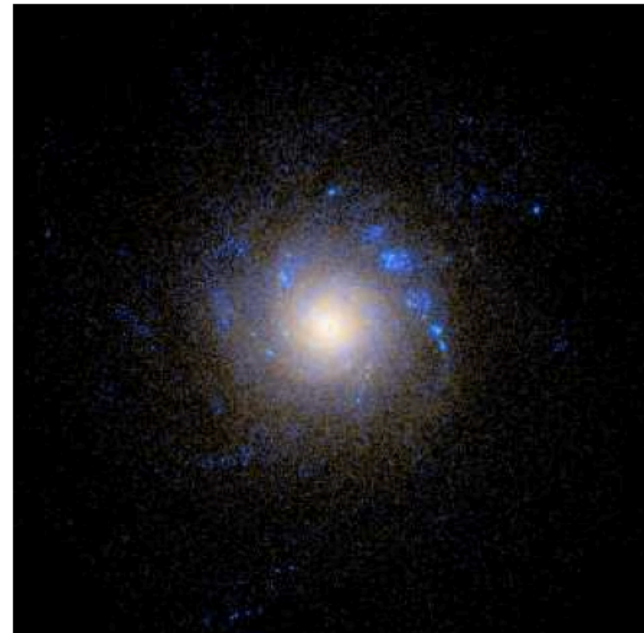
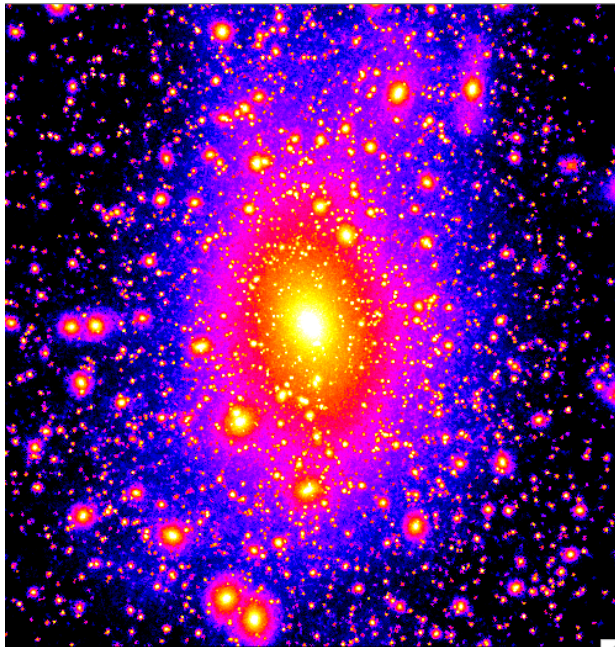


