Projet Horizon - Horizon Project

-- Projet Horizon (site interne) - Science - Simulations à grandes échelles - Marenostrum Simulations - The huge run - Mare Nostrum @ z=4 --

Mare Nostrum @ z=4

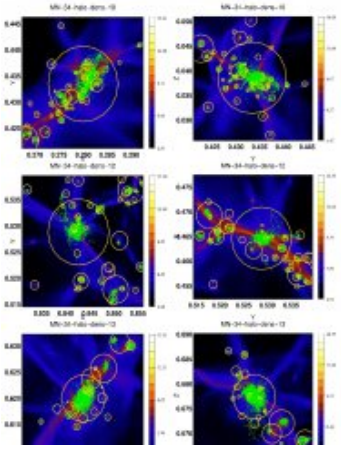
Mare Nostrum @ z=4 stellar

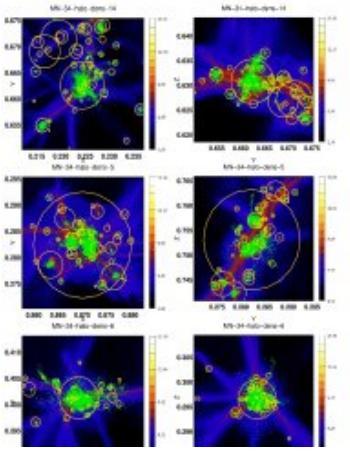
Pichon Christophe

Monday 30 October 2006

<PDF_LINK>

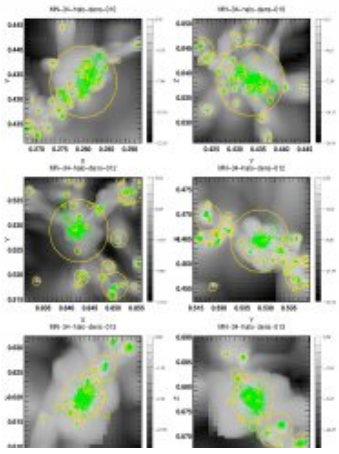
Structure identification on MN 34

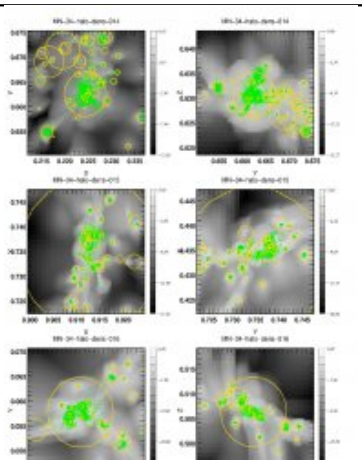




galaxies identification	galaxies identification

In colour the gas density, in green the stars, in yellow the leaves of DM + core of mother with Dylan s post treatment.





Metal distribution @ z=4	Metal distribution @ z=4 cont

In grey the metal density, in green the stars, in yellow the leaves of DM + core of mother with Dylan s post treatment.

gzip d cat of gals @ z=4 sorted in mass
The corresponding dark matter adaphop structures are available on the FTP server of the HORIZON collaboration: HORIZON-FTP

3 files are found there

- MN-34-adaphop.nod : all clumps in adaphop format
- MN-34-leaves-with-stars.nod : all galaxy clumps
- MN-34-star.nod : clumps in the star catalog

The second catalog corresponds to a post treatment of the first, following the prescription described in Sort Nodes, and a selection based the fact that each clump contains at least one star. It is our GALAXY reference catalog.

CAVEATS: the dark matter adaphop catalog and its sequels was produced by segments of 1/8th of the simulation. A reordering and overlapping recovery of the full catalog in in progress. It was shown for the FOF catalog that the difference in treatment was minimal (0.2 %).

