

It takes a supercluster to raise a galaxy

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Life of a galaxy

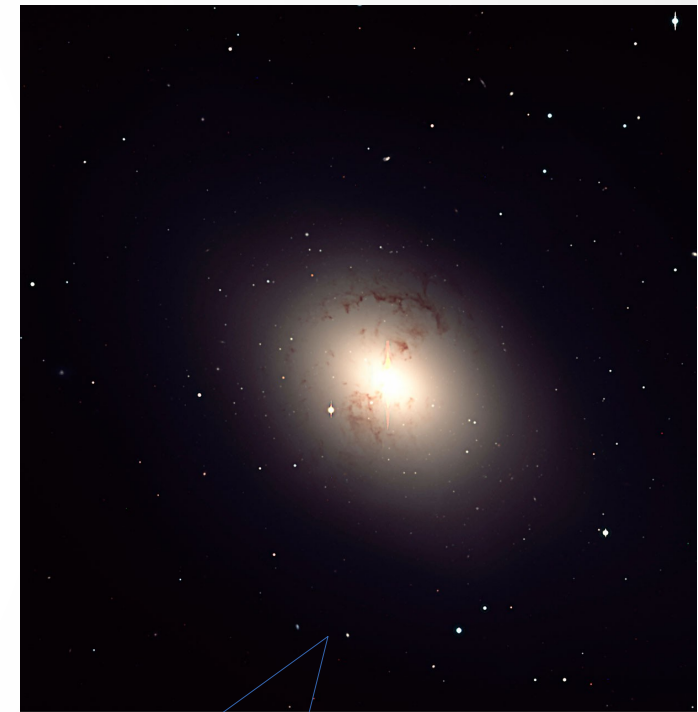
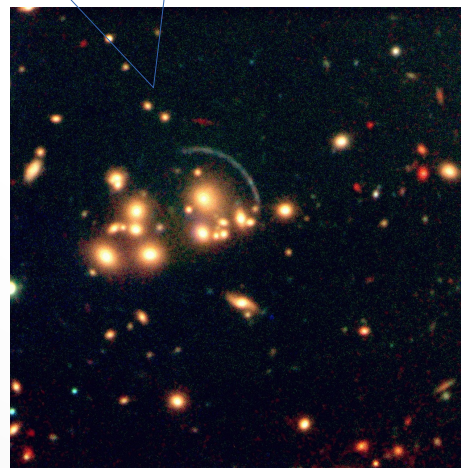


Turning cold gas into stars...



Let's interact!

Hey! You're harassing me!



No more cold gas. My star-forming days are over.

