A BRIEF SUMMARY OF CURRENT SIMULATION PROJECTS

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CLUES Workshop 2012

Hydro Sims

- CLUES
- MUSIC
- CURIE Universe

CLUES Sims

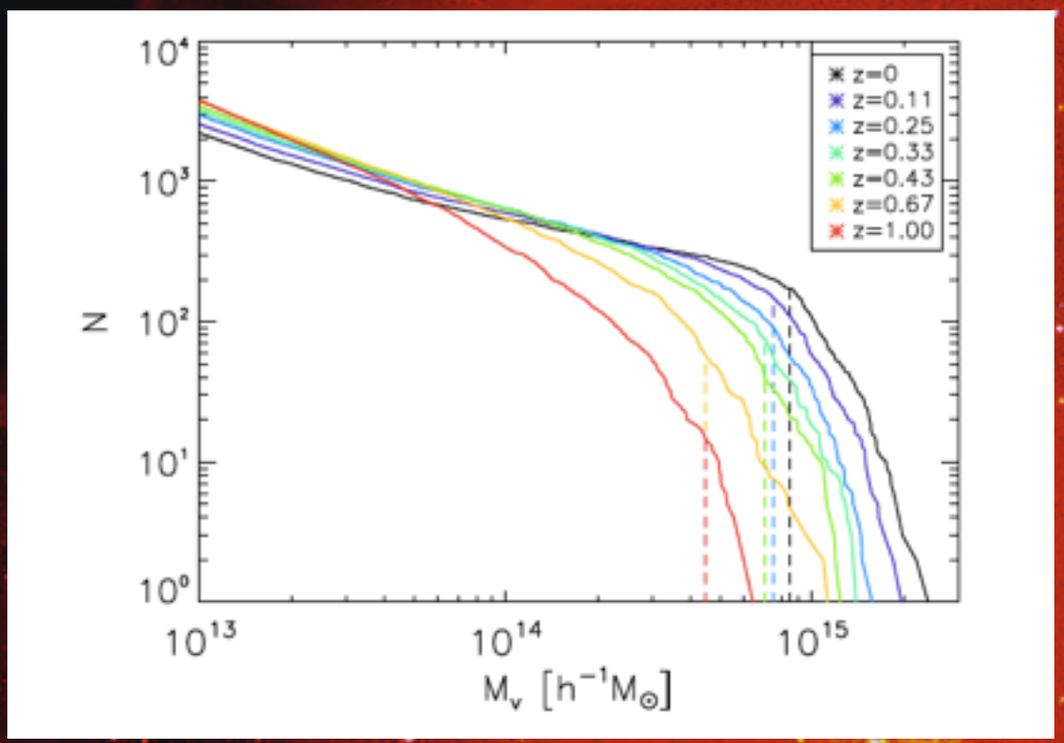
- Most of the recent work has been focused on the Local group object found in one of the CR simulations made with WMAP5 cosmological parameters: We named it by the number of the random seed: B64_WMAP5_10909.

- Several Simulations with an effective particles number of 2048^3 have been done:
  - Standard GADGET with Springel-Herquist feedback model.
  - Gadget + Cecilia´s feedback model.
  - ART + Daniel's model.
- The long awaited 4096^3 is still not yet done properly. New set of resimulated initial conditions have been done.
- New productions of CRs from Timur's and Kitaura's codes will be tested and hopefully will produce next generation of LGs soon

MUSIC

- MUltidark Simulation of Galaxy Clusters
  - **http://music.ft.uam.es**
- Select all objects with M > 10^15 Msun from MULTIDARK for resimulations with 4096^3 equivalent particles in 6/h Mpc sphere centred on each cluster.
- Total of 283 resimulations which gave rise to more than 2000 objects (groups and clusters).

MUSIC



Cumulative Mass function of MUSIC resimulated objects with no contamination. Vertical lines show the volume limited mass cut.

Two sets of simulations:

Non-radiative: Gravity + Hydro

Radiative: Cooling+SF+feedback

Springel&Hernquist model (all)

Piontek& Steinmetz 2011 (not all)

Main features:

Same cosmology as Multidark

Mgas= 10^8 /h Msun

Mdm= $9x10^8$ /h Msun

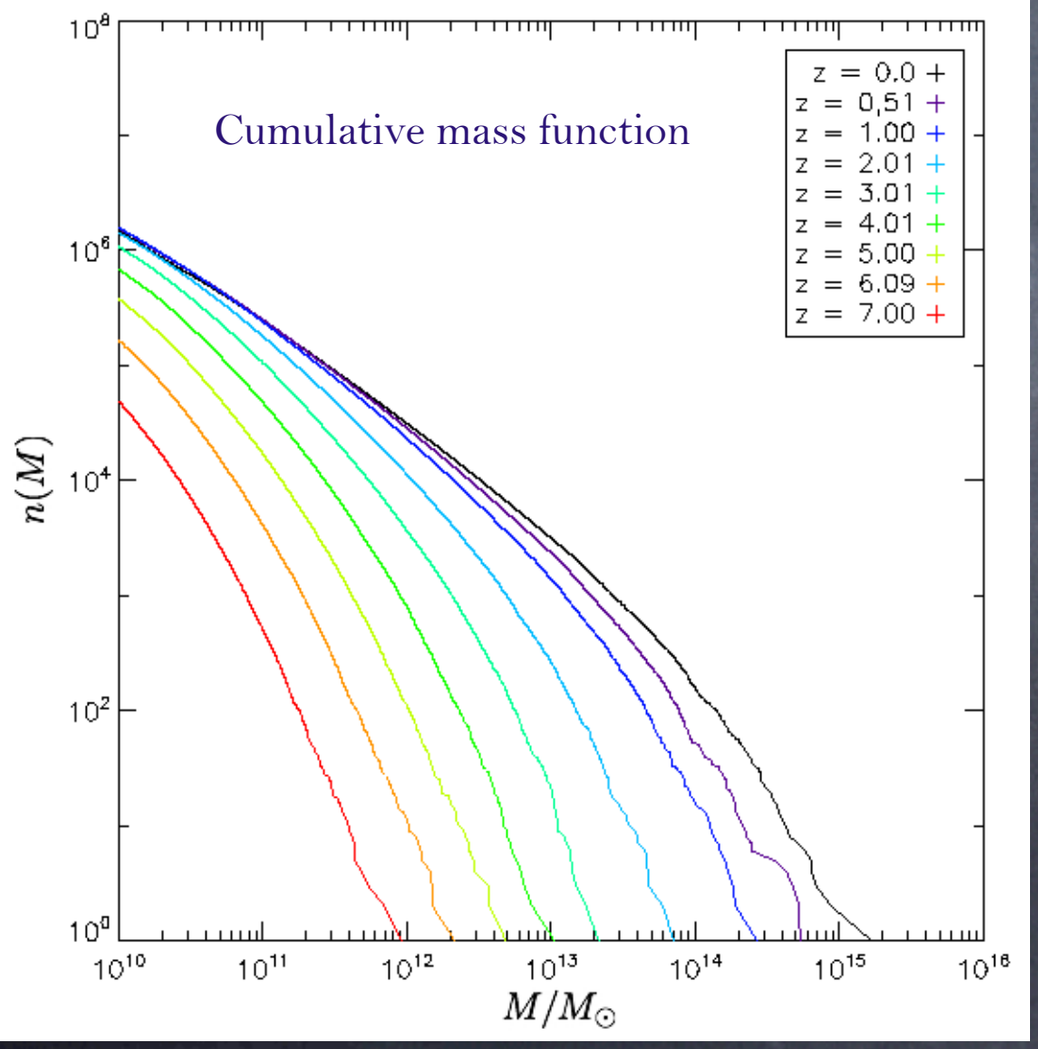
Gravitational Smoothing: 6/h kpc

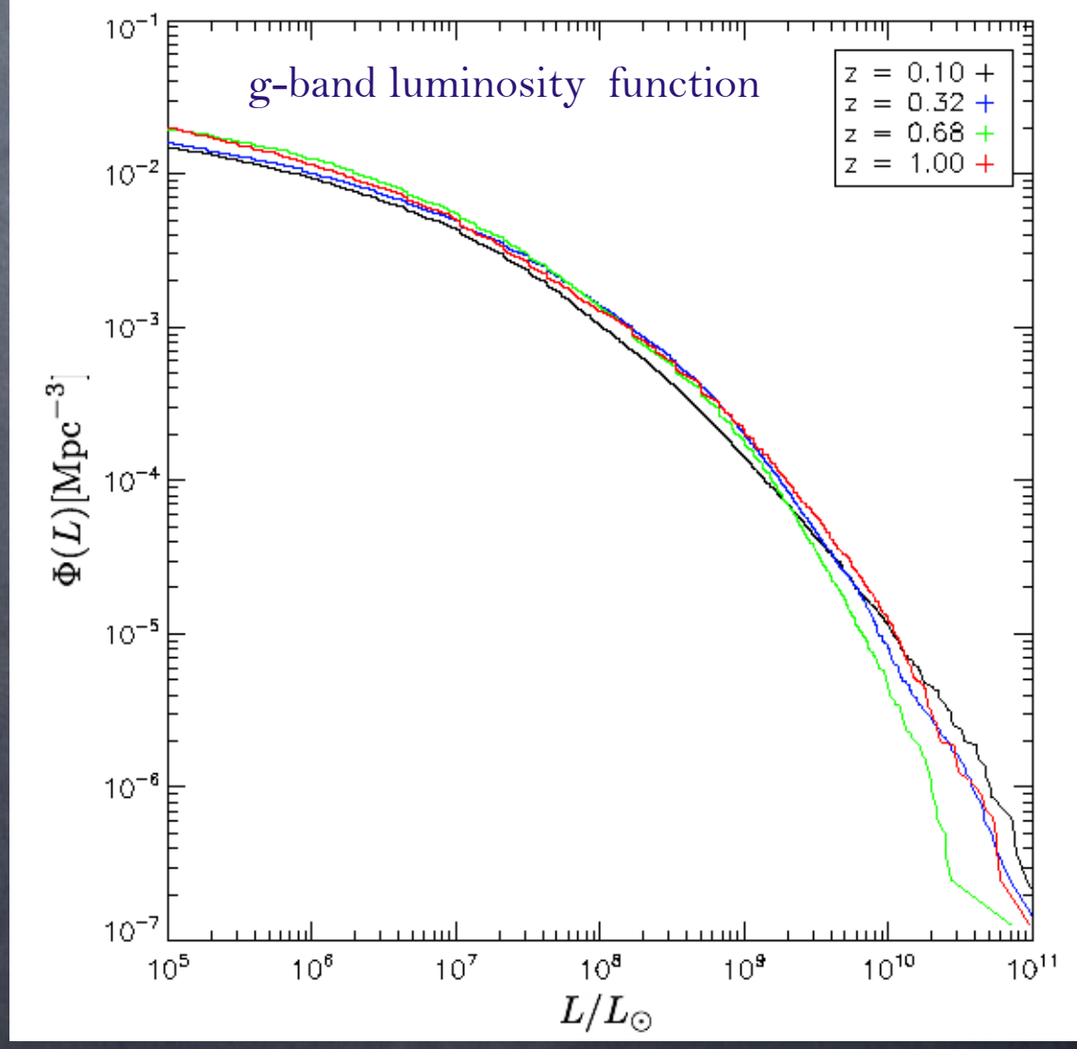
CURIE Universe

- 2011 PRACE project done in CURIE supercomputer.
- Purpose: Study the formation of Ly-a and LBG at high z.
- Base simulation:
  - 200 /h Mpc box, same cosmology as MUSIC done in multiple mass resolutions:
    - Dark Matter only: 512^3 and 1024^3 (only few snapshots)
    - Gas+ Cooling+SF (S&H model) 2x 1024^3 (280 snapshots stored.)
      - $M_{DM}=4.6x10^8$ /h Msun ; Mgas=$9.7x10^7$ /h Msun;
      - Full AHF analyses + Merger trees available for half of snapshots.
      - FoF analysis for DM and stars done in 1/5th of snapshots

CURIE Universe

- AHF and FoF will be accesible from
- http://curiehz.ft.uam.es





Dark Matter only SIMS

- Big-MULTIDARK
- JUBILEE

Big Multidark (BigMD)

- A series of GADGET simulations with increasing number of particles reaching the resolution of MD (1Gpc and 2048^3)
- Same cosmology than original Multidark.
- BigMD: 2.5 /h Gpc box size. 15.6 more volume than MD.
  - Three runs already finished
    - 1280^3, 2560^3, 3840^3 particles.
    - A total of 80 snapshots stored. Half of them have been processed with AHF.
    - BDM are also being done.
- Studies of galaxy 2-point correlation function and comparison with BOSS LRG clustering (Nuza et al 2012 paper).

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The Jubilee Simulation

A Coherent Hubble Volume Simulation for All-Sky ISW predictions and Large Scale Surveys