The corresponding spectra (73k Galaxies) produced with PEGASE2 are available on the FTP server of the HORIZON collaboration: HORIZON-FTP

5 files are found there

- MN-34-gal-spectra.dat (500 megas)
- MN-34-gal-spectra.txt
- MN-34-gal-spectra-wavelength.txt

- MN-34-gal-color.dat
- MN-34-gal-color.txt

the first is in totor format (see below) it contains

x y z [box fraction]	m [solarM]	age [Myr]	log10 z [mass fraction]	flux [Erg/s/solar M/cm^2]

the second is the beginning of the first in ascii as a check

the third is the corresponding wavelength in Angstrom.

the forth is the table of colours in various filters relevant for high redshift objects

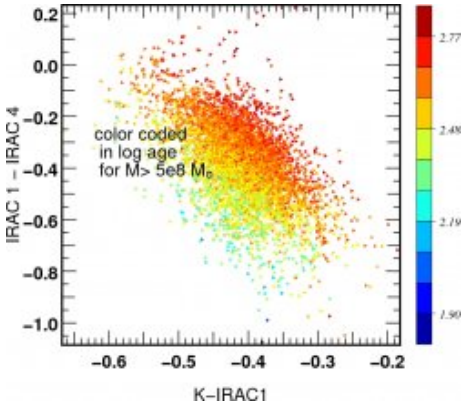
x y z [box fraction]	m [solarM]	age [Myr]	log10 z [mass fraction]	observed Magnitude in G R I z K IRAC-3.6 IRAC-8.0

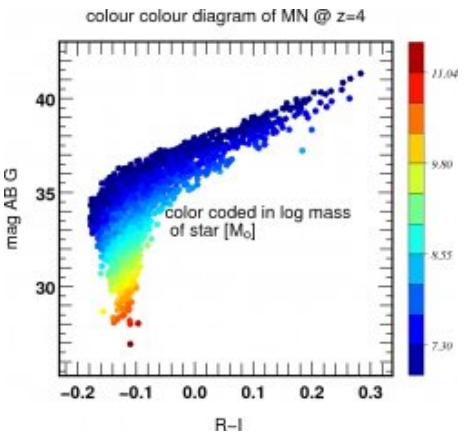
The last is the first 80 lines of the fourth as a check

The following Fortran example shows how to read such files:

```
 program readfile

implicit none
integer(kind=4)::i1,i2,np1,np2
real(kind=4), dimension(:,:), allocatable :: f

open(10,file='le_fichier_a_lire.dat',form='unformatted')
read (10)np1,np2
allocate(f(np1,np2))
 read(10) ((f(i1,i2),i1=1,np1),i2=1,np2)
enddo

close(10)
end program readfile
```

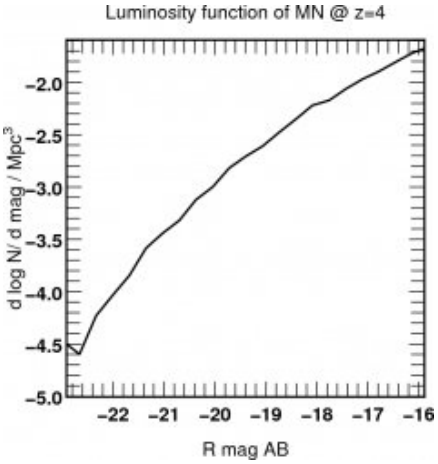
As a check we produced the following color diagrams from the above spectra:





color color diagram of galaxies @ z=4 Only half of the box is processed. This figure can be reproduced qualitatively from the catalogs given on the ftp server	color magnitude of MN @ z=4

Quantitativement, la Distribution ci dessous semble en bon accord avec les donnees publiees par Bowens et al. 2006 pour des galaxies à z 6



