zCOSMOS: The dependence of clustering on luminosity and stellar mass at z=0.2-1.0

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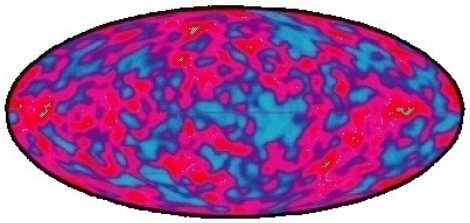
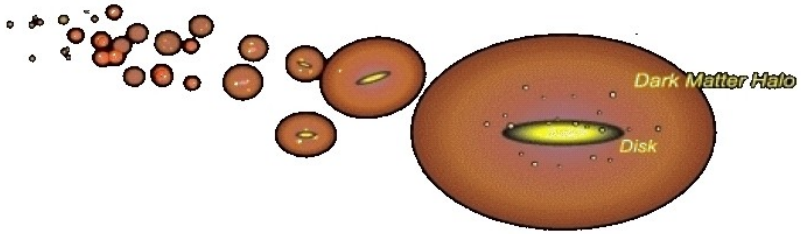
Motivation

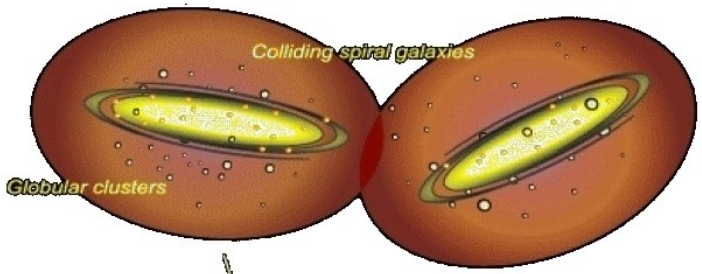
- Galaxy are thought to form through the cooling of baryonic gas within extended dark matter halos (White & Rees, 1978).



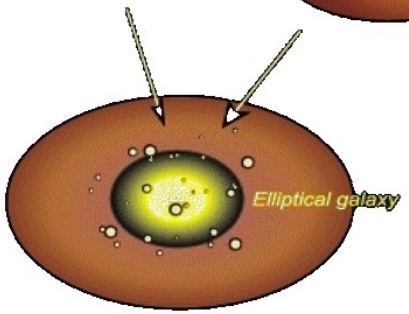
- The mass of the hosting halo is expected to play a significant role in the definition of the properties of the galaxy (total mass in stars, luminosity, color, morphology, ...).



- Major challenge is to link visible properties of galaxies and their evolution to those of dark matter halos.