Baryons and Dark Matter distribution



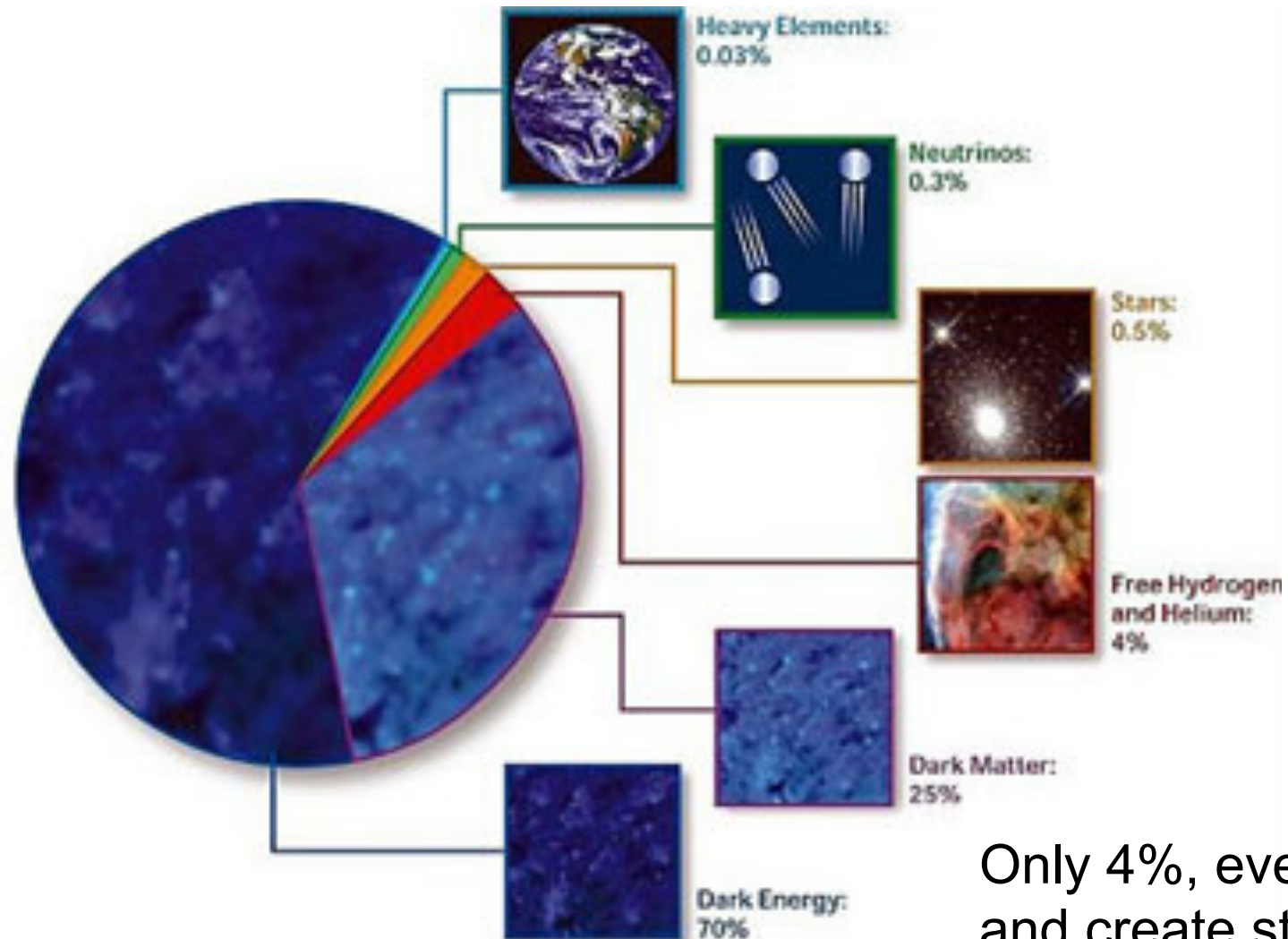
Andrea V. Macciò

Max Planck Institute for Astronomy Heidelberg

G. Stinson, C. Brook, R. Kannan, C. Penzo



Baryons, really?



Only 4%, even less cool
and create stars (0.5%)

Can't we simply ignore them?

