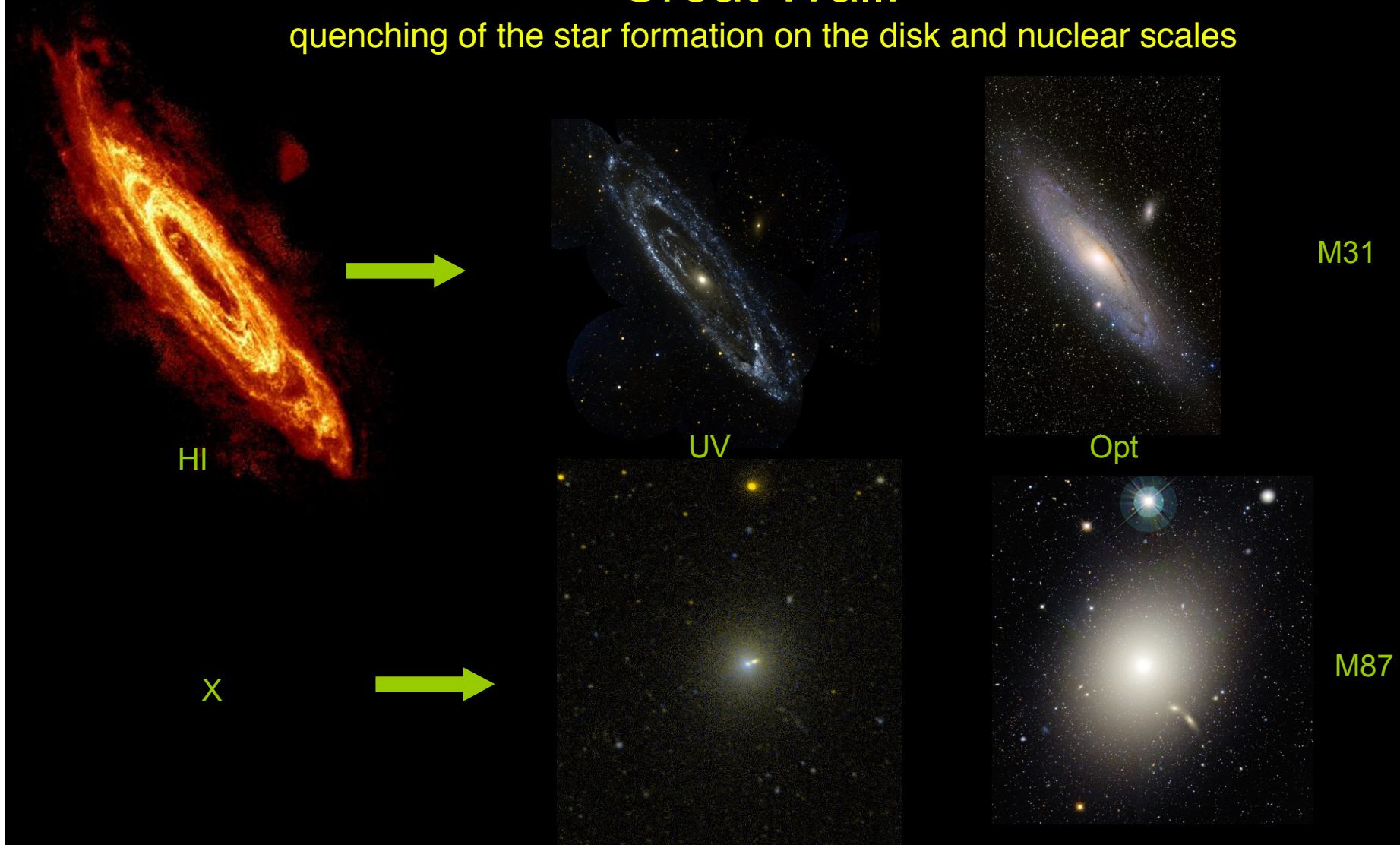


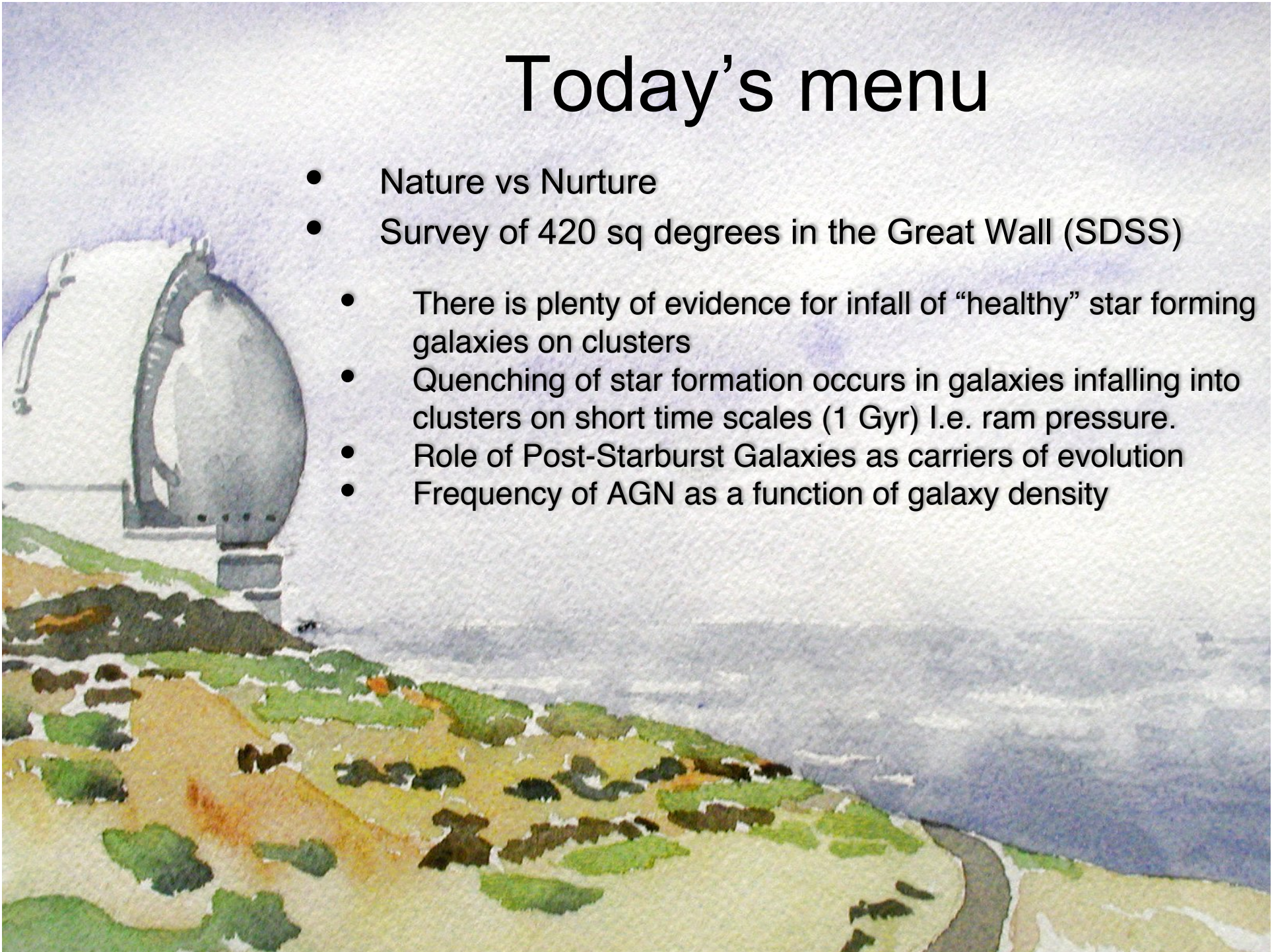
# A snapshot on galaxy evolution in the Great Wall:

quenching of the star formation on the disk and nuclear scales

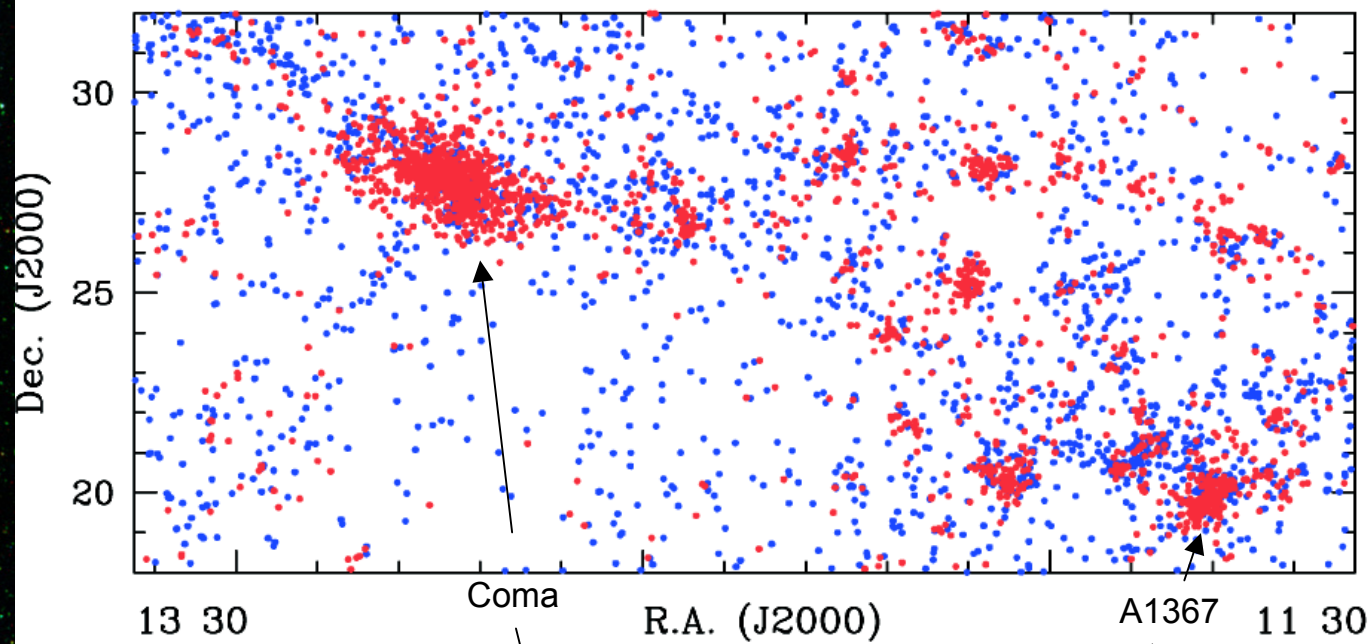


# Today's menu

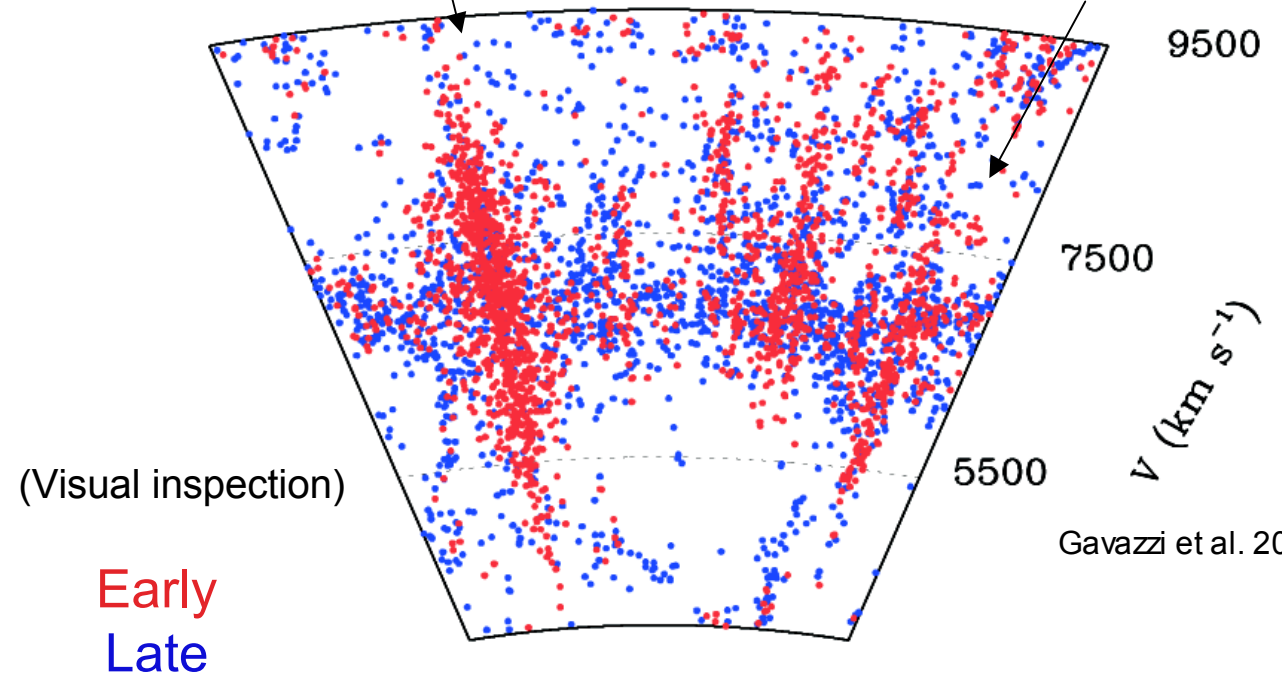
- Nature vs Nurture
- Survey of 420 sq degrees in the Great Wall (SDSS)
  - There is plenty of evidence for infall of “healthy” star forming galaxies on clusters
  - Quenching of star formation occurs in galaxies infalling into clusters on short time scales (1 Gyr) I.e. ram pressure.
  - Role of Post-Starburst Galaxies as carriers of evolution
  - Frequency of AGN as a function of galaxy density



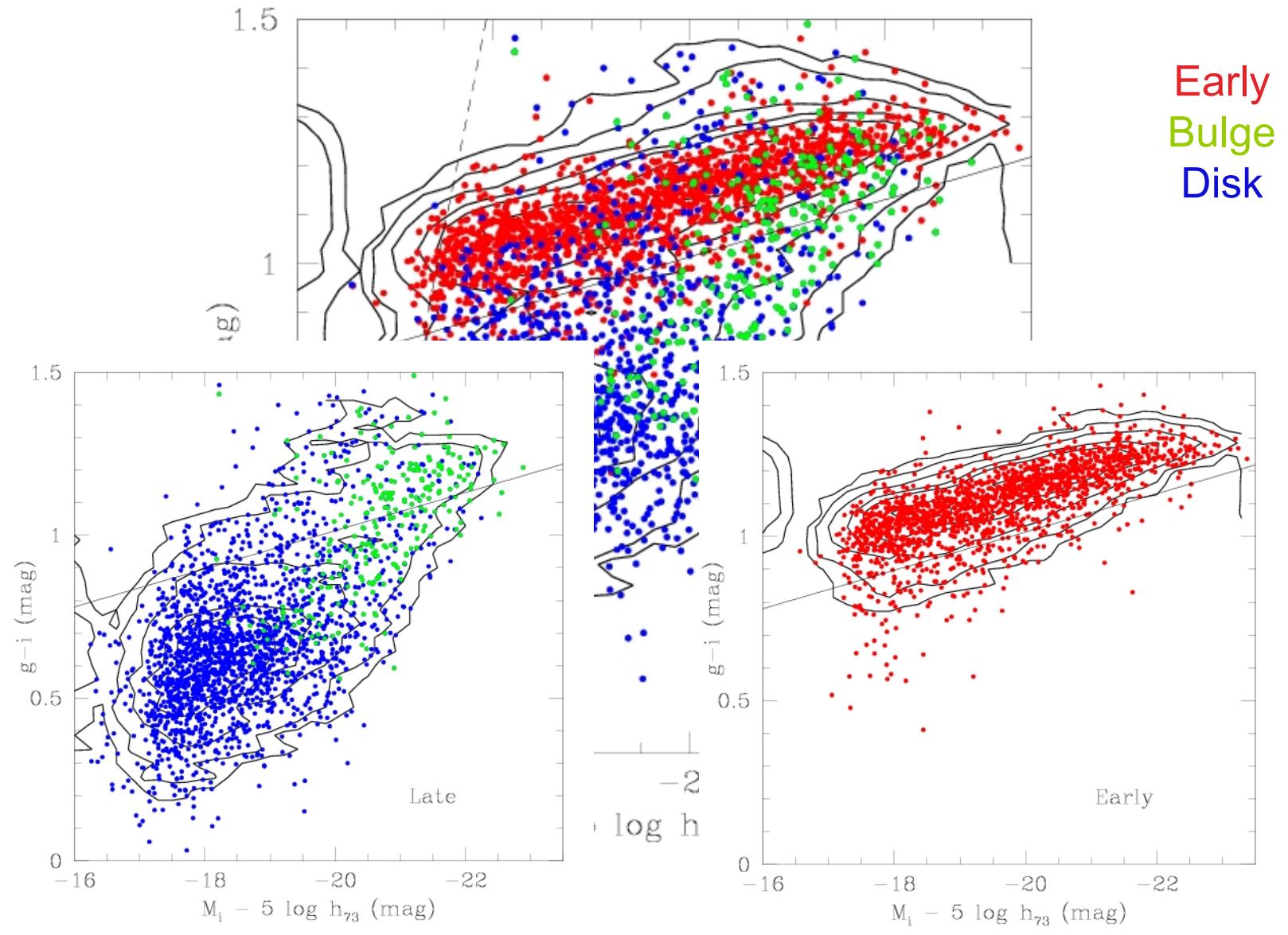
# COMA SUPERCLUSTER



SDSS  
DR7  
# 4132



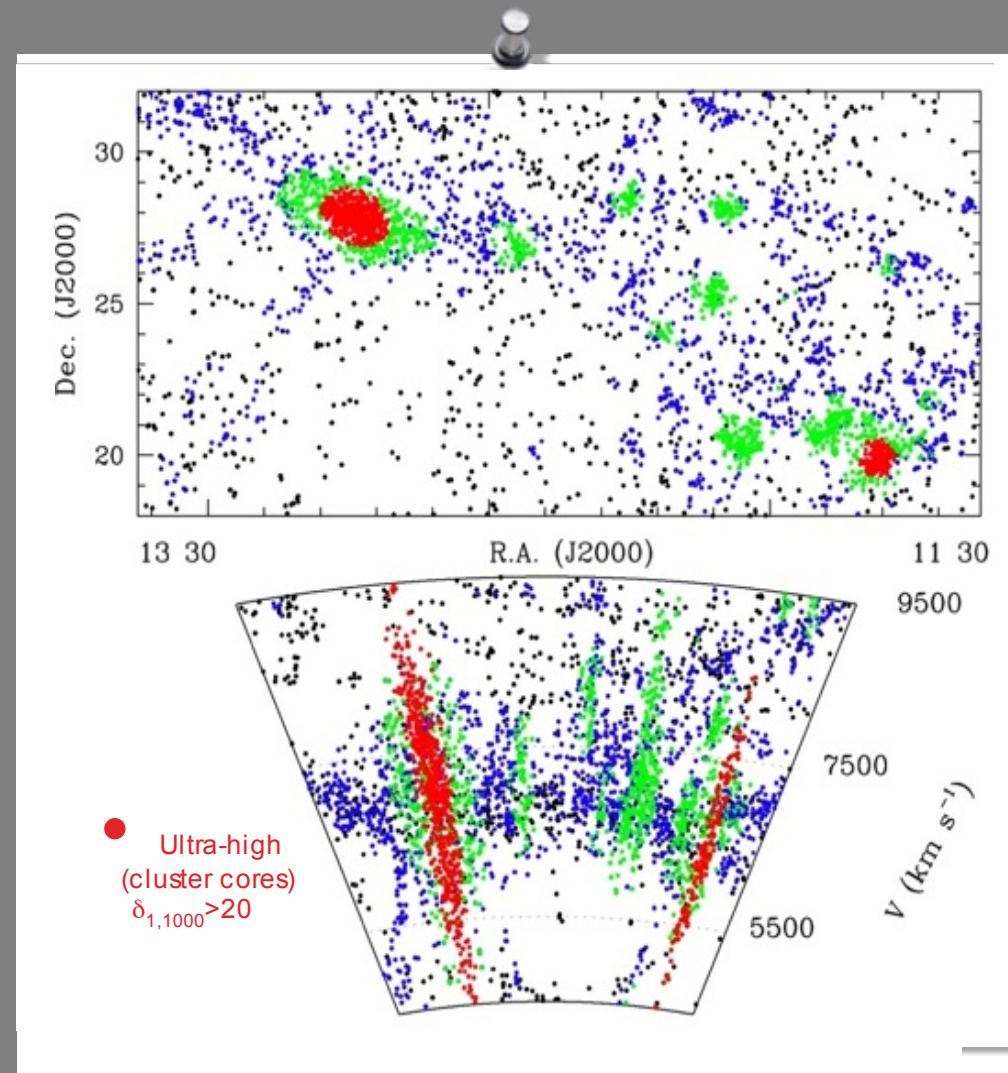
# Color-magnitude



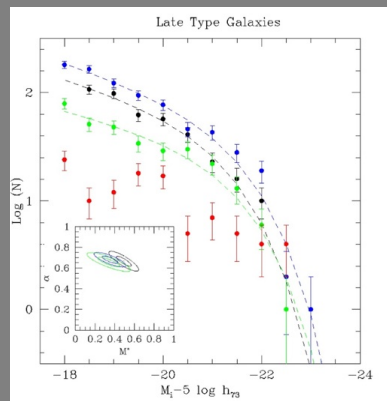
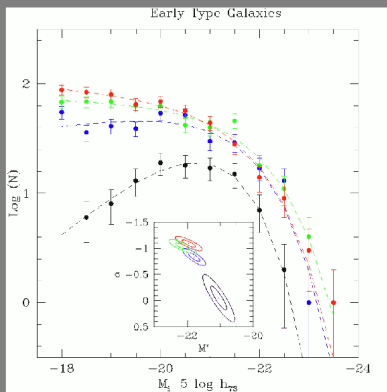
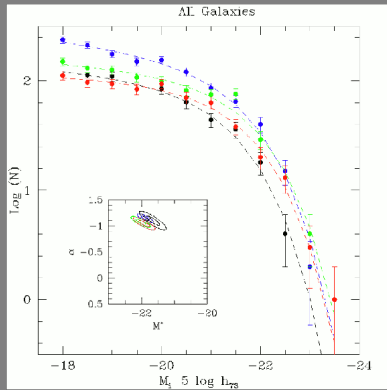
# Quantifying Local Density

local density  $\rho$  computed in  
cylinders with  $R=1\text{Mpc}, H_L=1000\text{km/s}$

