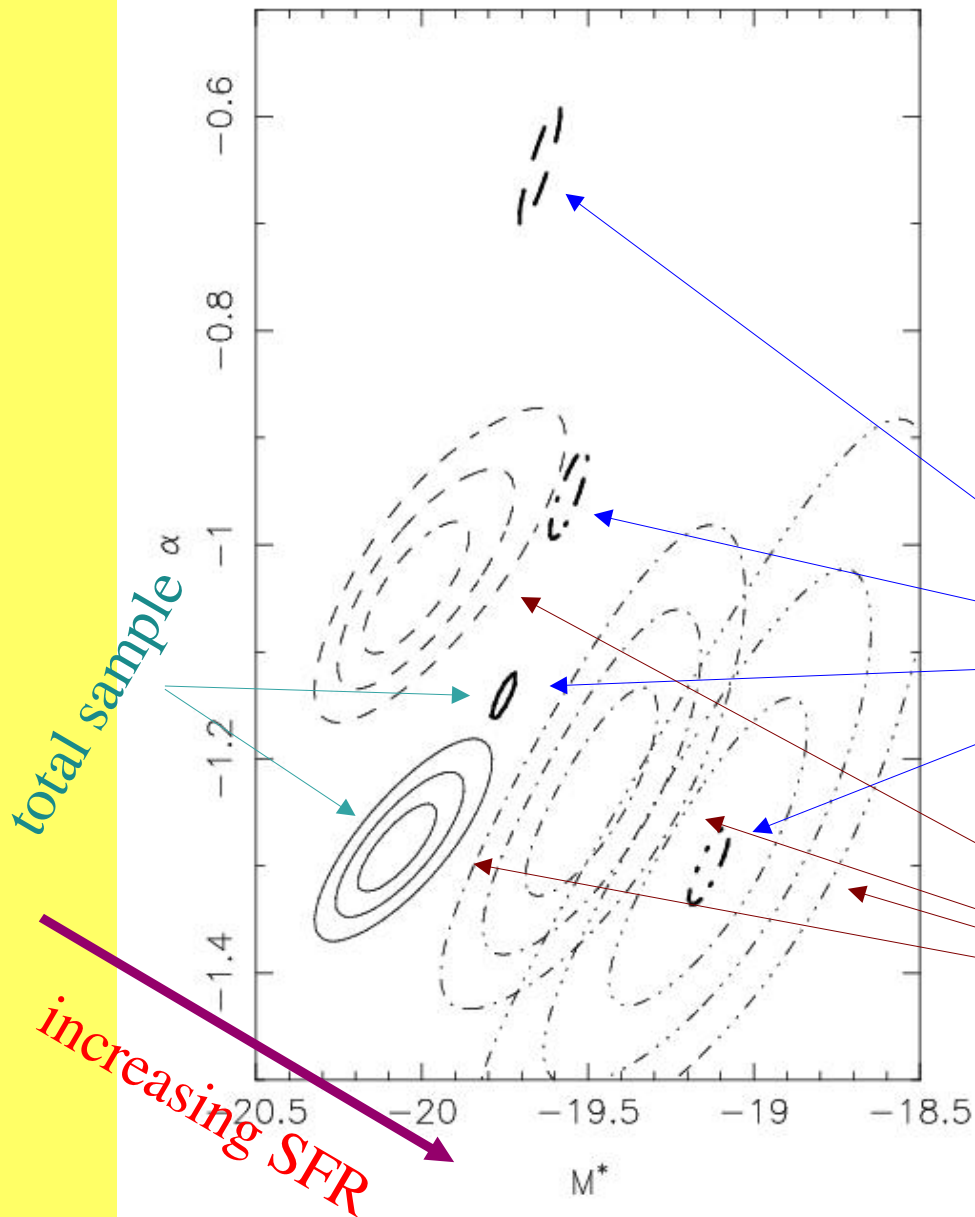


lowSFR

high SFR

(2dF: de Propris et al 2002)

# Cluster vs field galaxy LF parameters



cluster galaxies

field galaxies

(2dF: de Propris et al 2002)