Galaxies and their environment



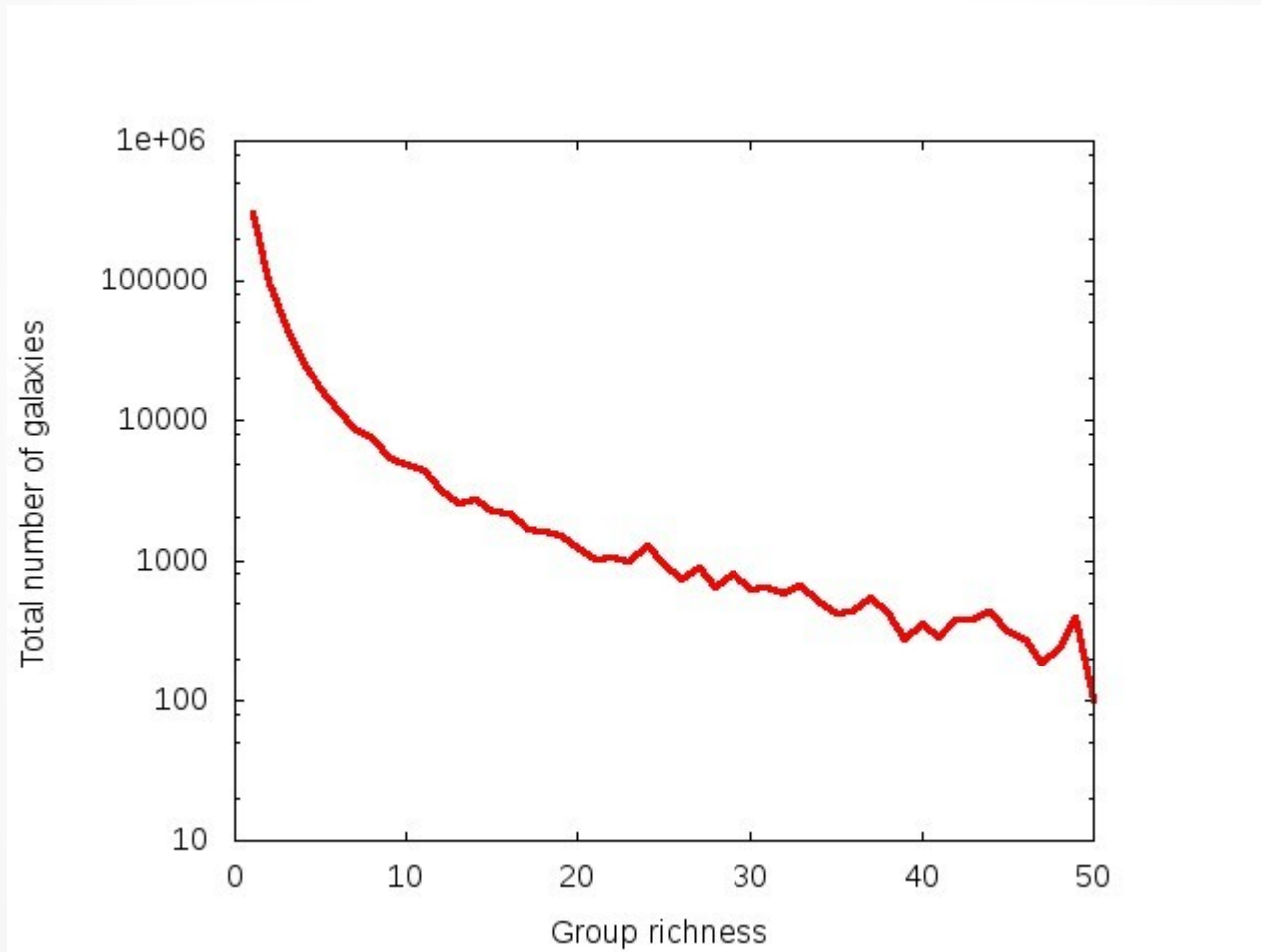
- Small groups, low densities
 - Blue, star-forming spirals