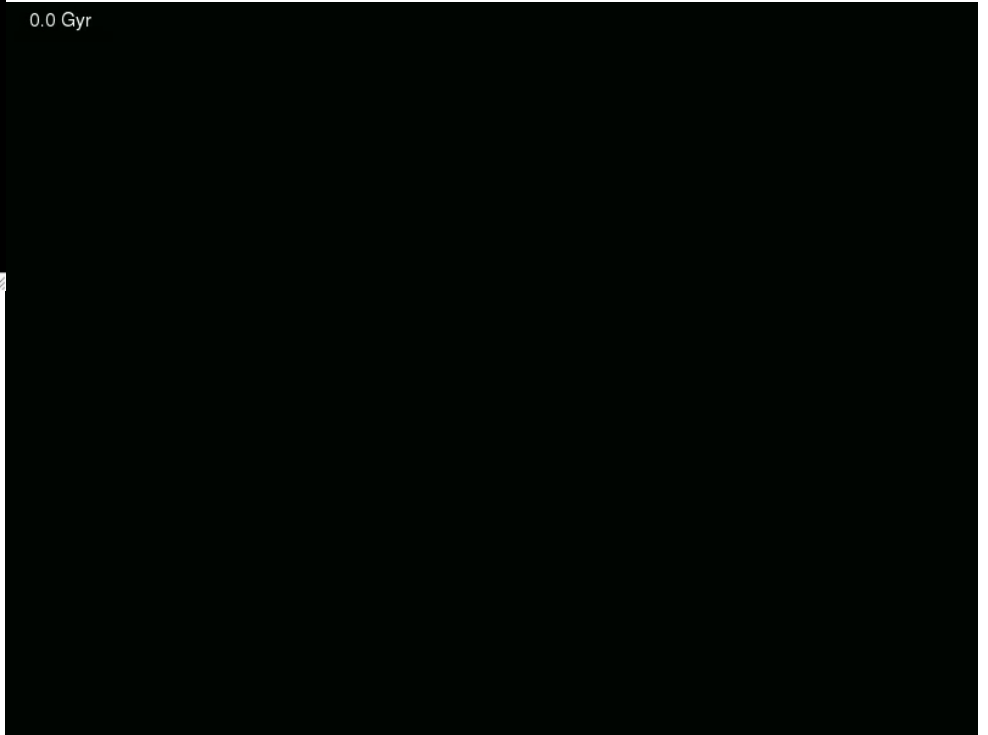
- Cosmological Model (DE & DM)
- Nbody Simulation
- Dark Halo properties
- (Large scales)
- Small scales

...and Baryons?