$$\delta_{1,1000} = \frac{\rho - \langle \rho \rangle}{\langle \rho \rangle}$$

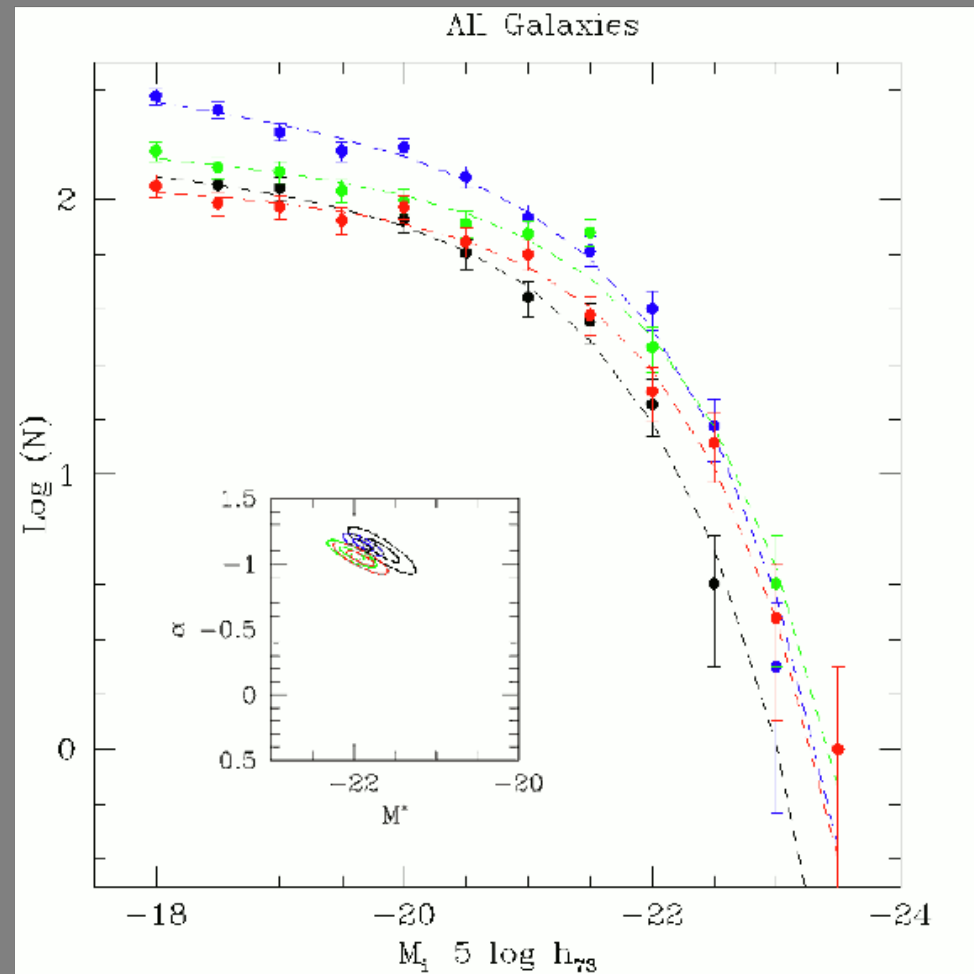
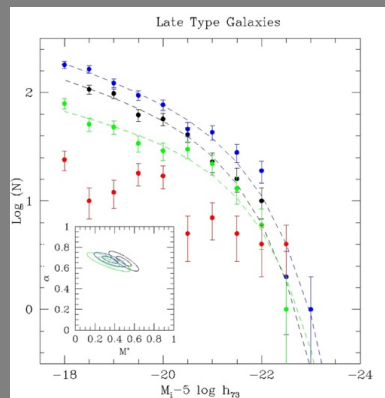
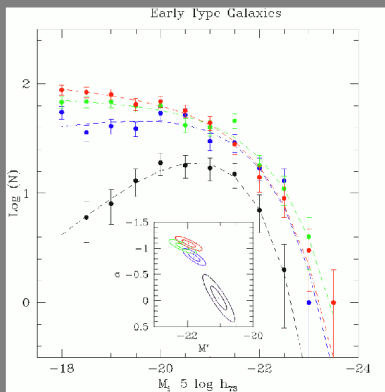


# Luminosity Function



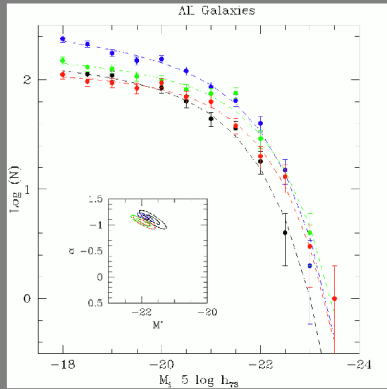
# Luminosity Function

EARLY  
+  
LATE

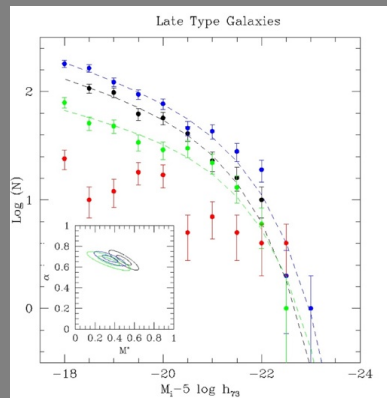
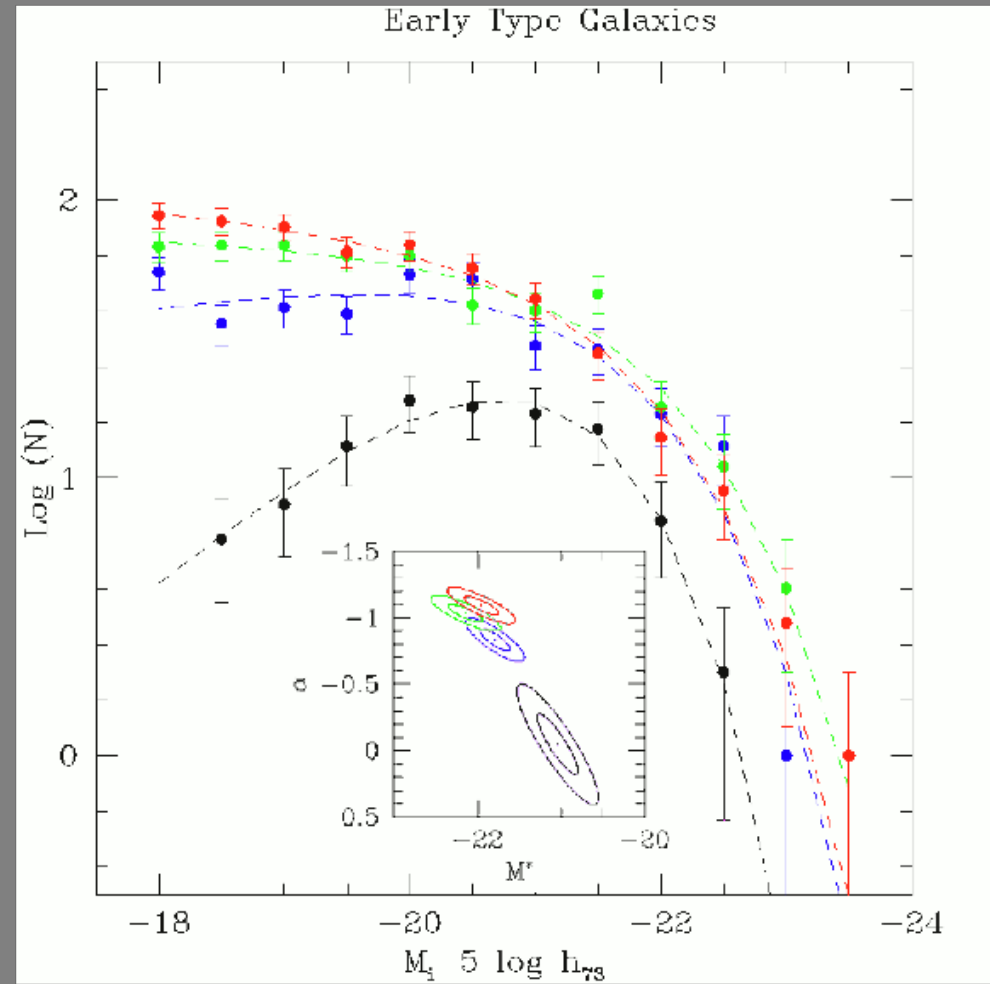


	$\Phi$	$\alpha$	$M_i^*$
all ● UL	$100 \pm 21$	$-1.10 \pm 0.08$	$-21.65 \pm 0.20$
● L	$156 \pm 20$	$-1.14 \pm 0.04$	$-21.89 \pm 0.12$
● H	$120 \pm 17$	$-1.07 \pm 0.05$	$-22.02 \pm 0.14$
● UH	$103 \pm 16$	$-1.04 \pm 0.05$	$-21.91 \pm 0.16$

# Luminosity Function



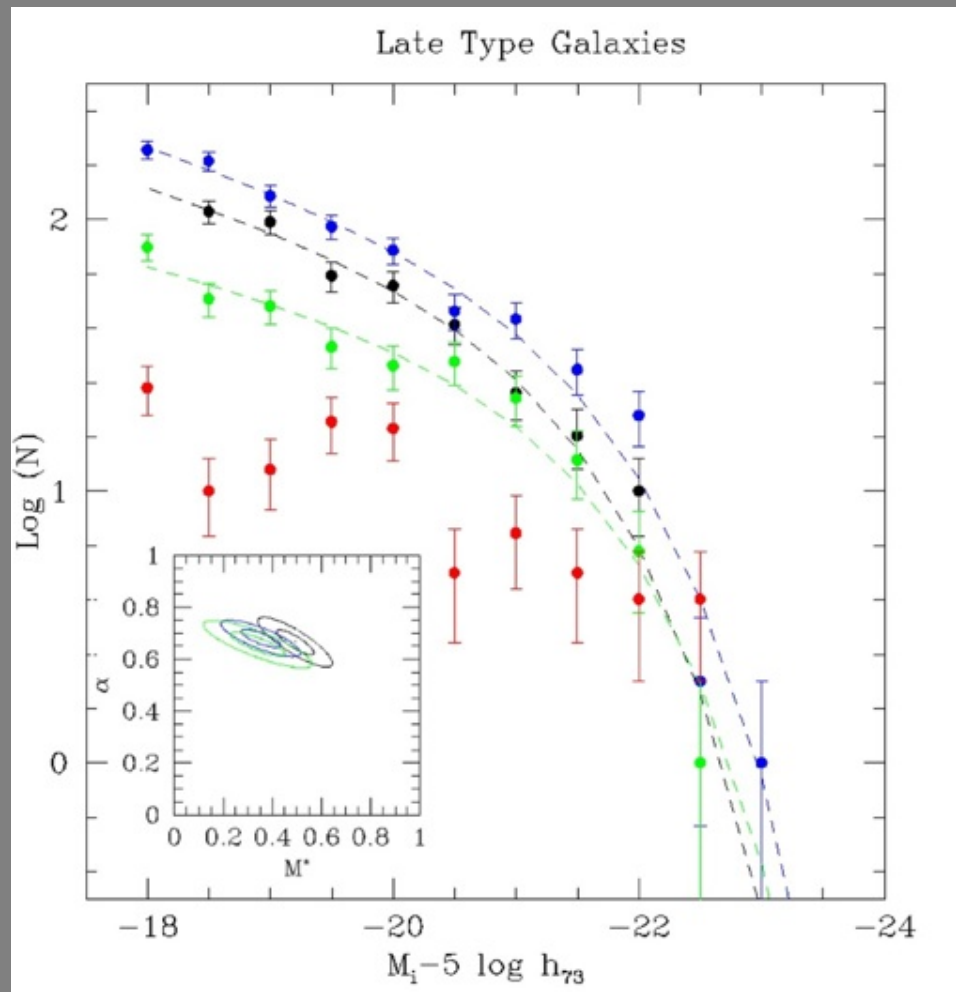
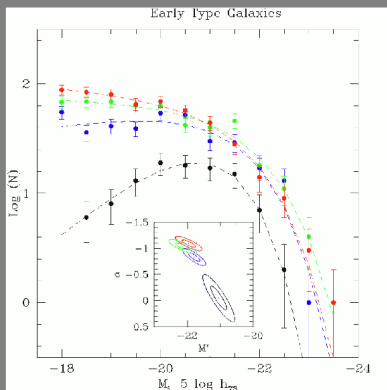
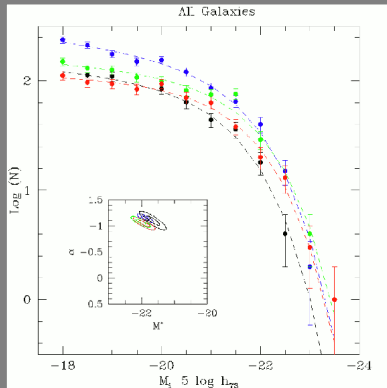
## EARLY TYPE GALAXIES