- Rich clusters, high densities
 - Red, passive ellipticals

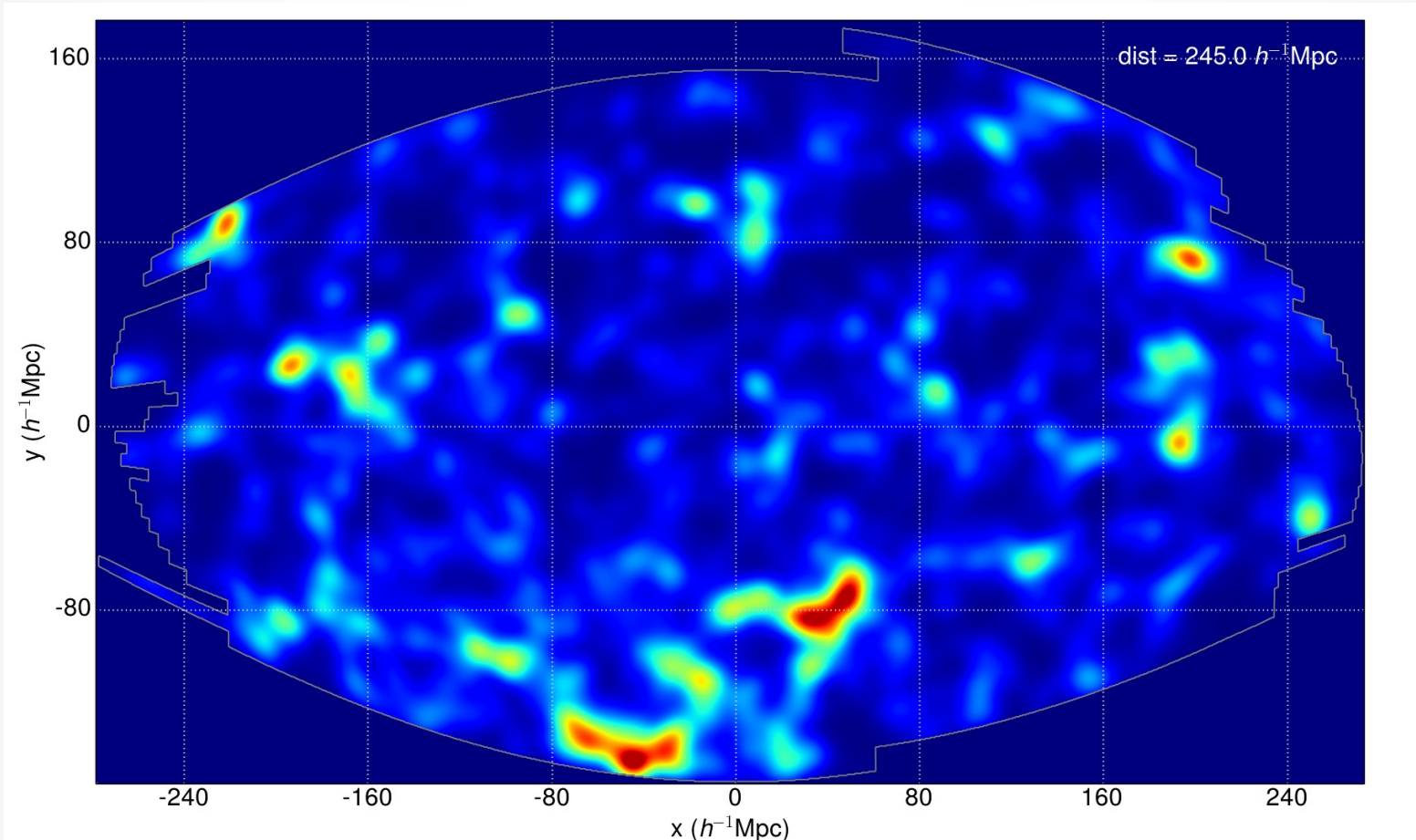
Galaxies in groups

There are more galaxies, where there are less galaxies!



Galaxy and group data: SDSS DR10: Tempel et al. 2014, A&A, 566, A1
SDSS DR8: Tempel et al. 2012, A&A, 540, A106