The JUBiLEE (JUropa huBbLE volumE) project

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One of the largest simulated volumes in the current most favored cosmology.

- **6/h Gpc** = 20 billons light-years
- Second largest number of particles
  - **6000^3** ~ 216 billion particles
  - **$12{,}000^3$**~1.6 trillion mesh for PM
- Covers all the universe from z=1
- N-body simulation CUBEP^{3}M code
- Use 8000 nodes of Juropa:
  - Node=8 Cpus and 24 Gbytes
- Each snapshot = 6 Tbytes. More than 30 snapshots stored
- Scientific results:
  - Measuring of ISW
  - Cross correl. ISW -LSS from LRG.
- Halos finding: AHF
- ISW from potential in a 12000^3 mesh
- Starting z=100.

JUBILEE

- **Deliverables:**
- AHF catalogs for z=0 and z=0.5
- FoF catalogs for z=0, 0.5 and 1
- On the fly spherical overdensity halo finder:
  - 127 redshifts.
- Next: Light cones, correlation functions, P(k)
- Gravitational potential on a 12000^3 mesh for ISW.
- **http://jubilee-project.org**

Coming Simulations

- Early access to SuperMUC next july-august:
- 16 Million cpu hours need to be spent until end of 2012.
- So, which simulations would you like to be done next?.
  - Suggestions:
    - CLUES: 64 Mpc WMAP5 @ 2048^3 DM only for reionization studies.
    - BigMD: Reach same resolution than MD: 5120^3 particles.
    - BigMD: Go to larger volumes (3.5 Gpc @ 6000^3)
    - CURIEHZ: 200 Mpc @ 4096^3 dark matter only, up to z=3.
    - CURIEHZ: 200 Mpc @ 2x 2048^3 dark + gas +SF till z=0.
    - CURIEHZ: 200 Mpc @ 2x4096^3 dark +gas + SF till z=5.