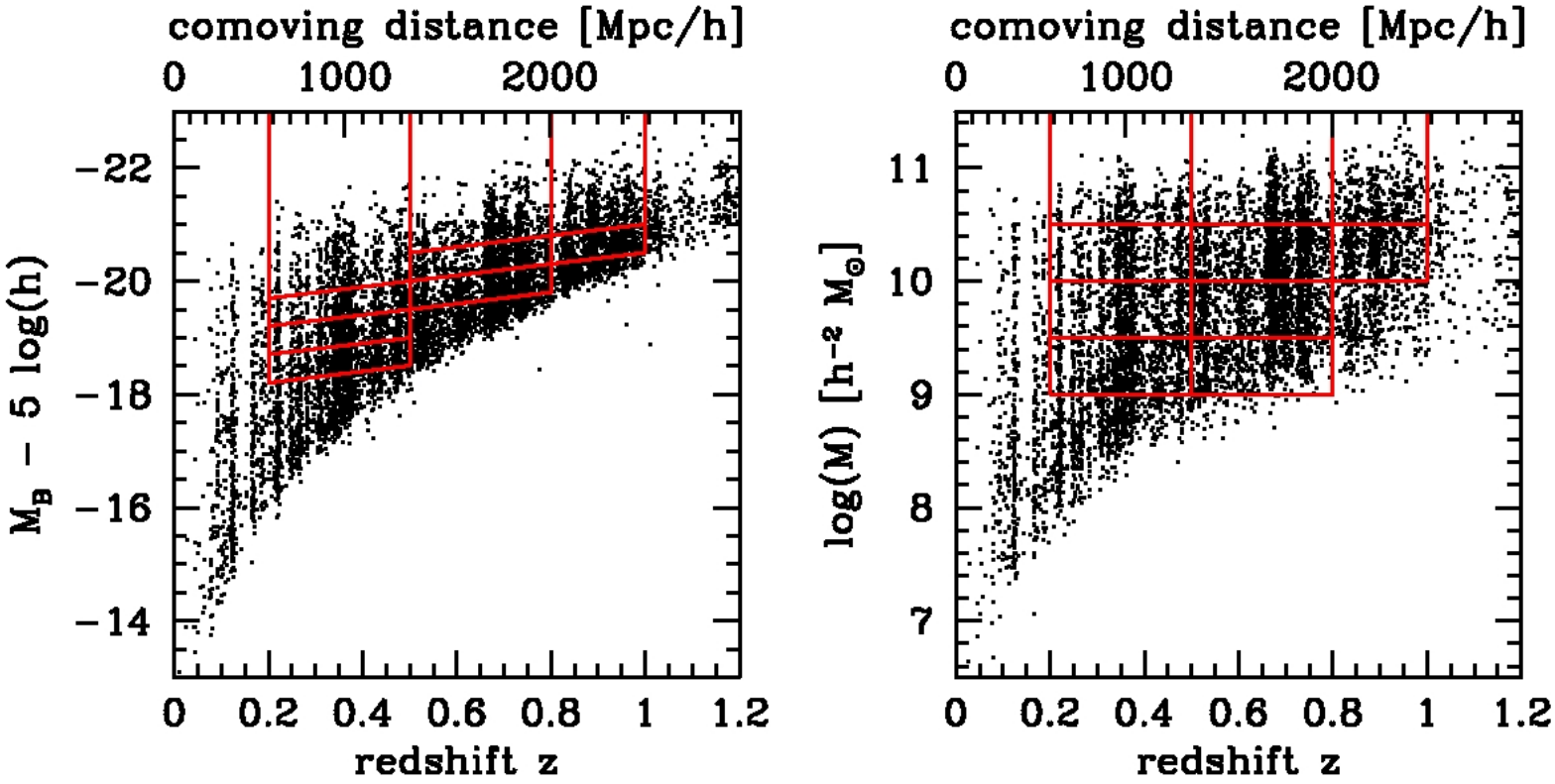


- Stellar mass is expected (and found) to be a better proxy of the total DM (halo) mass, in particular of the 'original' mass (e.g. Conroy et al.)