The large scale: luminosity-density field



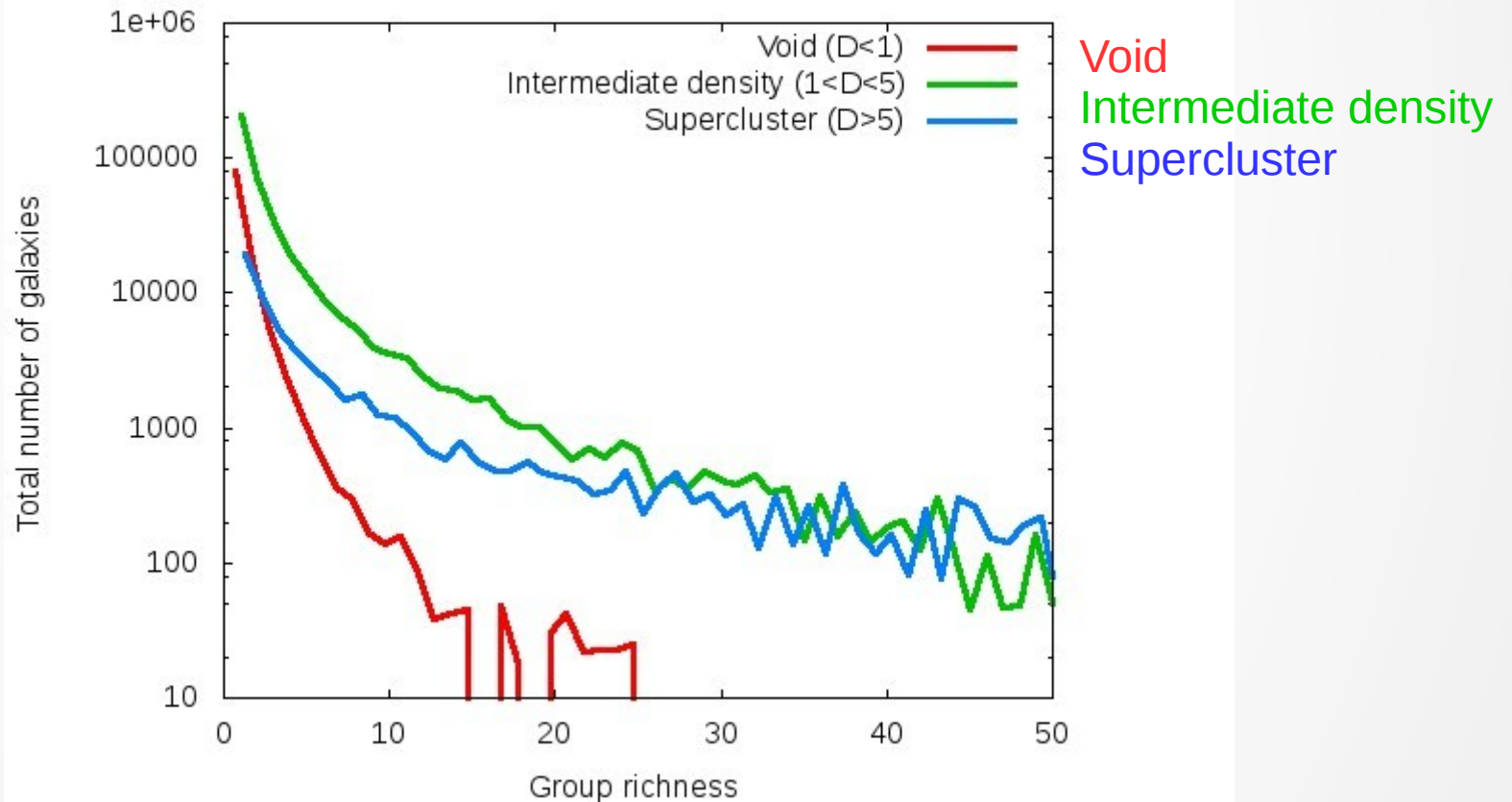
SDSS DR8, 1 Mpc grid, 8 Mpc smoothing.

Superclusters: $D > 5$ times the mean