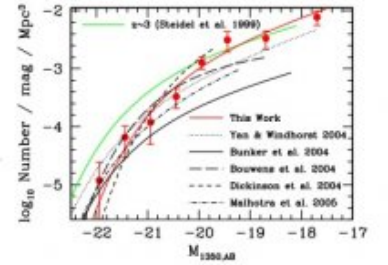


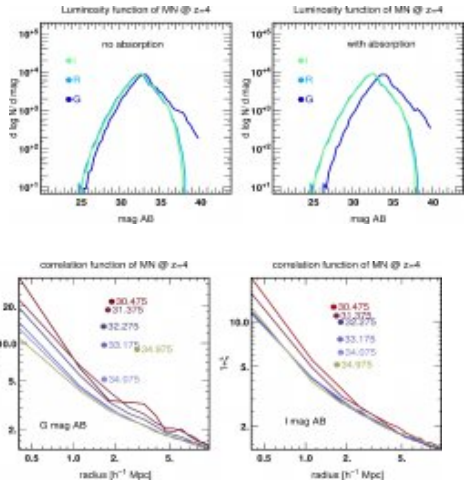
FIG. 14.— Comparison of our rest-frame continuum UV (∼ 1350Å) luminosity function (Figure 10; *red line* and *red circles*) with that of others. Included are the $z \sim 6$ LFs of Yan & Windhorst (2004; *dotted black line*), BSEM04 (this *solid black line*), Bouwens et al. (2004a; *thick dashed black line*), Dickinson et al. (2004; *thin dashed black line*), and Malhotra et al. (2005; *dashed-dotted line*). The $z \sim 3$ Steidel et al. (1999) LF shifted to 1350 Å rest-frame is shown for context (*green line*). All the LF determinations are only plotted to their nominal faint-end limits. A compilation of the Schechter parameterizations of the plotted LFs is provided in Table 13. The careful and comprehensive nature of the current analysis should make the present determination of the $z \sim 6$ LF the most robust (§6.1).

Luminosity function of MN @ z=4 to be compared to the published distribution to the right	Luminosity function of real galaxies

One and two points statistics

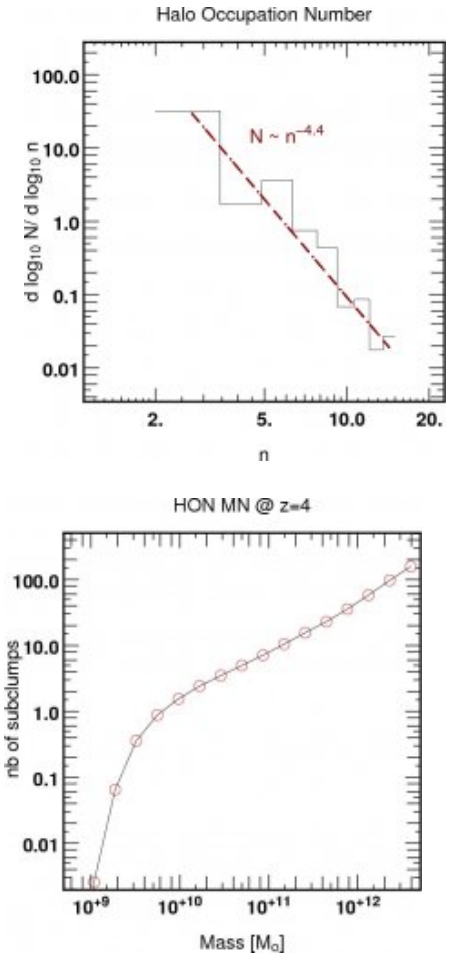
Once the colours have been computed, it is possible to look at one and two points statistics with the catalogs.

In particular,



1 pt stat of MN @ z=4 vz color using a subset (1/3) of the full catalog
Two pts stats of MN @ z=4 vz color