	$\Phi$	$\alpha$	$M_i^*$
early ● UL	$56 \pm 7$	$-0.04 \pm 0.22$	$-21.03 \pm 0.24$
● L	$79 \pm 13$	$-0.83 \pm 0.08$	$-21.79 \pm 0.17$
● H	$69 \pm 13$	$-1.03 \pm 0.06$	$-22.14 \pm 0.20$
● UH	$72 \pm 14$	$-1.09 \pm 0.06$	$-21.95 \pm 0.20$



# Luminosity Function

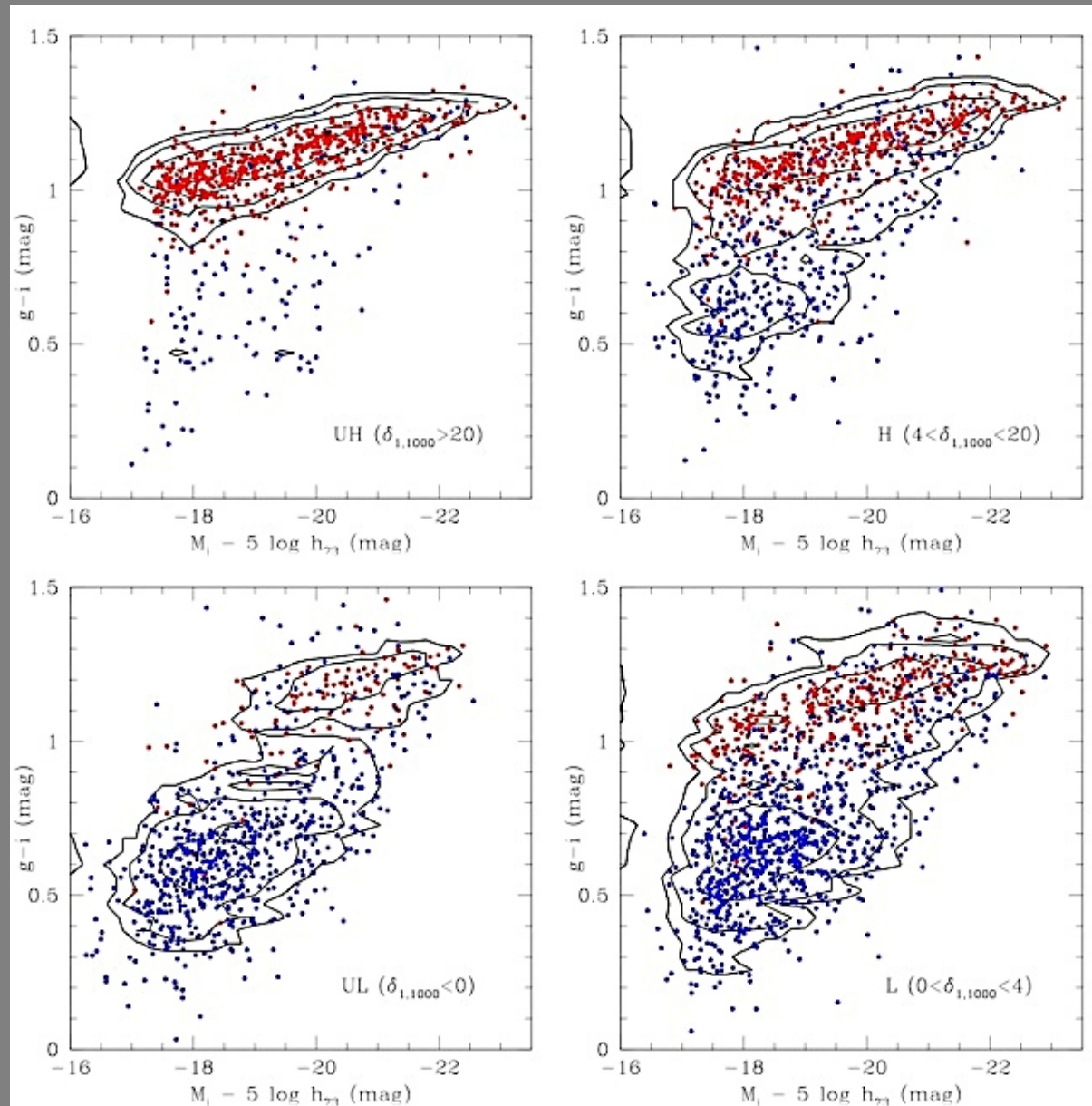


LATE TYPE  
GALAXIES

	$\Phi$	$\alpha$	$M_i^*$
late ● UL	$52 \pm 17$	$-1.33 \pm 0.10$	$-21.58 \pm 0.27$
● L	$59 \pm 13$	$-1.37 \pm 0.06$	$-21.84 \pm 0.19$
● H	$29 \pm 10$	$-1.28 \pm 0.10$	$-21.80 \pm 0.30$
● UH	-	-	-

# Color Magnitude vs Density

Cluster  
Cores



Groups /  
Cluster  
Outskirts

Isolated

Loose  
Groups

# Summarizing

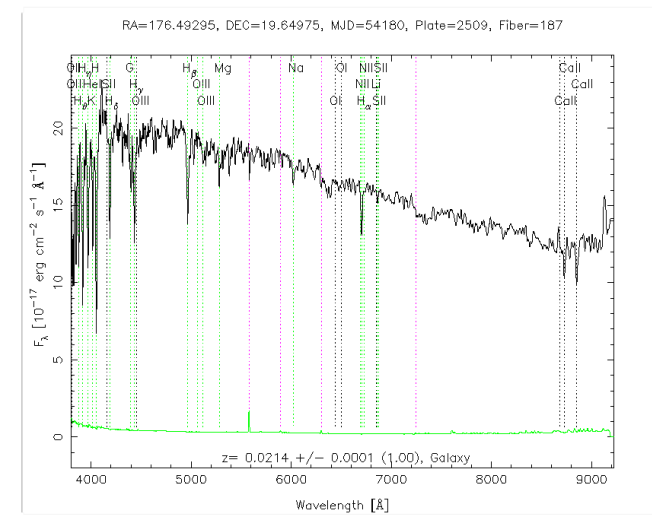
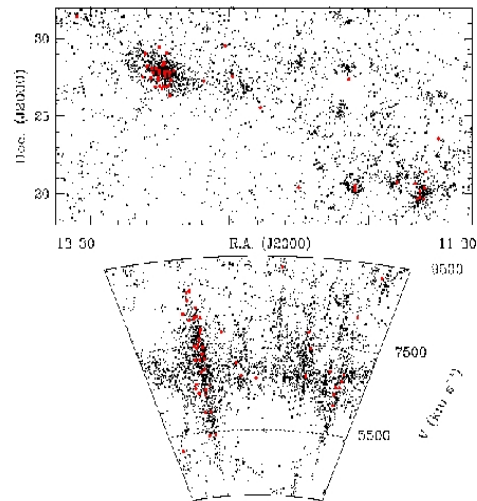
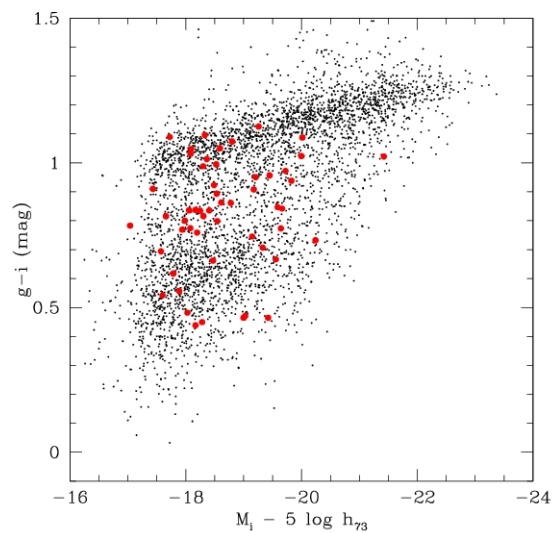
- Red Sequence well formed in all environments at high luminosity (consistent with high  $z$  studies)
- Low luminosity Red Sequence exists only at higher density
- Evidence for infall into rich clusters
- Quenching of the star formation takes place on low mass gal falling in dense environment (due to Ram Pressure Stripping)

- Can we identify a tracer of the migration from Bs to Rs?

TNG 19/12/99

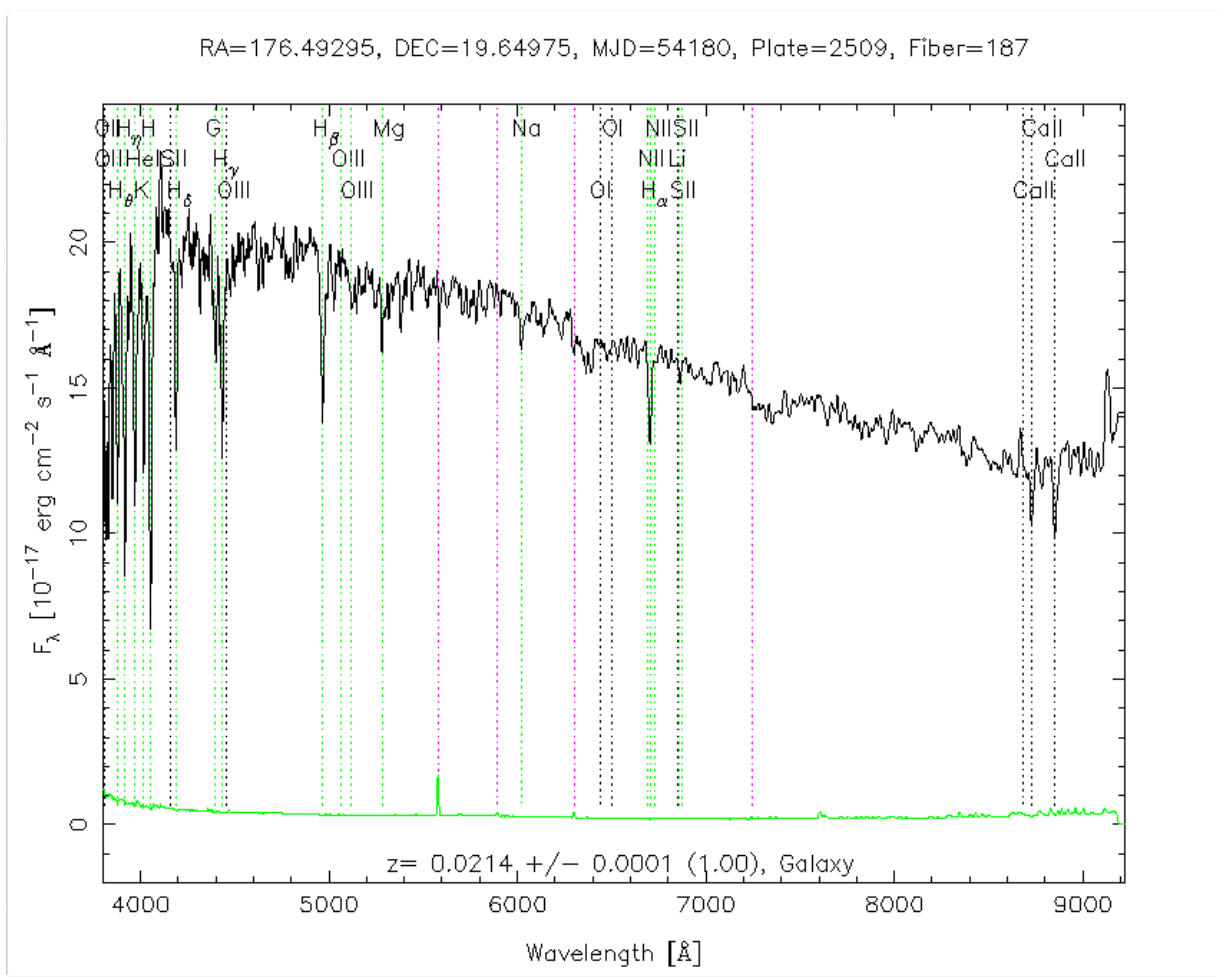
## PSB Galaxies

- Post Star Burst Galaxies, also named k+a
- Violently truncated Star Formation < 1-1.5 Gyr ago
- Spectroscopical feature: Balmer lines in absorption
- We find 53 candidates with  $S/N > 5$ , with non random distribution in ra-dec and in color-magnitude