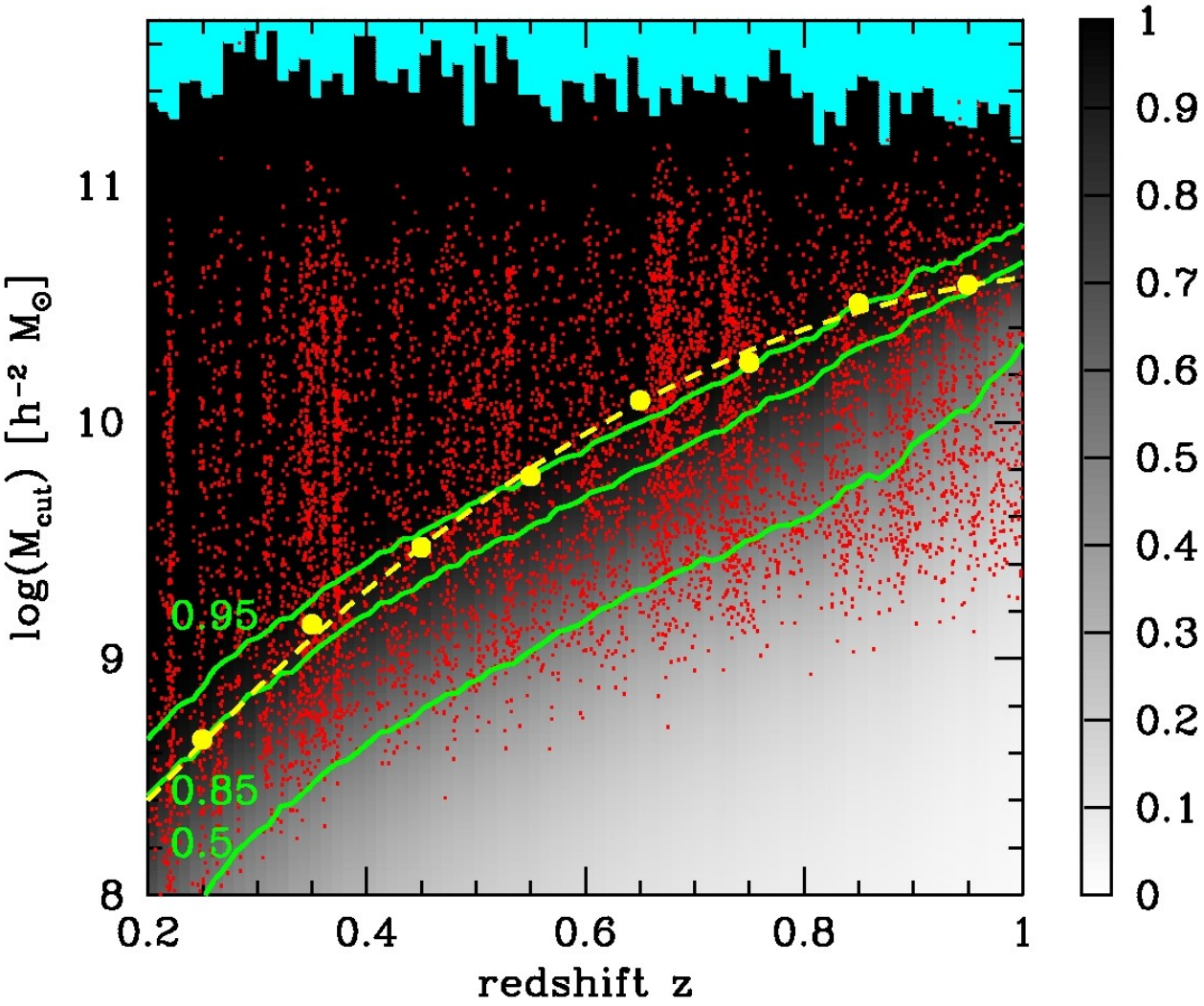
Galaxy samples

- We used the 10K zCOSMOS sample (Lilly et al., 2009)
- Absolute magnitudes from Zucca et al. (2009)
- Stellar masses from Bolzonella et al. (2009)
- 3 redshift ranges : [0.2 – 0.5], [0.5 – 0.8] and [0.8 – 1.0]
- Evolution of luminosity as a function of redshift : $M_B(z) = M_B(0) - z$