Halo Occupation Number

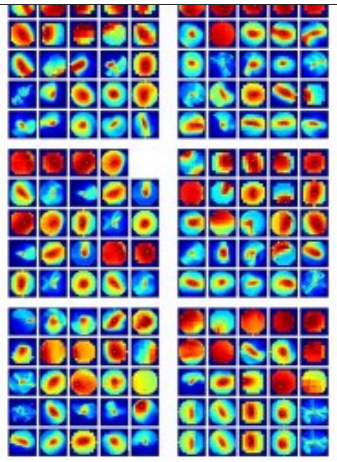


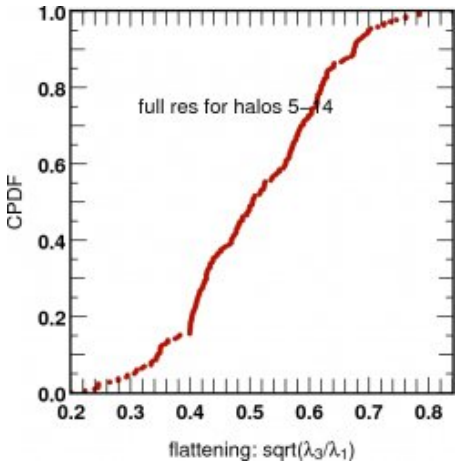
	Halo occupation number in MN @ z=4

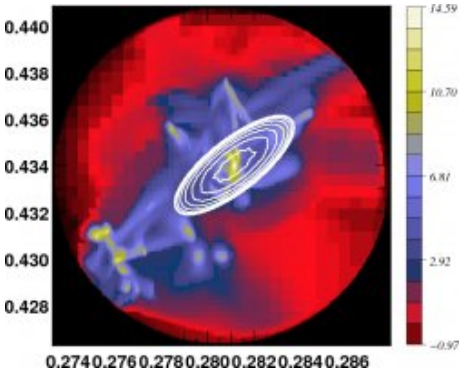
These are computed using the daughters of the adaphop catalogs given above.

Inner structure

For the galaxies above we compute the local maps within a sphere centered on the center of mass of the stars (not the gas) and compute the moment of inertia with respect to the brightest pixel. The Cumulative PDF of ellipticity (the square root of the ratio of the eigenvalues of the inertia tensor weighted by exp(-r/rmax)) is also shown there. An example of ellipsoid fit is also shown

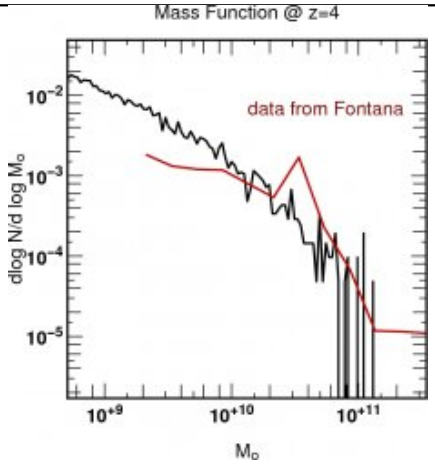


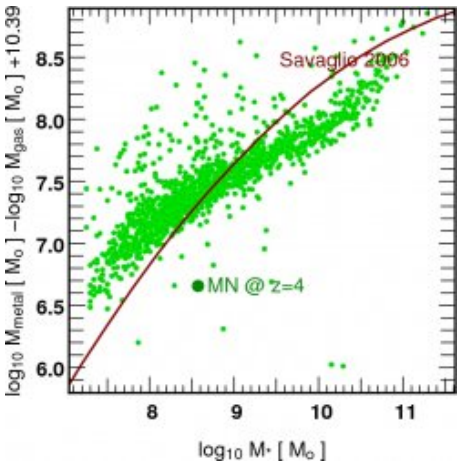




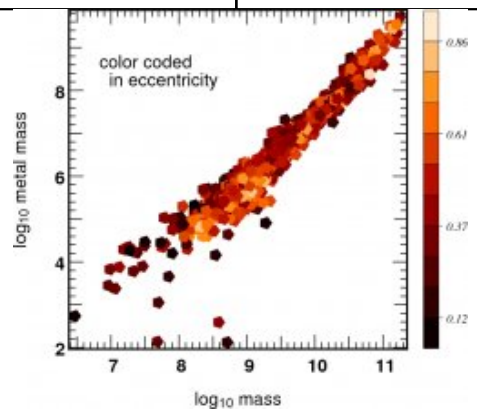
core of gal @ z=4 The inner structure of galaxies within the adaphop radii. These X-Y maps correspond to the maximum pixel along the LOS. a dot shows the position of the projection of the densest pixel w.r.t. which the moment of inertia is computed.	CPDF of flattening @ z=4 Computed from all galaxies within 6 hires cubes near the first few most massive halos.	Ellipsoid fit to the density Example of fit of a uniform ellipsoid in order to model the dust.