Nbody
density map

0.0 Gyr



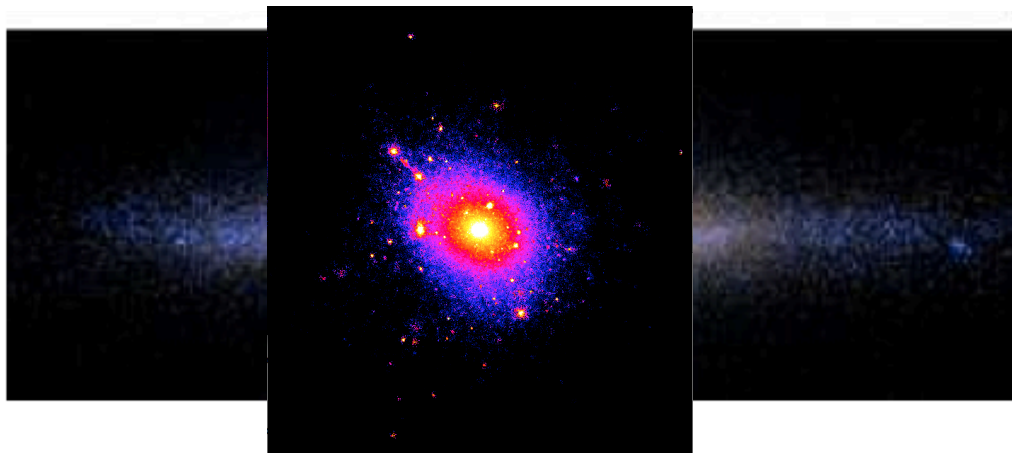
Hydro
GAS, stars, SN



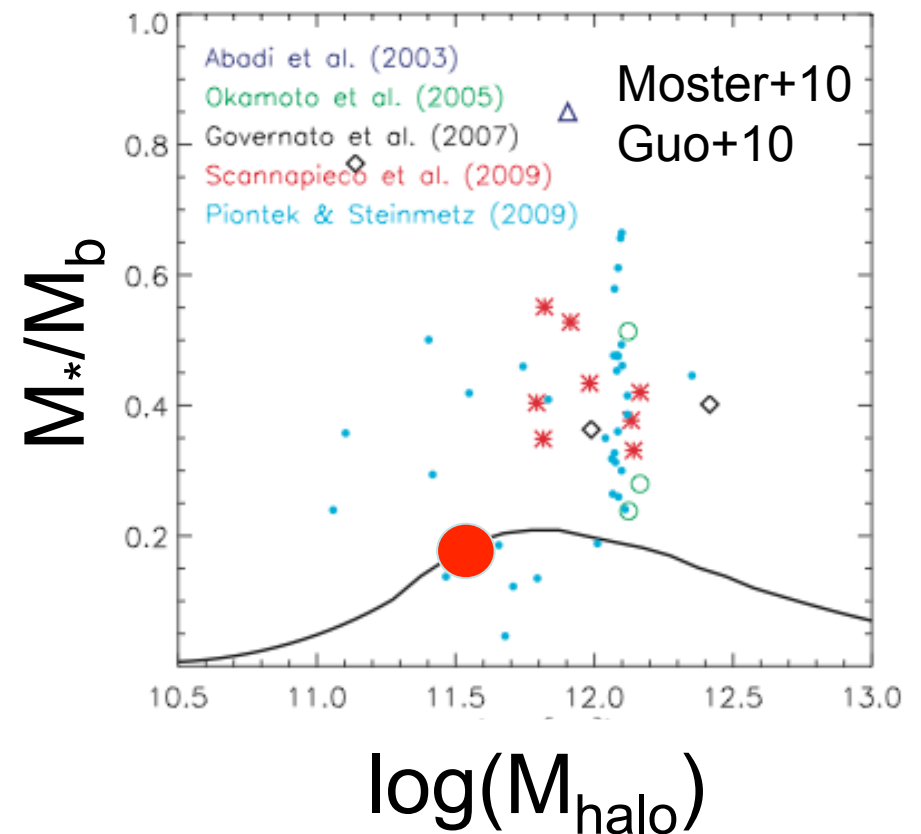
Making Galaxies in a Cosmological Context