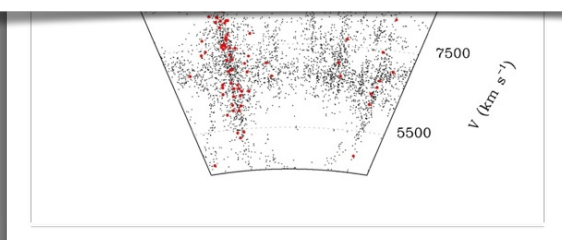
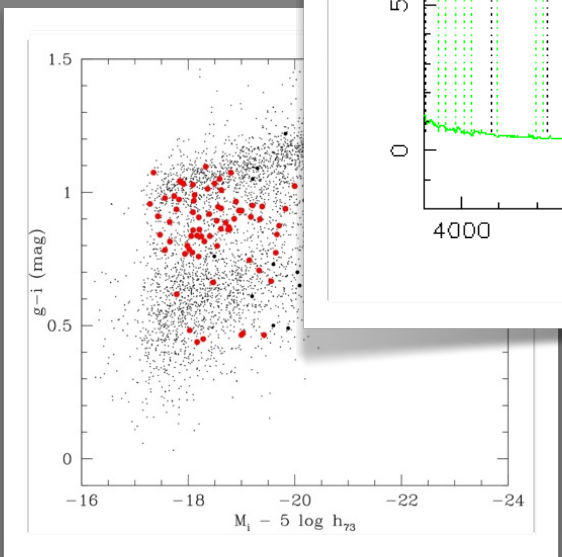


# PSB Galaxies

- Truncation
- Spectral
- We find
- ra-dec

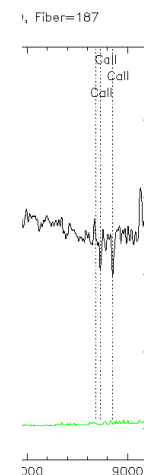
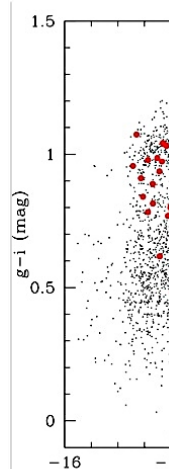
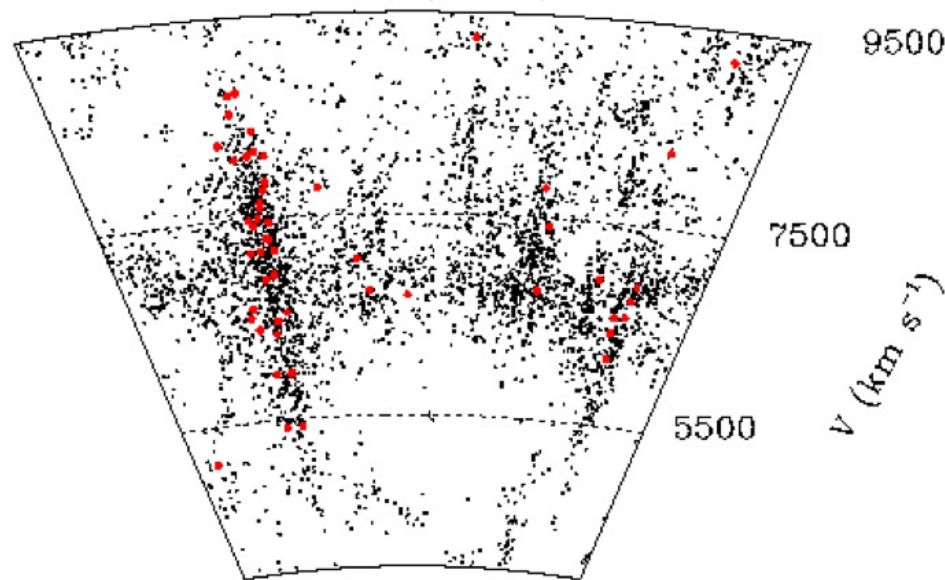
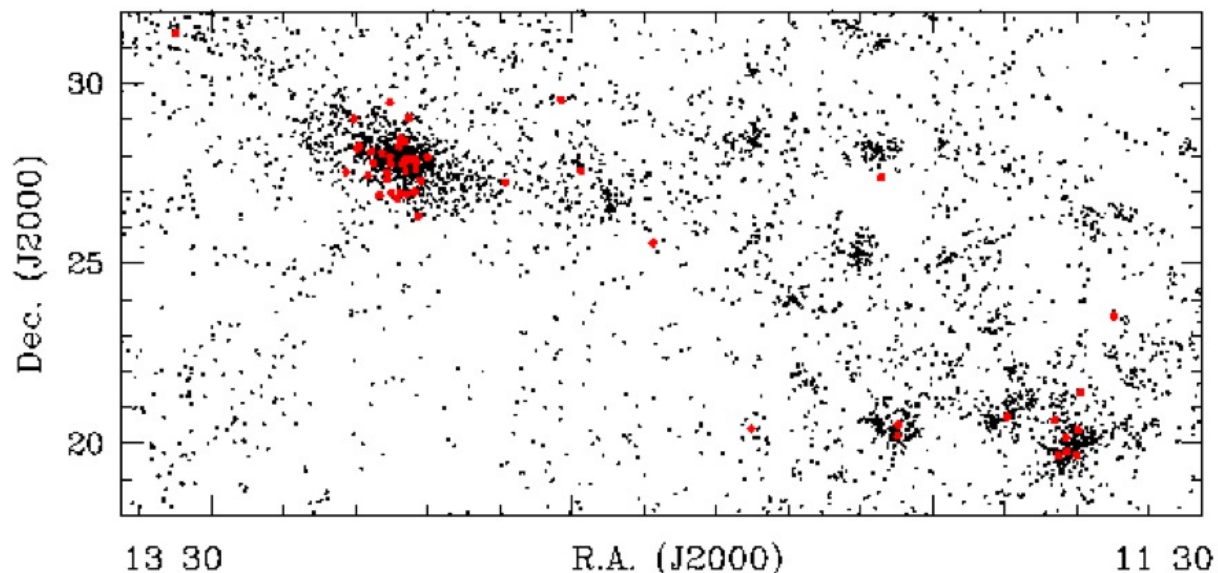