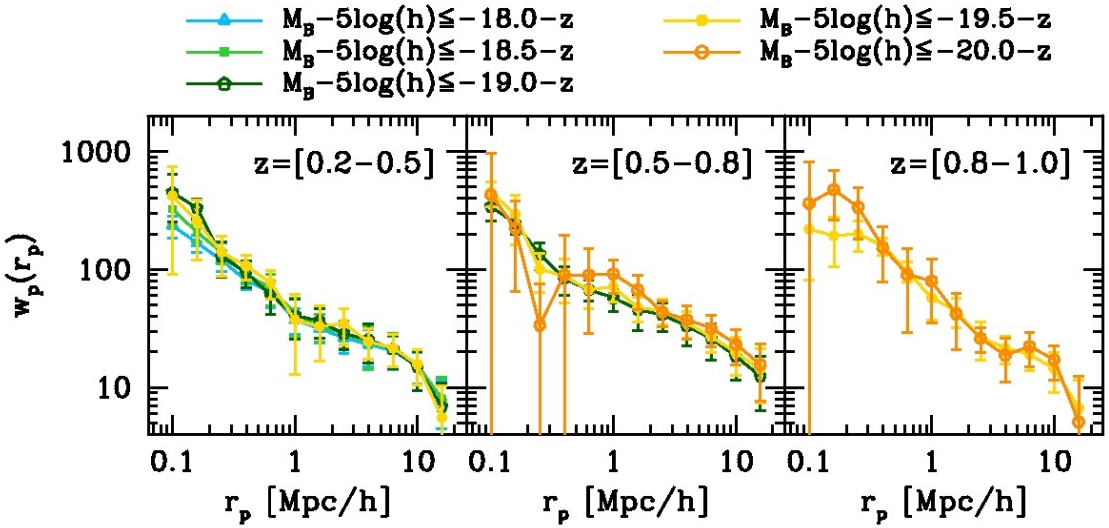
Stellar mass (in)completeness

- mock catalogues complete in stellar mass down to ~ 10^8 h^{-2} $M_\odot$
- completeness as the fraction of galaxies brighter than $I_{AB} \leq 22.5$ above a given stellar mass threshold
- completeness derived from the data themselves in agreement
- mock catalogues allow us then to estimate how it affects the clustering measurement

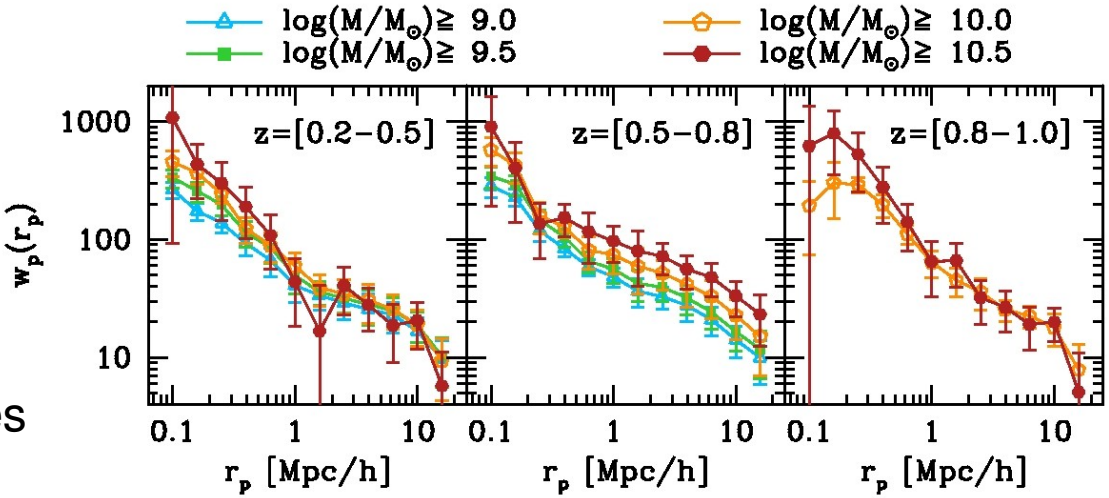


Projected correlation functions $w_p(r_p)$

- weak dependence on luminosity.
  at odds with other galaxy surveys
  (Pollo et al. 2006, Coil et al. 2006, ...)
- flat shape of $w_p(r_p)$, consistent with being
  in an overdense region (Abbas & Sheth 2007)
- no coherent evolution with redshift