density. Voids: $D < \text{mean density}$.

Figure by Juhan Liivamägi.

Galaxies in superclusters and out

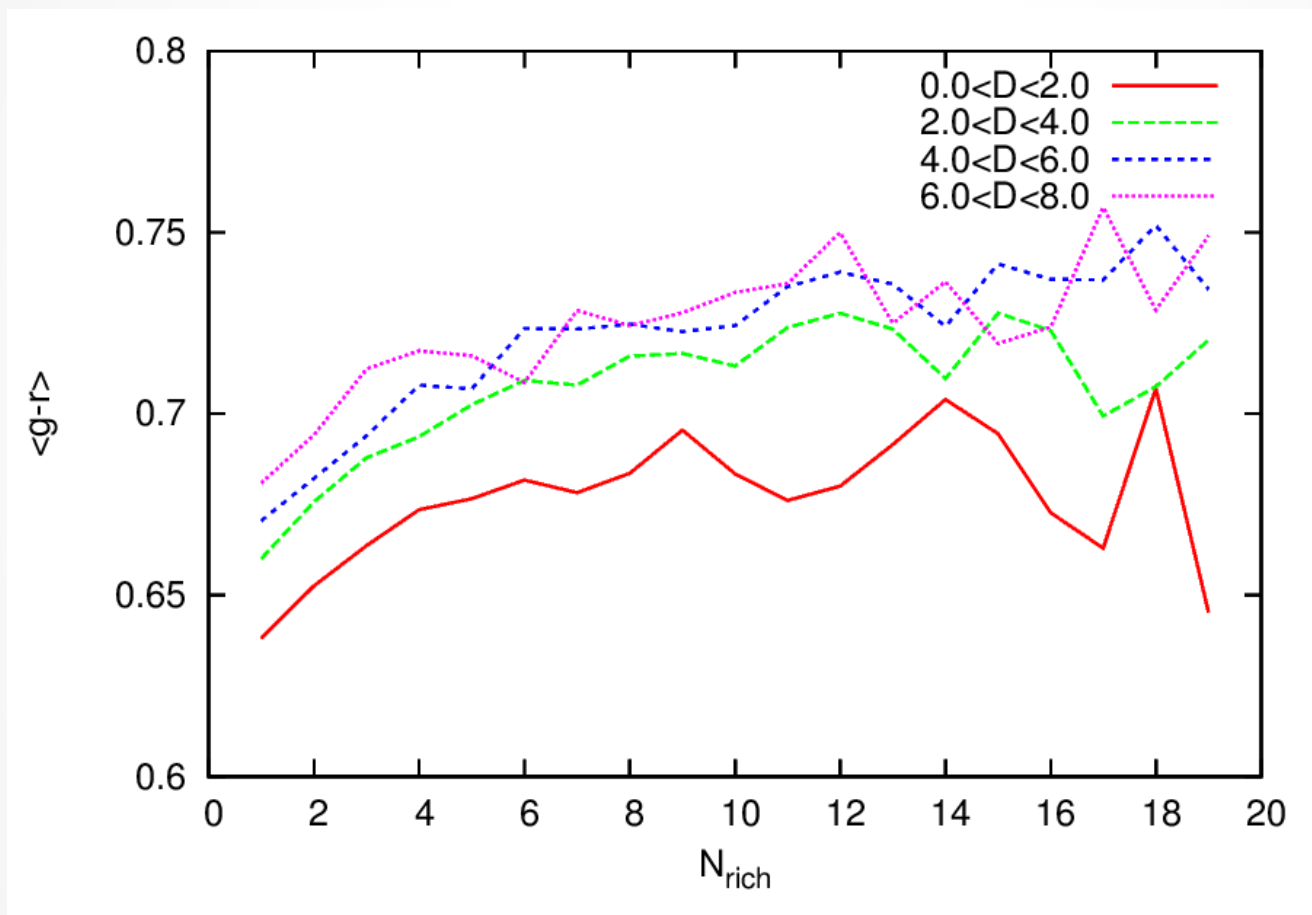
Small groups are everywhere.