in



# PSB Galaxies

- T
- S
- W  
r

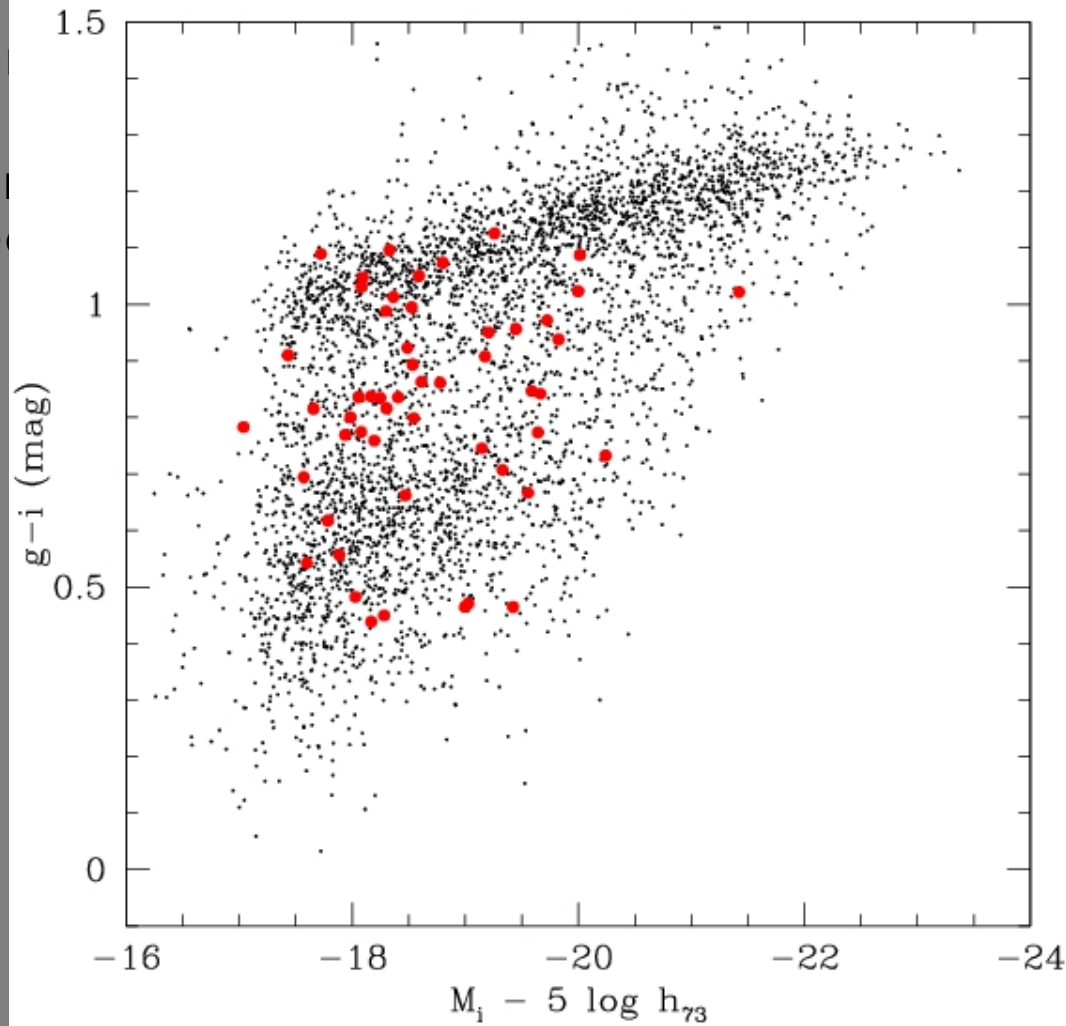


# PSB Galaxies

- Truncated Star Formation < 1-1.5 Gyr ago

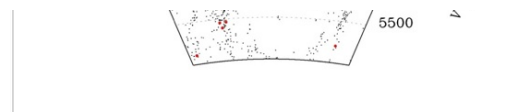
- Spect

- We fit
- ra-de

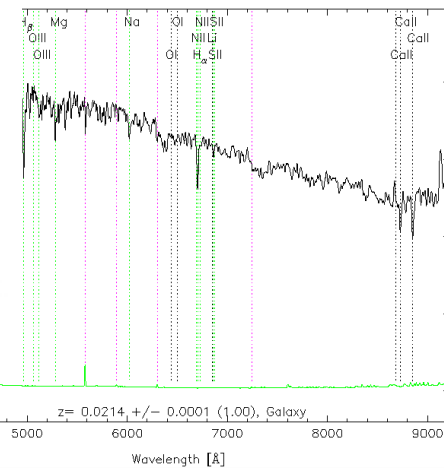


nes

bution in

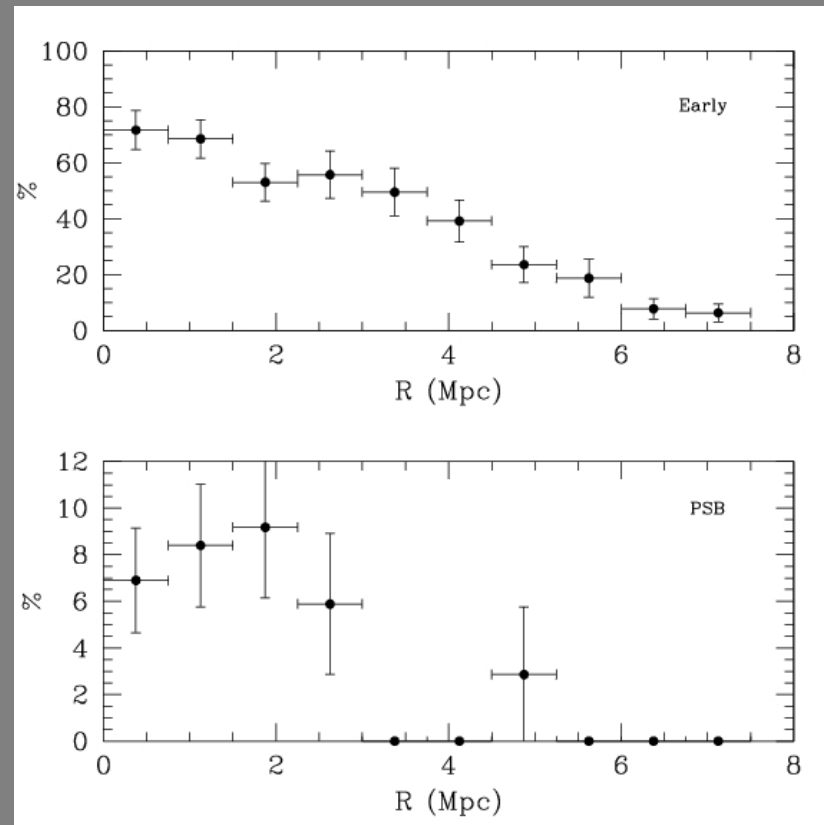
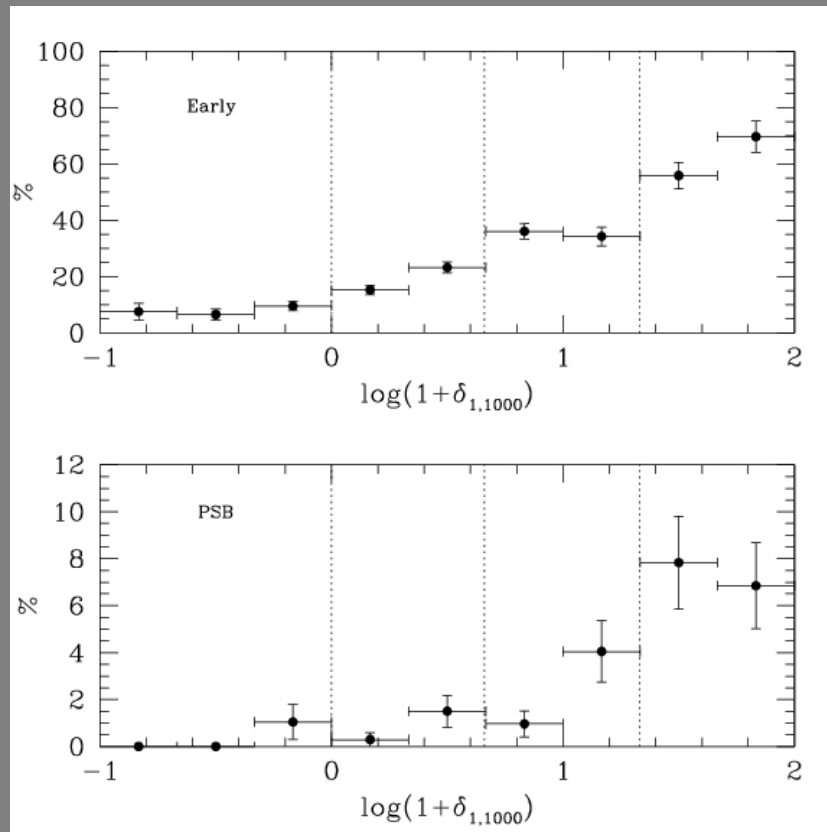