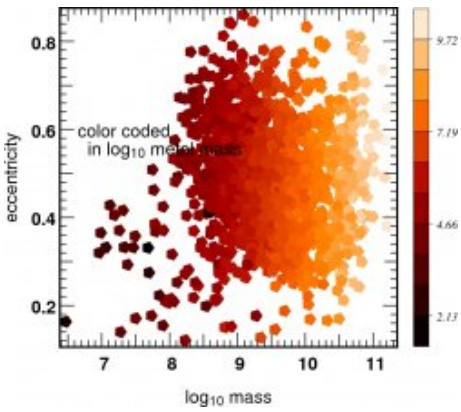
Properties of galaxies

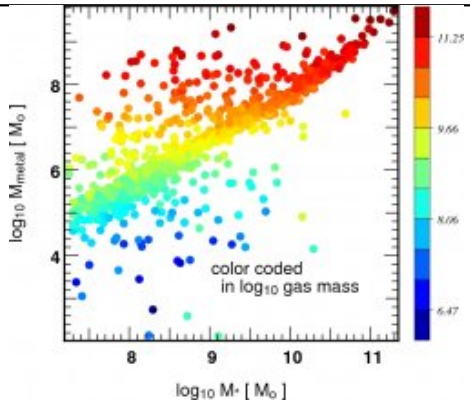


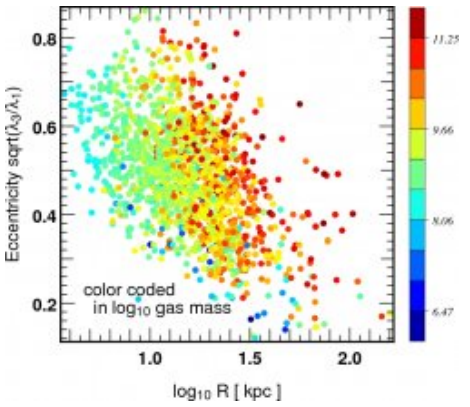


Mass function of galaxies Number of galaxies per unit mega parsec in bins of solar mass	Observed Z stellar mass correlation The red curve is an extrapolation of z=3 data.





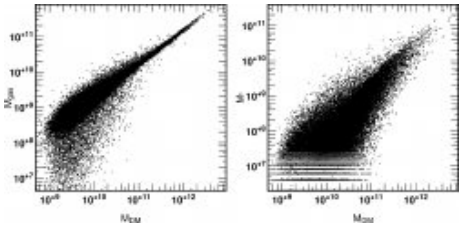




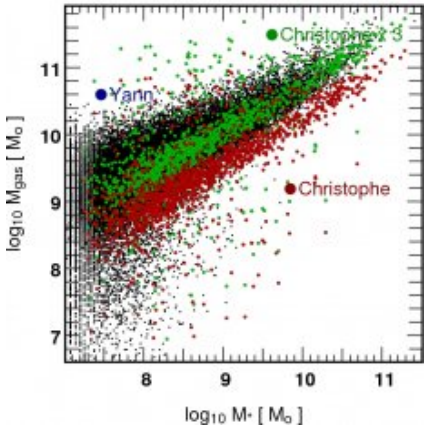
Mass of metal vz Mass of gas of MN @ z=4. Within ellipsoid containing 85 % of young stars. Color coded in eccentricity (= sqrt(I1/I3))	Eccentricity of gal vz Mass of gas colour coded in log Mass of metal. The eccentricity is defined as = sqrt(I1/I3)
Metals in Gas vz Stellar Mass @ z=4 The metal gas is computed within the ellipse; the stellar mass is computed within the adaphop sphere.	eccentricity vz size of gal @ z=4 The size and ellipticity are measured as the long axis and sqrt(I3/I1)

catalogs of star/gas/DM

gzip d cat of star/DM/gas mass num_adaptahop,x,y,z,r,mdm,mgas,mstar,mFe
Note that here Yann chose 3 Adaphop radii to make the measurements