The MaGiCC project

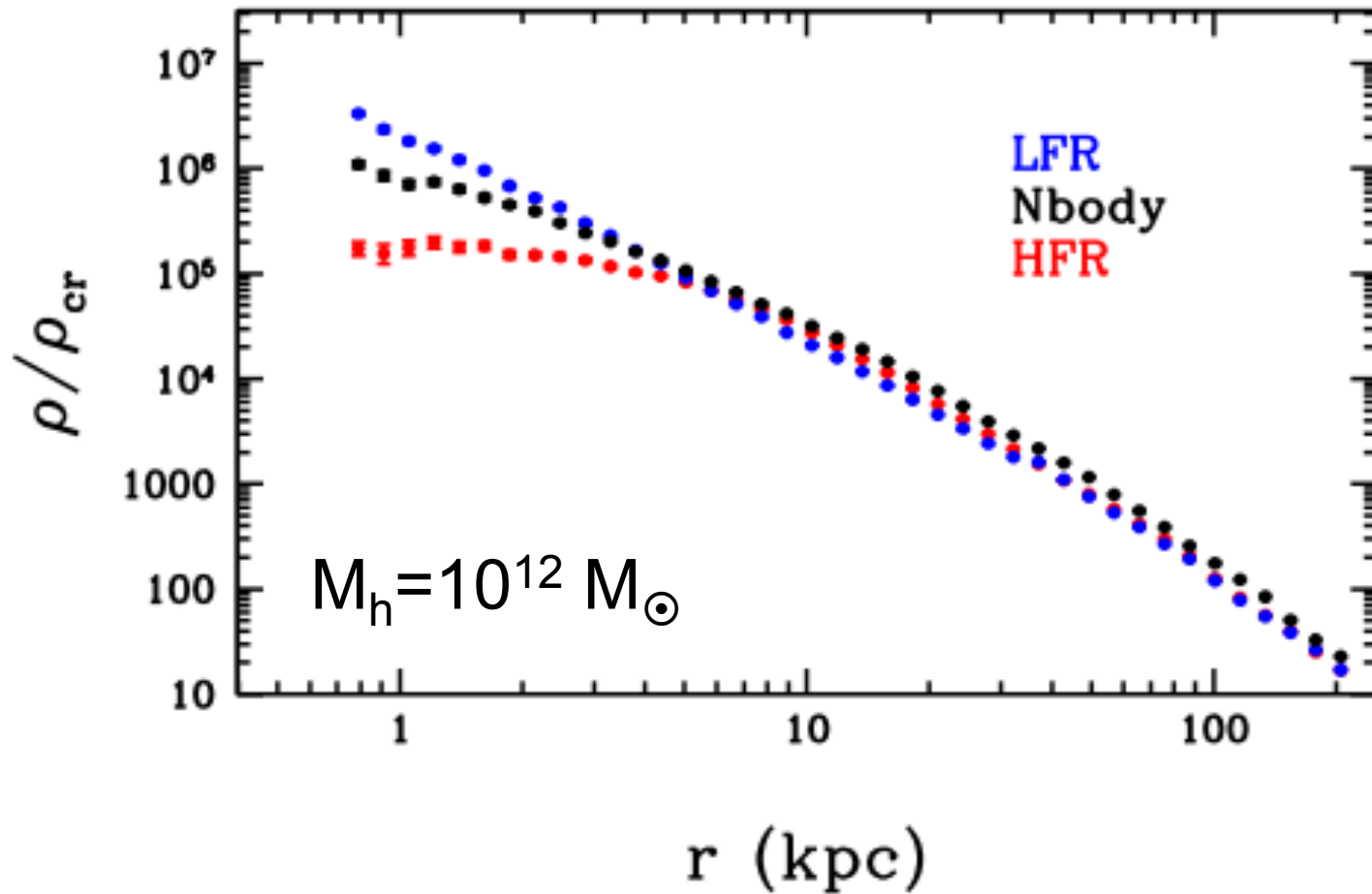
- Cosmological hydro simulations
- Gasoline SPH code
- SN feedback
- Chabrier IMF
- Massive stars rad. pressure
- Higher resolution
- Diffusion to suppress SPH artifacts (Stinson, Brook, Macciò+12, MNRAS)



...and the DM distribution?