3295, DEC=19.64975, MJD=54180, Plate=2509, Fiber=187

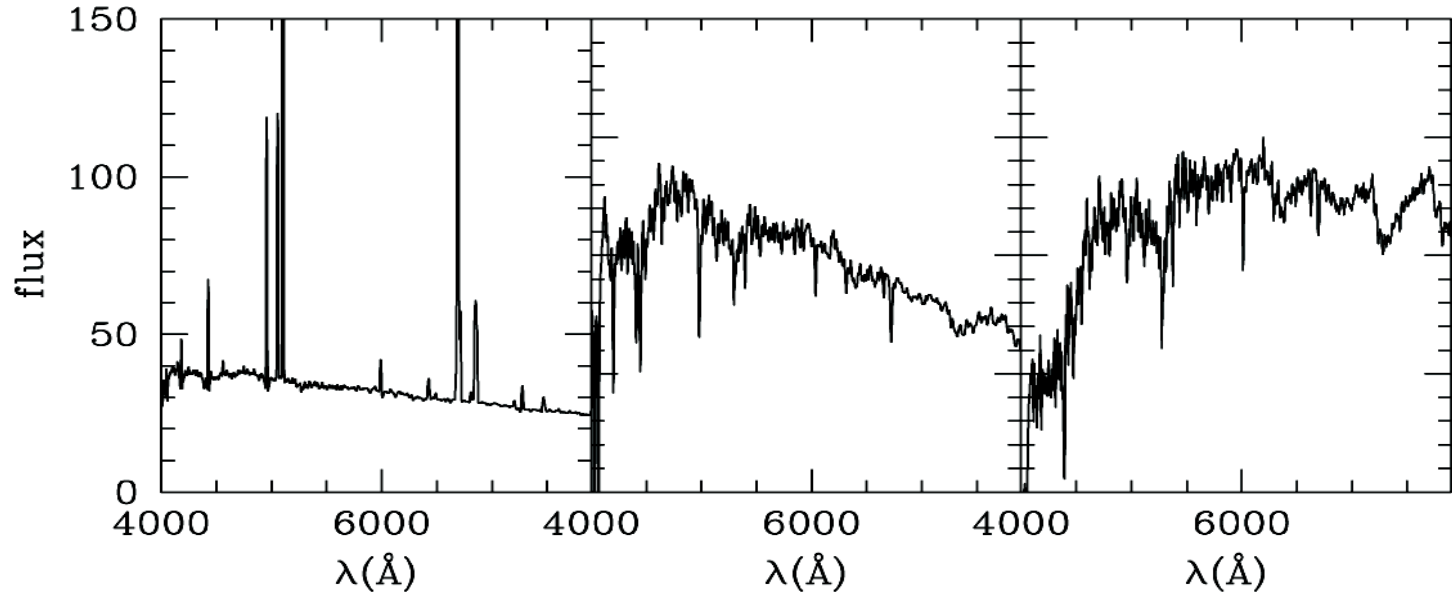


# PSB Galaxies

Distribution in Density ... and Distance from the center of Coma







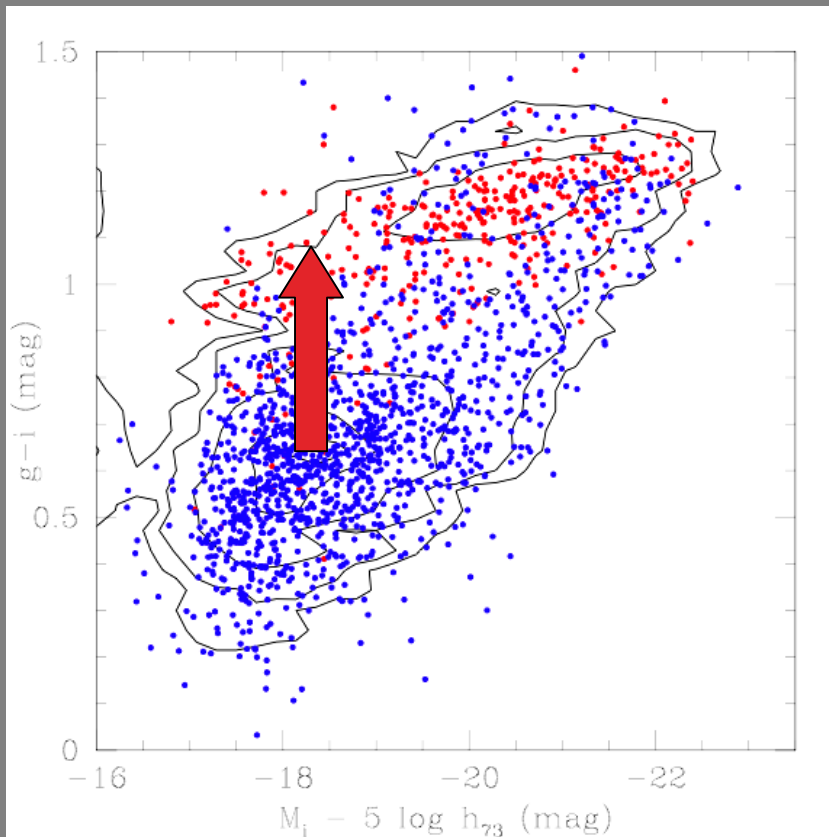
Star form

PSB

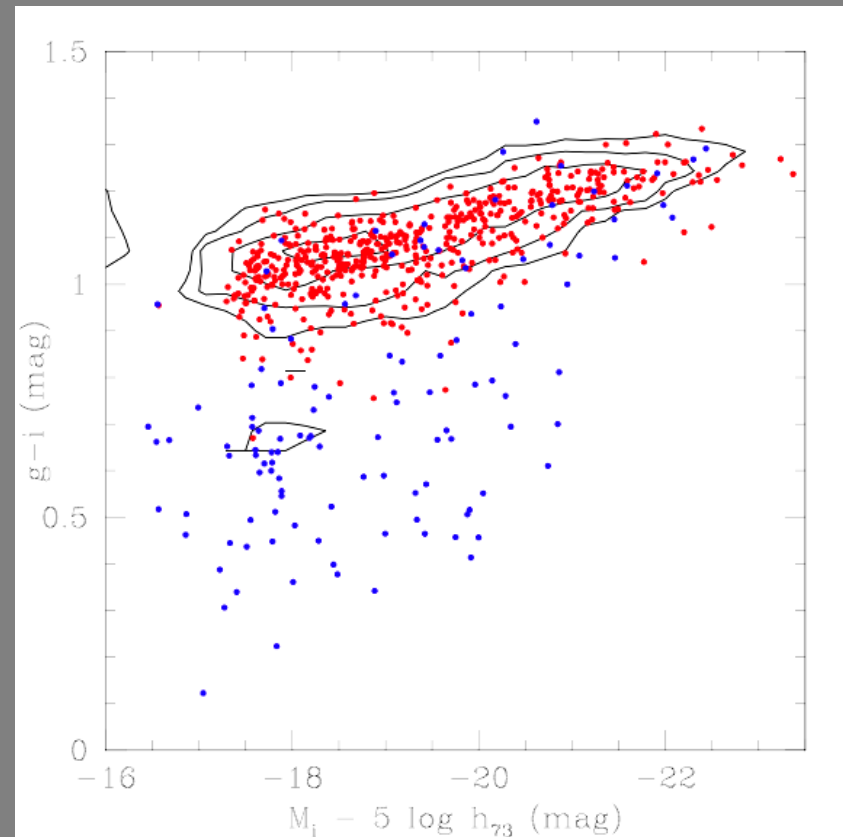
quiescent

# Conclusions

field



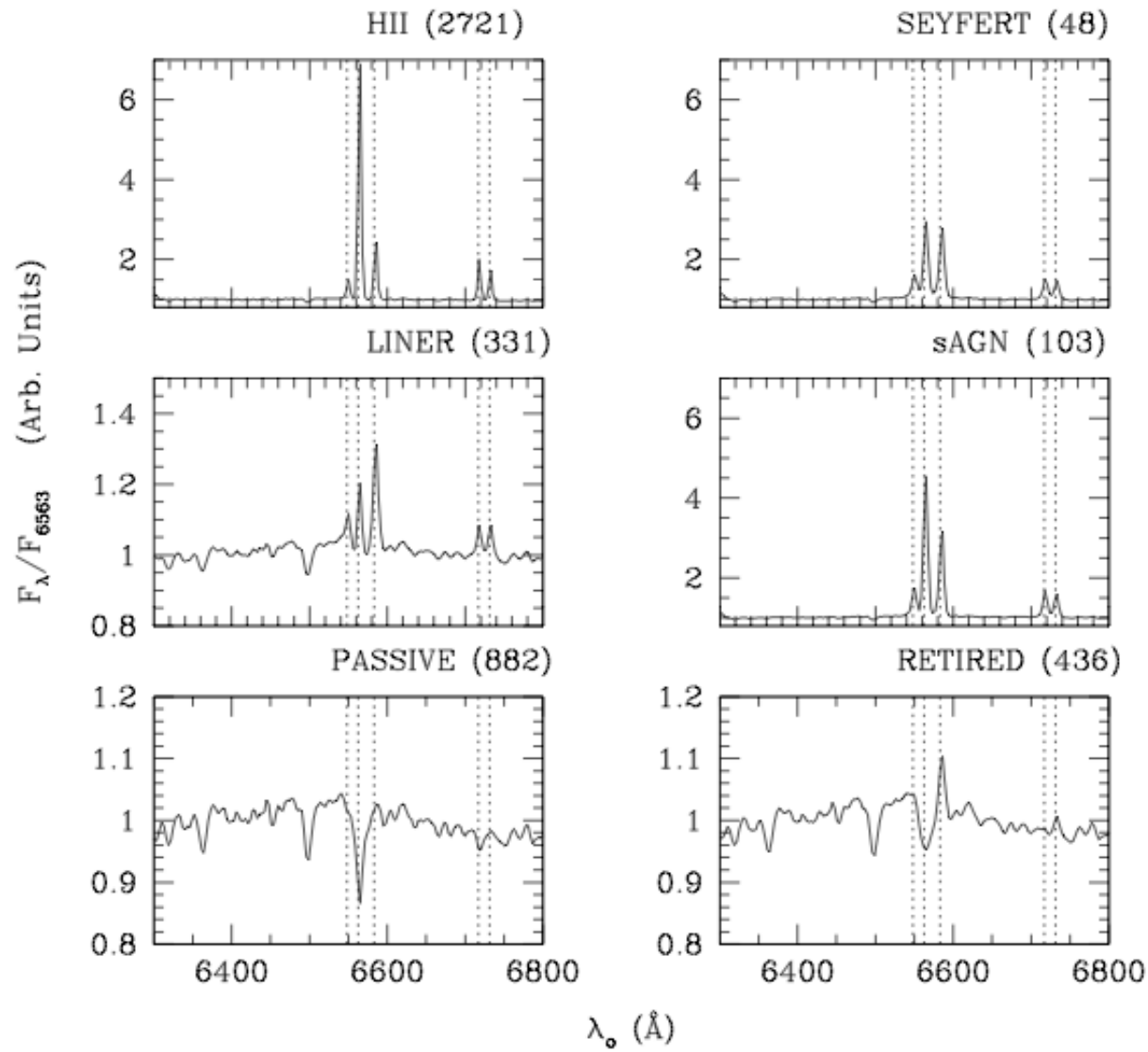
clusters



- Infall of galaxies from the cosmic web into clusters (and groups) produces quenching of star formation, thus their transformation from late (blue) to early (red) sequence.
- At  $z=0$  the process affects mainly low-mass systems
- In clusters the quenching of star formation takes place in a short timescale (Ram Pressure Stripping)
- PSB are likely to represent the carriers of the transformation

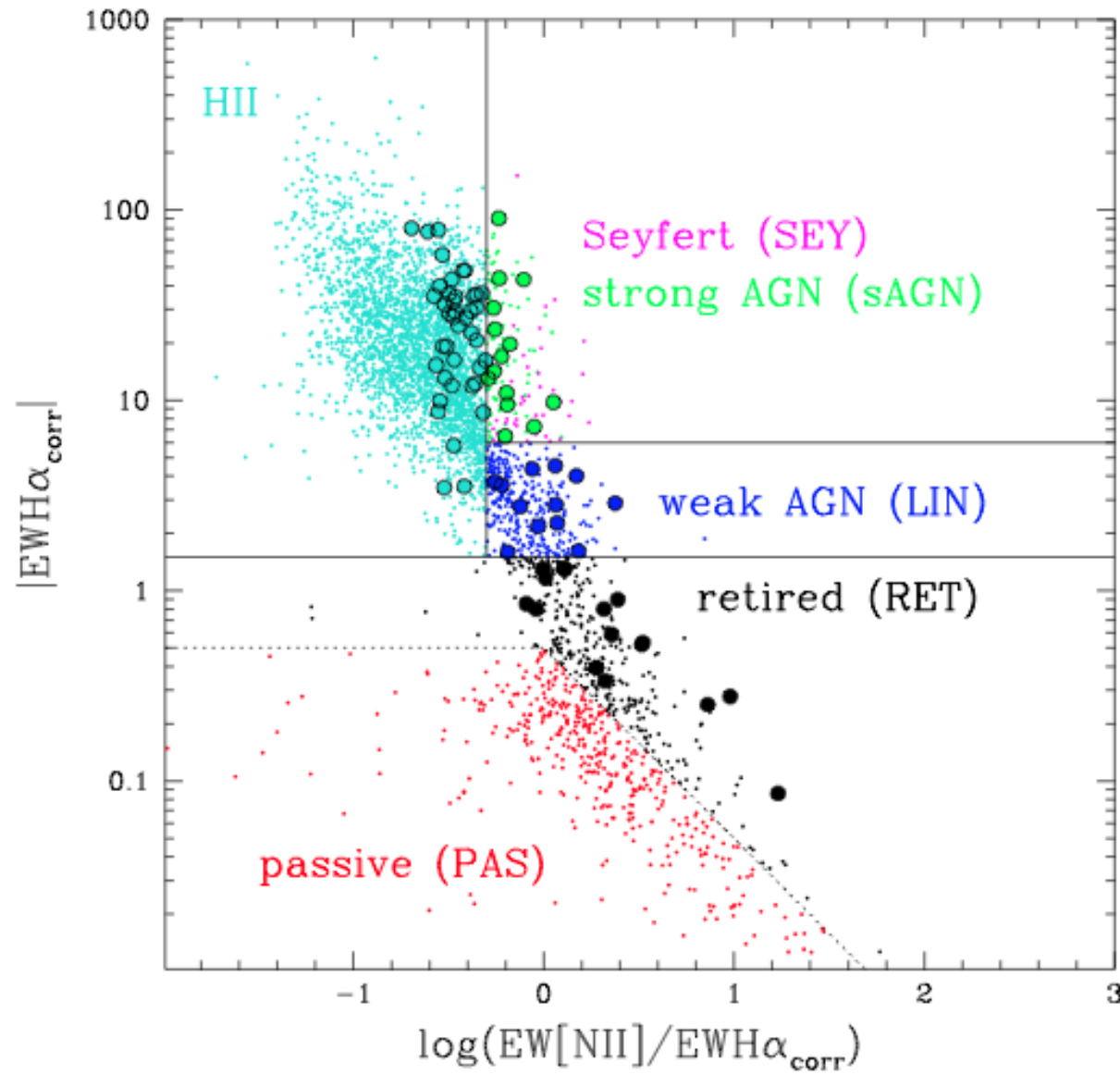
# Nuclear spectra

SDSS+Loiano



# WHAN

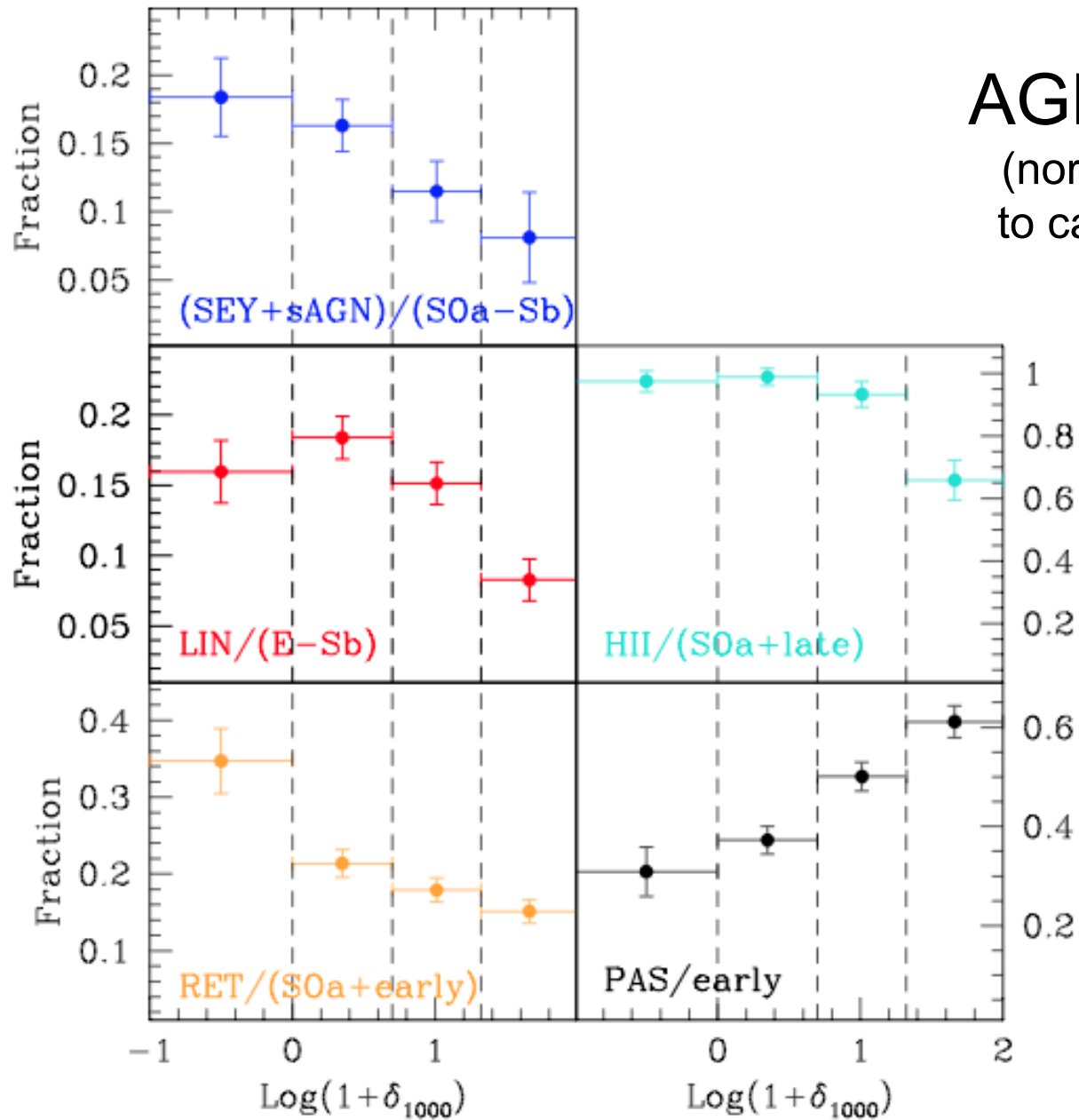
(Cid Fernandes+Stasinska)



Large symbols(Loiano)  
Small dots (SDSS)