Galaxies in small groups:
Does the large-scale environment
affect them?

Galaxies are redder in superclusters

SDSS DR8, magnitude-limited sample, distances 120 to 340 Mpc

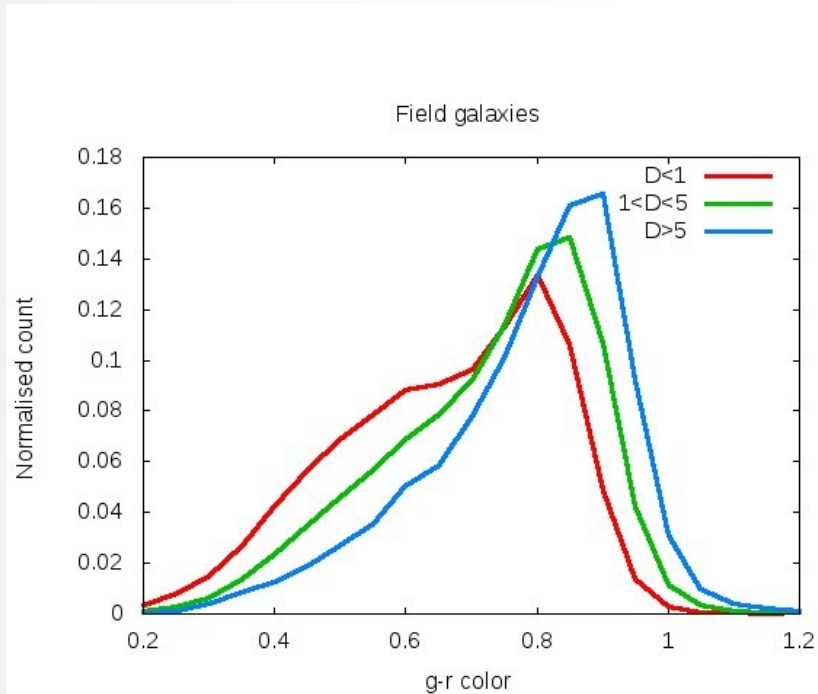


Supercluster core
Supercluster edge
Intermediate density
Void

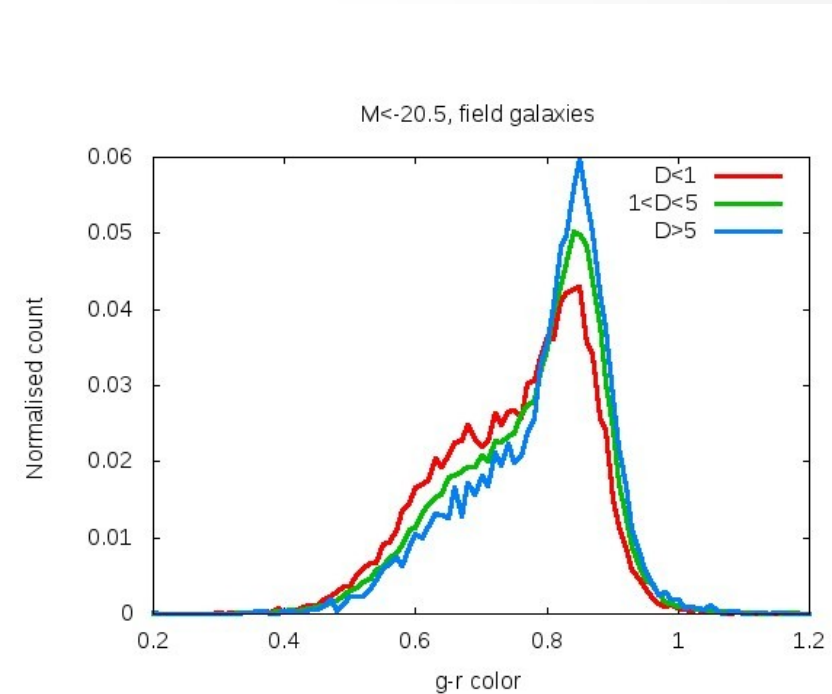
Color distribution for lonely galaxies

Galaxies not in groups

Magnitude-limited sample
 $12.5 < r < 17.77$

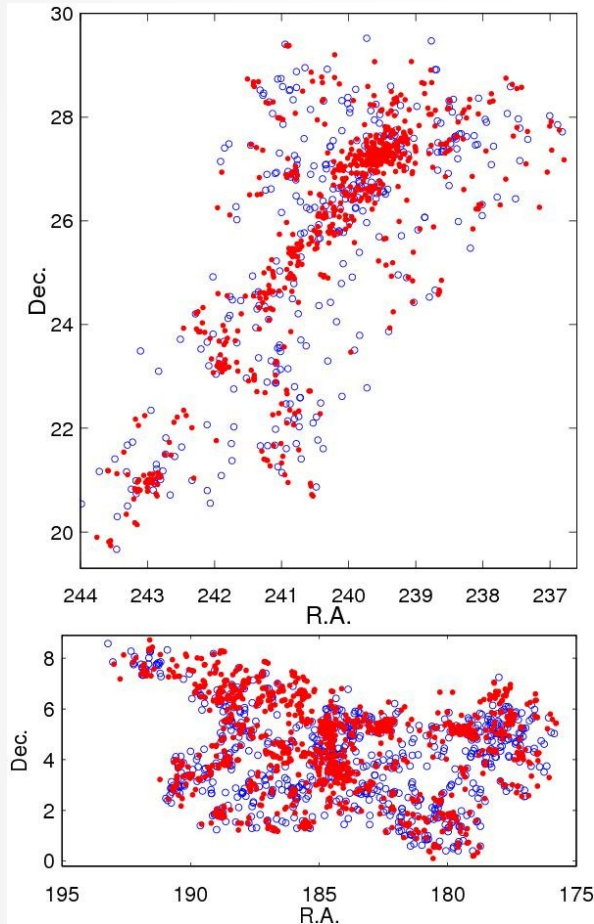


Volume-limited sample
 $M < -20.5$



Void
Intermediate density
Supercluster

Supercluster morphology



Filament



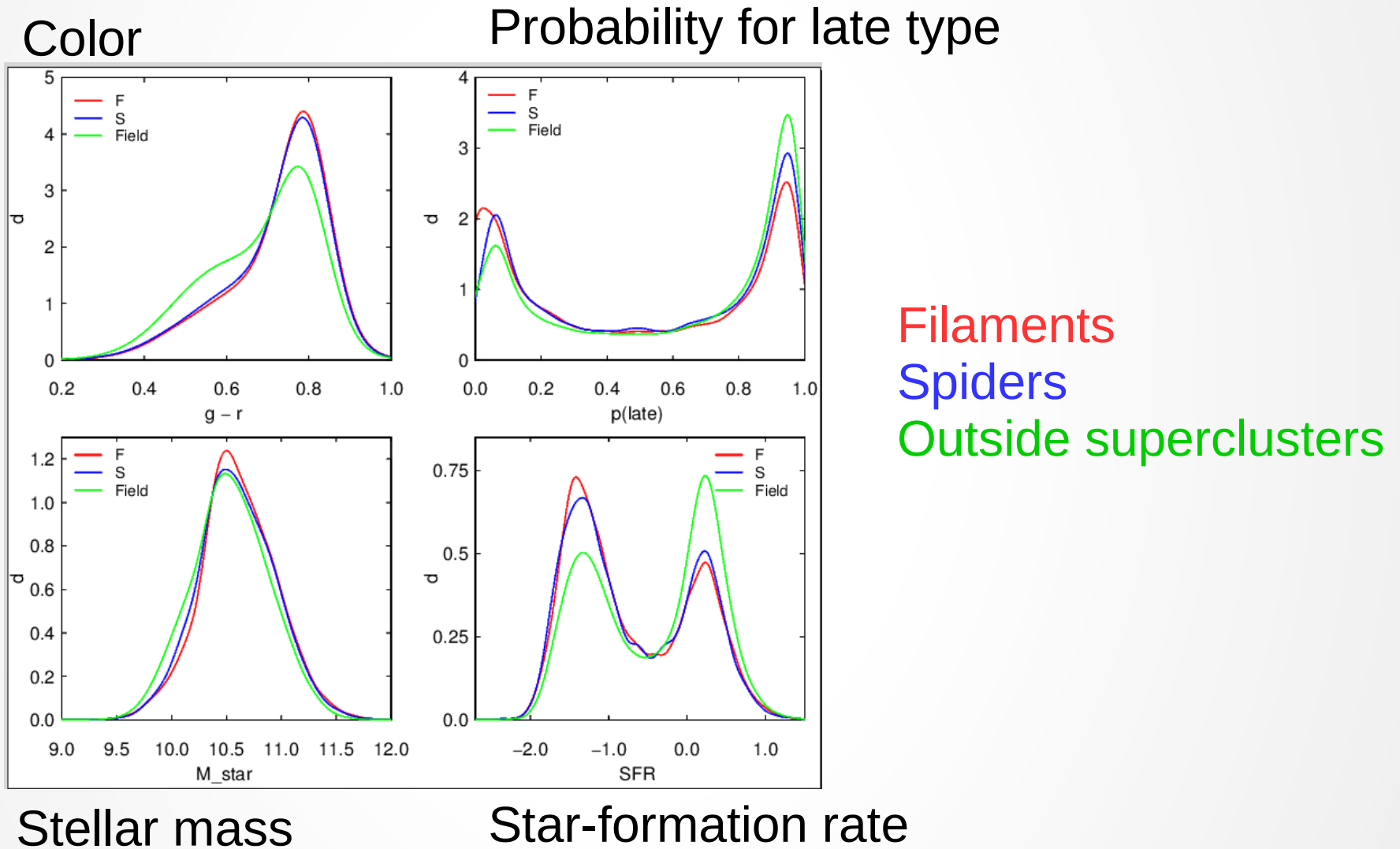
Spider



http://www.animalcorner.co.uk/venanimals/ven_spidfunweb.html

Einasto, Lietzen, Tempel, et al. 2014, A&A, 562, A87.

More star formation and lower stellar mass in spiders



Does it really take a supercluster?

- There are more red and dead galaxies in superclusters than in lower densities.
 - Even when the group richness is the same!
- The biggest difference is between voids and higher densities.
- Superclusters with different morphologies have different galaxy populations.

Does it really take a supercluster?

Yes, it does take a supercluster to raise a galaxy – the large-scale environment is important.

More information:

Lietzen, Tempel, Heinämäki, et al. 2012, A&A, 545, A104

Einasto, Lietzen, Tempel, et al. 2014 A&A, 562, A87