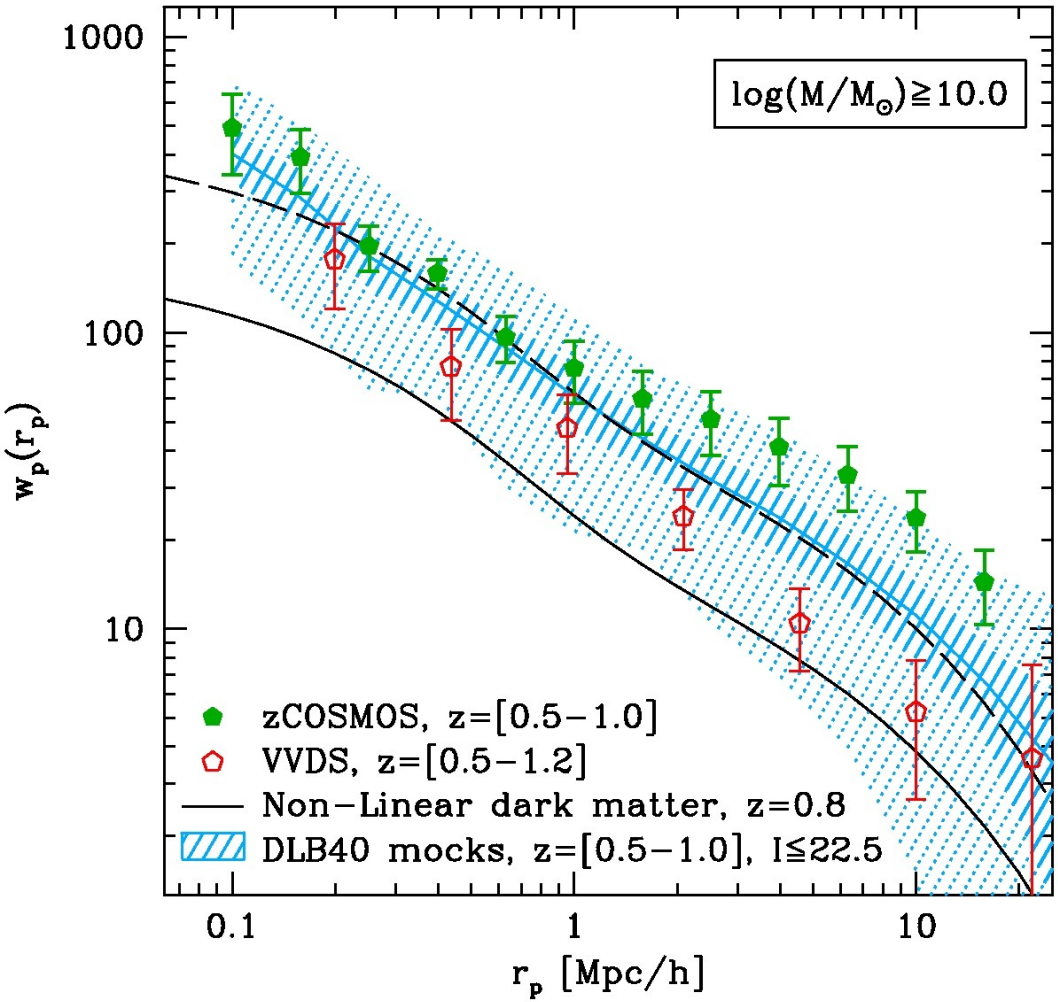


- weak dependence on stellar mass,
  except at z=[0.5 – 0.8]
- flat shape, excess of power on large scale,
  driven by large scale structures at z~0.3,
  0.7 and 0.9
- no clear evolution with redshift.
- confirmation that biasing of massive galaxies
  evolves more rapidly between z=1 and z=0



zCOSMOS vs. VVDS, Millennium & Halofit

- zCOSMOS agrees with SAMs (De Lucia & Blaizot 2007) on small scales but is +3σ away from the mean of the mocks at r_p=10 Mpc/h
- the VVDS lies at ~ -1σ from the mean
- COSMOS has picked up a particularly rare positive fluctuation in a volume of ~ 10^6 h^{-1} Mpc^3
- we need larger field/volume. cosmic variance is still strong in a 2 deg^2 field



Galaxy clustering as a function of morphology

- Work done by **S. de la Torre** et al. (now available on the COSMOS wiki)
- Morphology classification by Tasca et al.
- Galaxy clustering in volume limited samples from z=0.2 to z=0.9
- Early-type (Elliptical) more clustered at all redshift than late-type (spiral +irregular)
- Consistent with the flatenning of the morphology-density relation