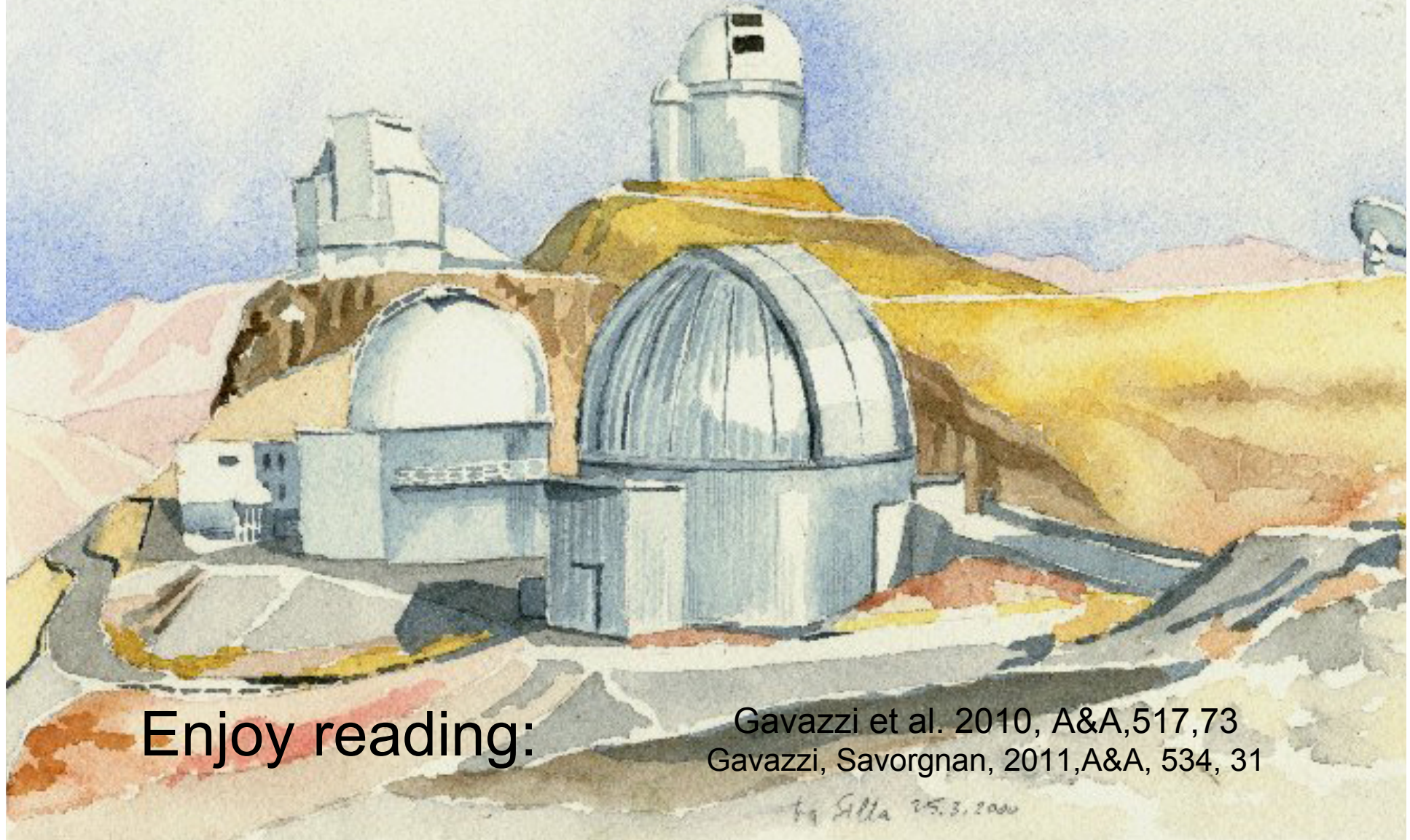
# AGN frequency

(normalized by type)  
to cancel morphology  
segregation



Gavazzi, Savorgnan+2011

Conclusion: clustering produces quenching of the “activity”  
on all scales, from disks to nuclei



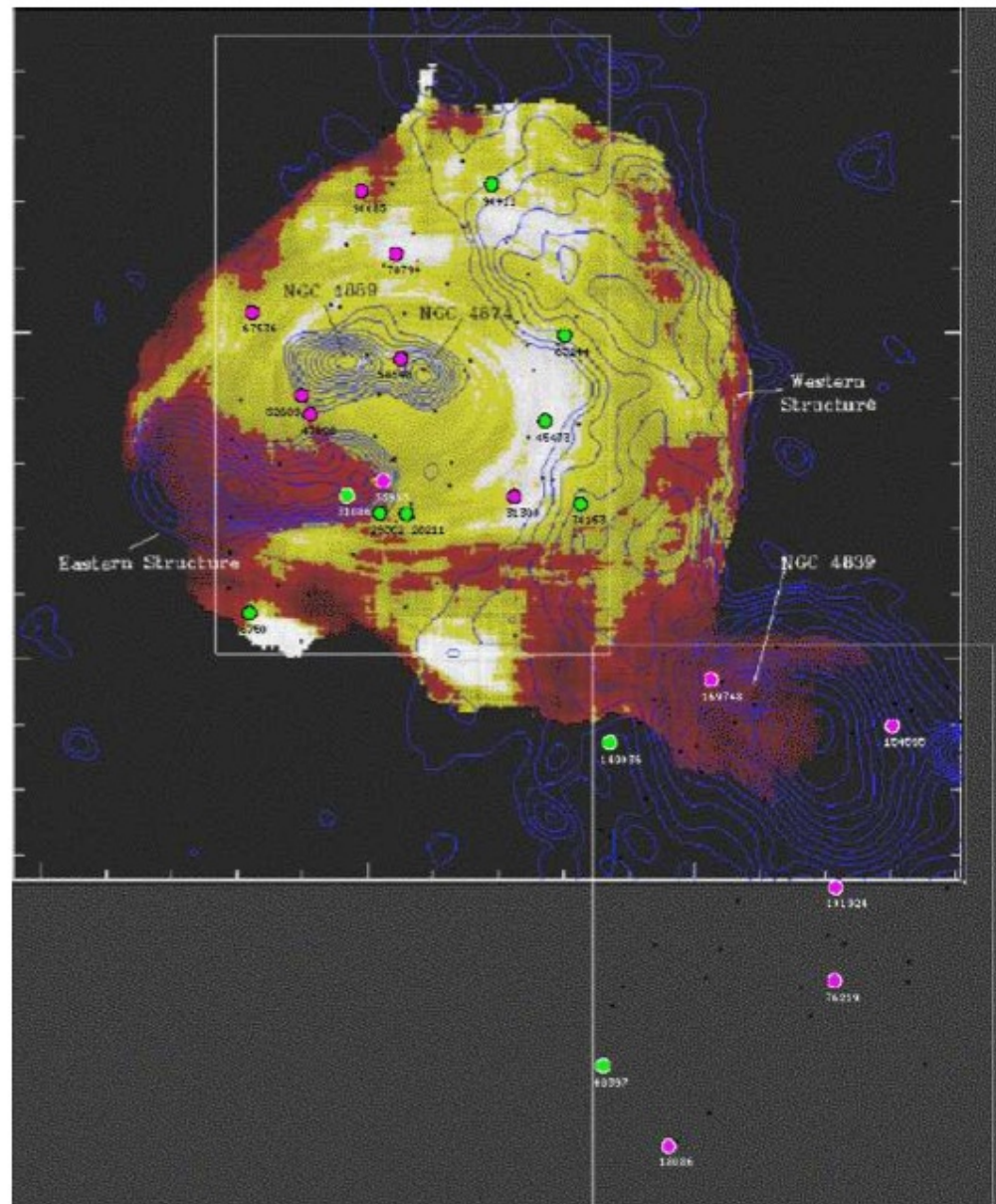
Enjoy reading:

Gavazzi et al. 2010, A&A, 517, 73  
Gavazzi, Savorgnan, 2011, A&A, 534, 31

*by Silla 25.3.2000*



# Coma cluster

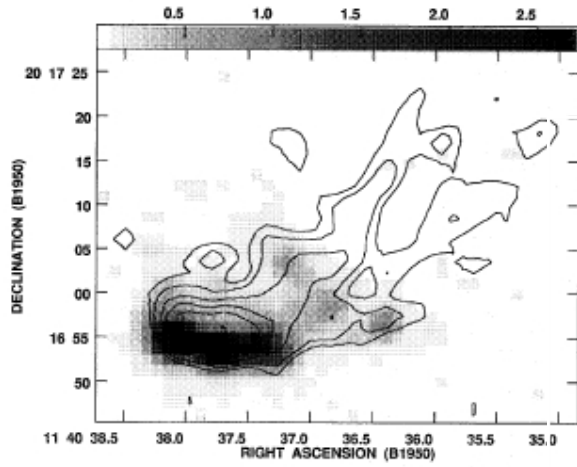


k+a galaxies correlate  
with substructure in  
the hot IGM

Poggianti+03

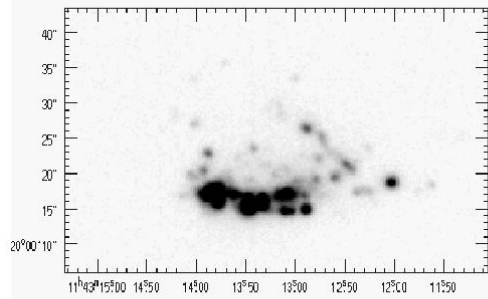


97-079

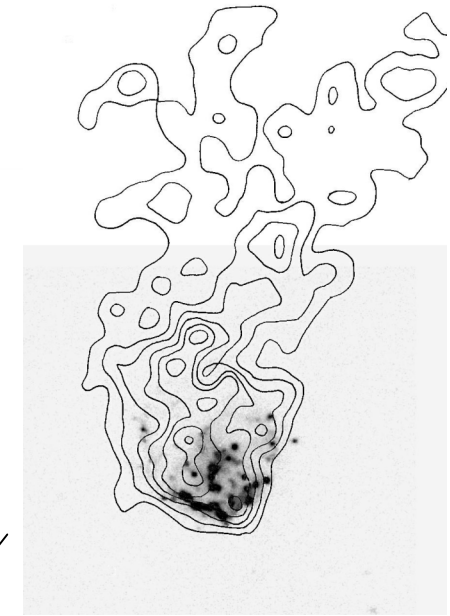


Radio

H $\alpha$

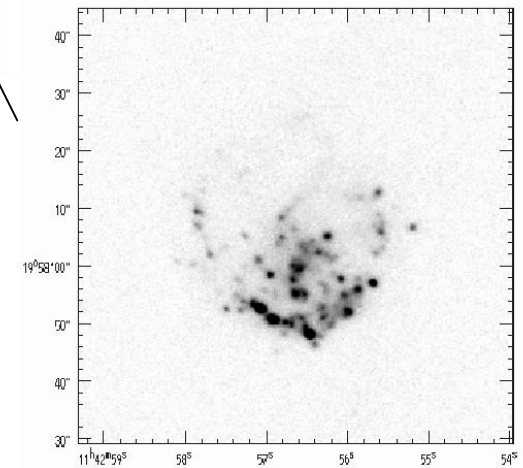


97-073

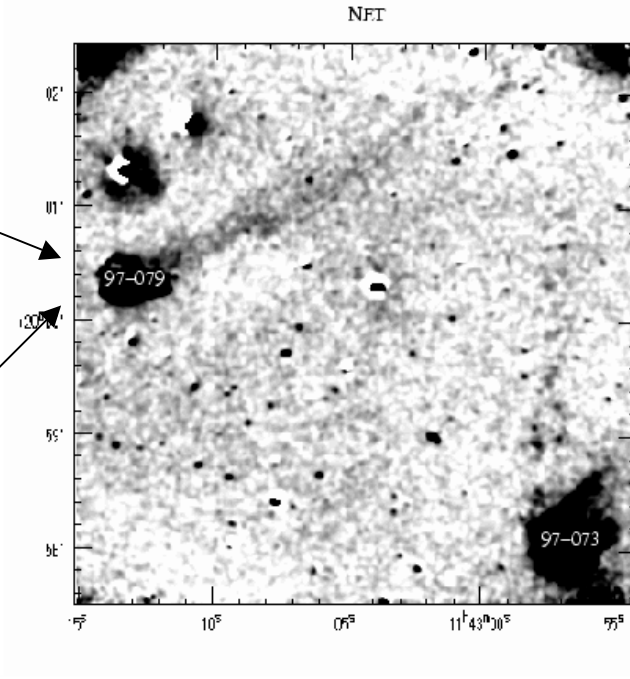


Radio

H $\alpha$



H $\alpha$



Gavazzi+01