GALAXY EVOLUTION AND ENVIRONMENT

Bologna, 3-5 Novembre 2009

Infall of galaxies from the cosmic web into clusters (and groups) produces quenching of star formation (via ram pressure?), thus galaxy transformation from late (blue) to early (red). At z=0 this process affects mainly low-mass systems

Are compact groups fated to become isolated ellipticals?

Massive galaxies are already in place at z=1, and do not show dependence on environment. At z≲1, more red galaxies emerge due to the progressive building-up of structures where nurture like phenomena take place

Why are some groups efficient at turning star-forming, late-type galaxies into passive, early-type galaxies and some are not? What are the physical processes involved?

What are S0 galaxies??

The life of Early Type Galaxies in Low density Environments is quite eventful!!

What is/are the physical process/esses responsible for the two passive families: "primordial" massive (elliptical) galaxies and "quenched/declining" less massive S0 galaxies?

Please, give me a local benchmark and I shall explain how galaxies evolve !!

Color segregation with density is stronger at lower redshift and brighter magnitudes, but it seems to disappear, also for the brightest galaxies, between z=1.5 and z=2

We are understanding "typical" kinematics of galaxy populations within clusters.
BUT
Is connection type-motion of galaxies the same in any cluster?
Or does it depend on cluster properties (e.g. mass, cool core presence, cD presence, relaxed or substructured, cluster environment density)?

Mid-IR sources in clusters mostly populate the "green valley", with a smaller number of objects falling on the red sequence, consistent with dusty star-forming galaxies.

Will our zCOSMOS heroes succeed in revealing whether SSFR at z~2 depends on environment? (local overdensity). As of today, and for some time to come, they are the only ones that can undertake this task…

The ETG evolution appears to be driven mostly by (dynamical) mass, while the effects of the environment appear minor, at most.
The problem: how to reach the detail necessary to detect the influence of the environment also at high redshift.

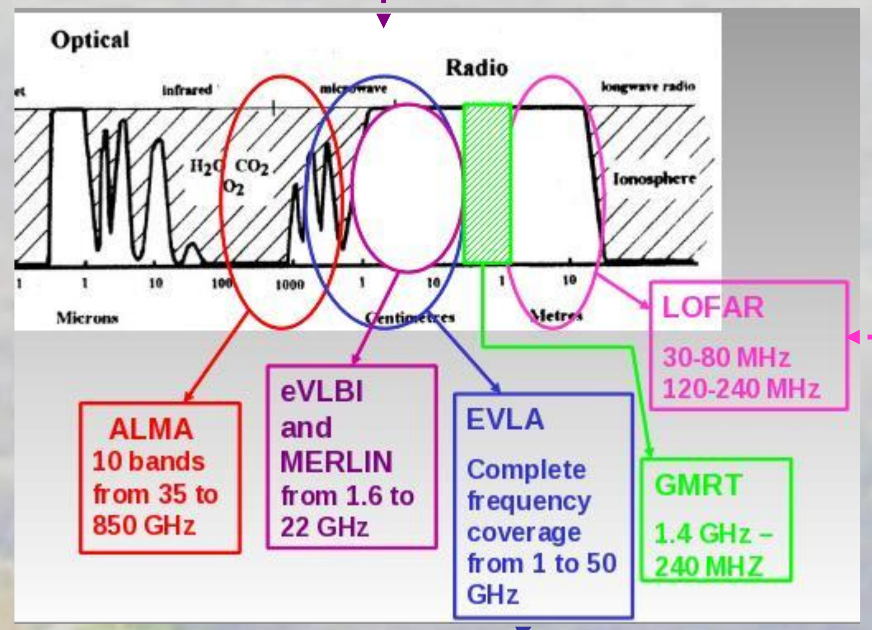
The variation of the FP relation from g through K implies significant differences in the mass sequence of (bright) early-type galaxies between low and high density environments.

Can we reconcile these results into a consistent picture for the mass assembly of ETGs in different environments ?

Normal and superdense ETGs coexist at z>1. Their different physical properties imply that they follow two distinct formation and evolutionary paths.

Has the environment the X-Factor ?

Low power end of the RLF for AGN
Starburst galaxies locally and at high z



Very distant radio galaxies

HI at high z

Starburst & starforming galaxies at high z

HI dynamics in the Local Universe

Unsurprisingly, both heredity and environment affect galaxy evolution, but what is their relative importance?
Little attention has been devoted so far in explicitely quantifying the importance of conditions at formation (nature rather than nurture). Not surprisingly … this is difficult…
We need to gain a better understanding about physical processes at the group scale. This is the most common galaxy environment.
We also need to improve (and better understand) our definitions of environment.

Mass Functions are the most secure predictions one can get from state-of-the-art N-body simulations
How much statistical nonlinearity is hidden in going from halos to light?

Painting courtesy of G. Gavazzi