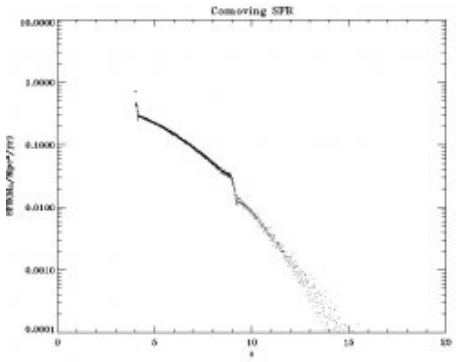


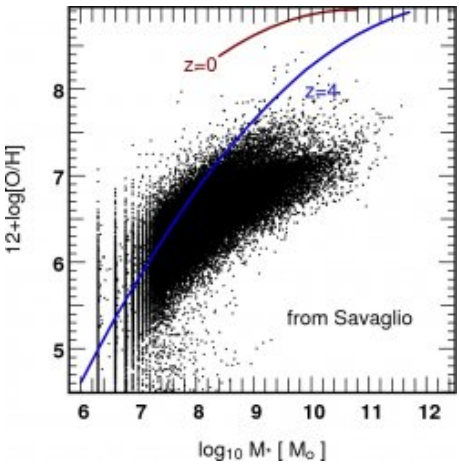
Yann vz Christophe

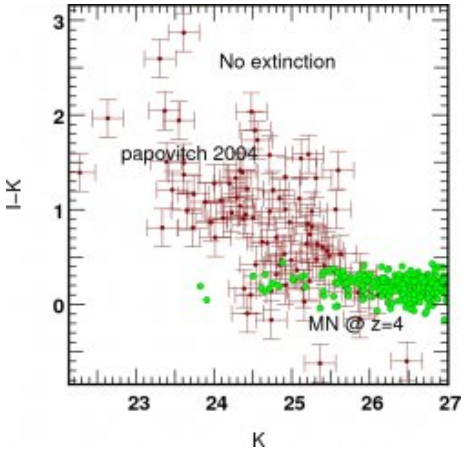


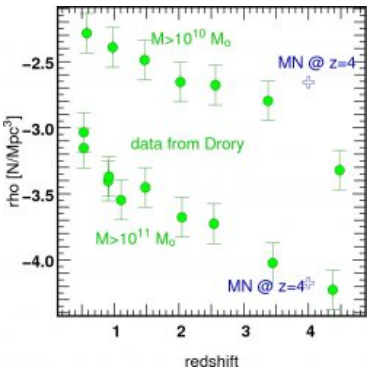
Mass of DM/*/gas @ z=4 courtesy of Yann see corresponding cat.	Yann s & Chris s Mstar vz Mgas The discrepency arises because of a different choice in outer radius.

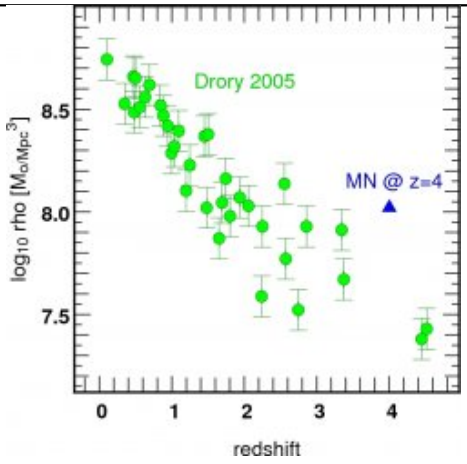
Cosmic SFH,Color, metals, density, SFR confrontation with data

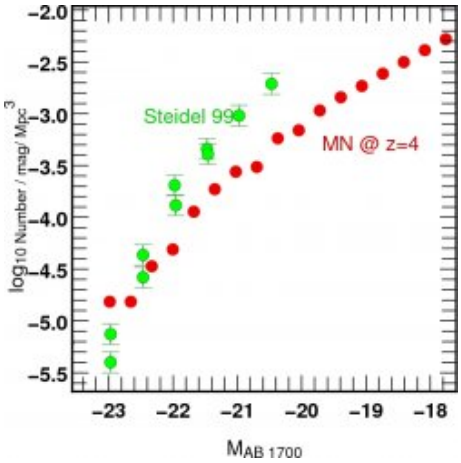








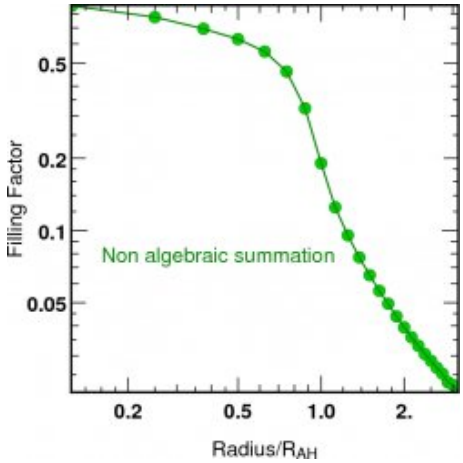




Cosmic SFR @ z=4 computed by Yann	Observed Z stellar mass correlation From the reduction of Yann.
Colour Mag @ z=4 Red points are measured. It seems that MN gals are too faint in Red.	Number density @ z=4 as a function of redshift and threshold in mass
Stellar mass density @ z=4 computed from all SSP belongings to galaxies. Somewhat high.	Luminosity function in UV rest compared to Steidel. Not enough galaxies at low SFR in MN @ z=4.