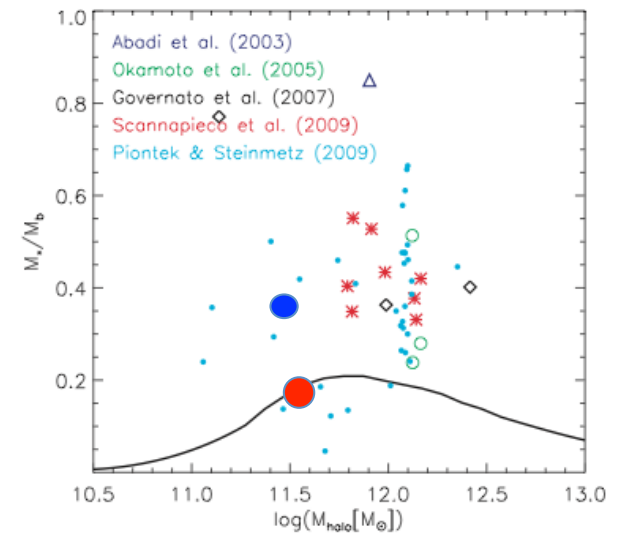


Dark Matter density profile



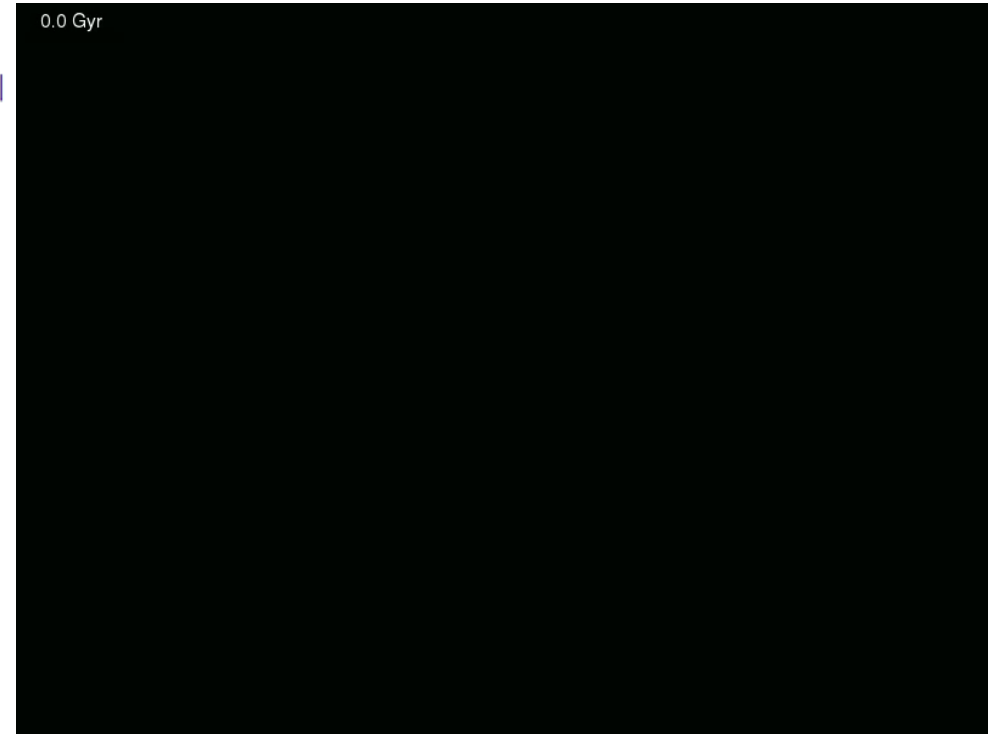
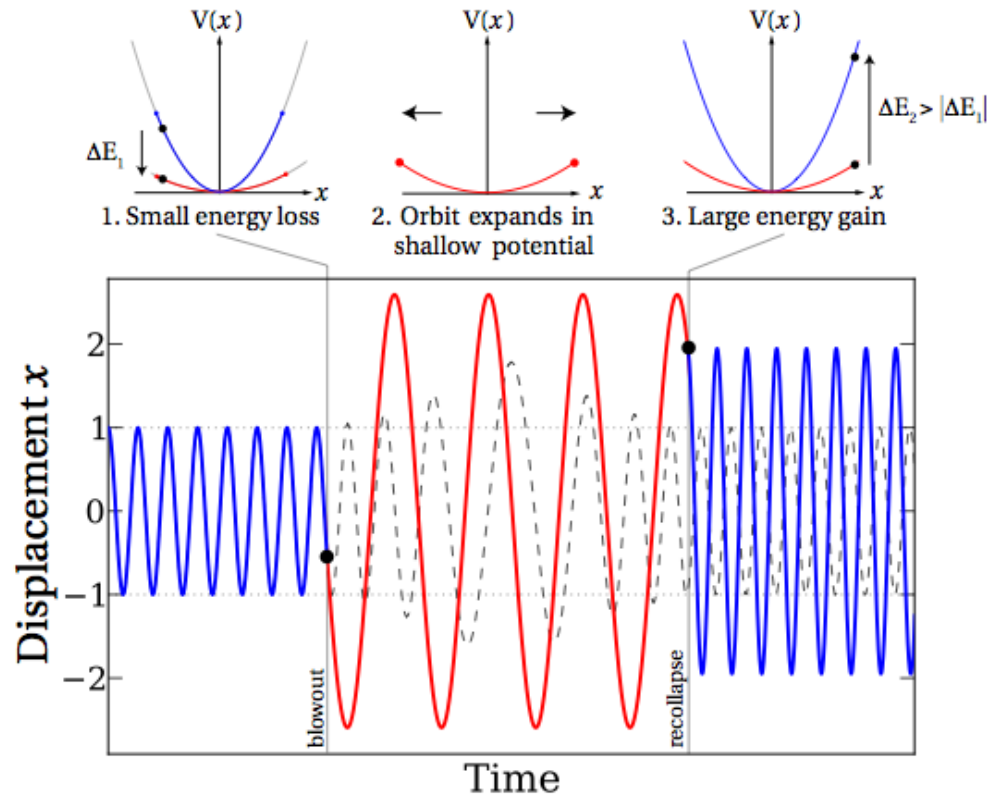
Cored profile in LCDM