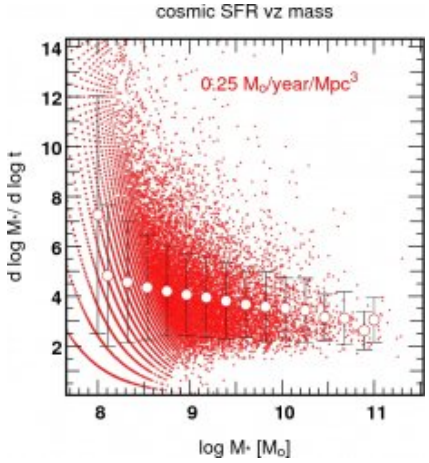
Satellite accretion efficiency

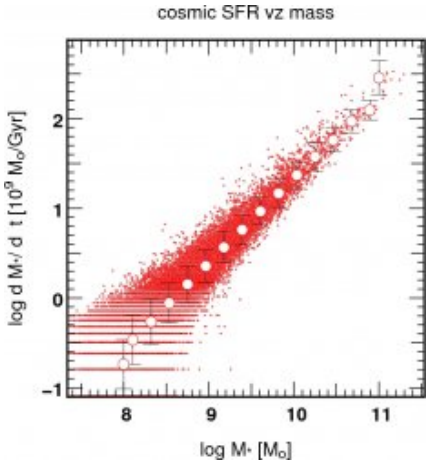
Here we compute the fraction of the surface of the (rescaled) adaphop mother radius which is covered by satellites.

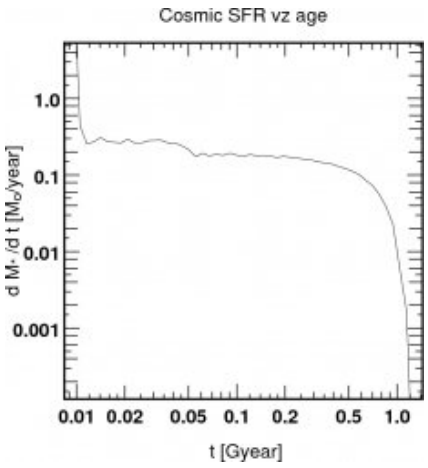


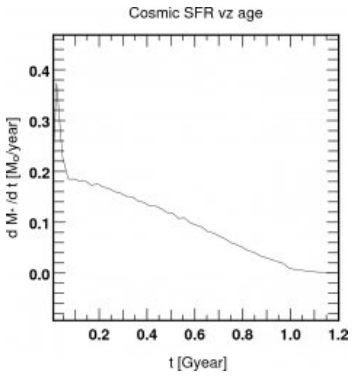
Filling factor at z=4 Filling factor of satellites @ z=4 as a function of fraction of mother radius.

Star Formation rate



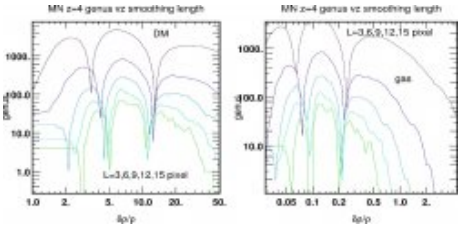






cosmic specific SFR @ z=4	cosmic SFR @ z=4
cosmic SFR vz age	linear cosmic SFR vz age

Genus (Euler Characteristic)



Genus of MN @ z=4 The genus of the gas and the DM is shown here.
TODOs:

- Two point correlation in redshift-real space for stars as a function of luminosity.
- Section of filaments gas/DM;
- Spectra and slices with metals species.
- Accretion flow maps;
- Redshift evolution;
- Mass profiles;
- phase space morphology segmentation and NN classification
- Redshift distorsion
- Pk multiscale
- feeding factor.

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