Macciò+2012, ApJL



Flattening of the Dark Matter profile

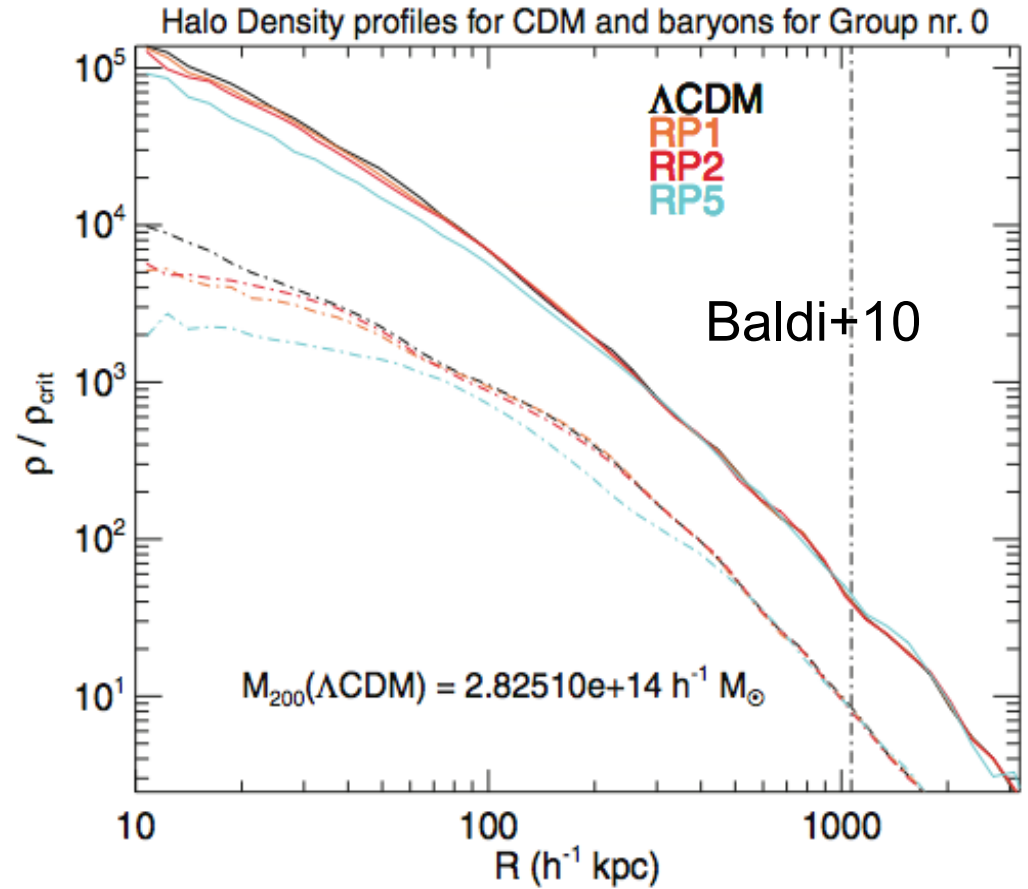
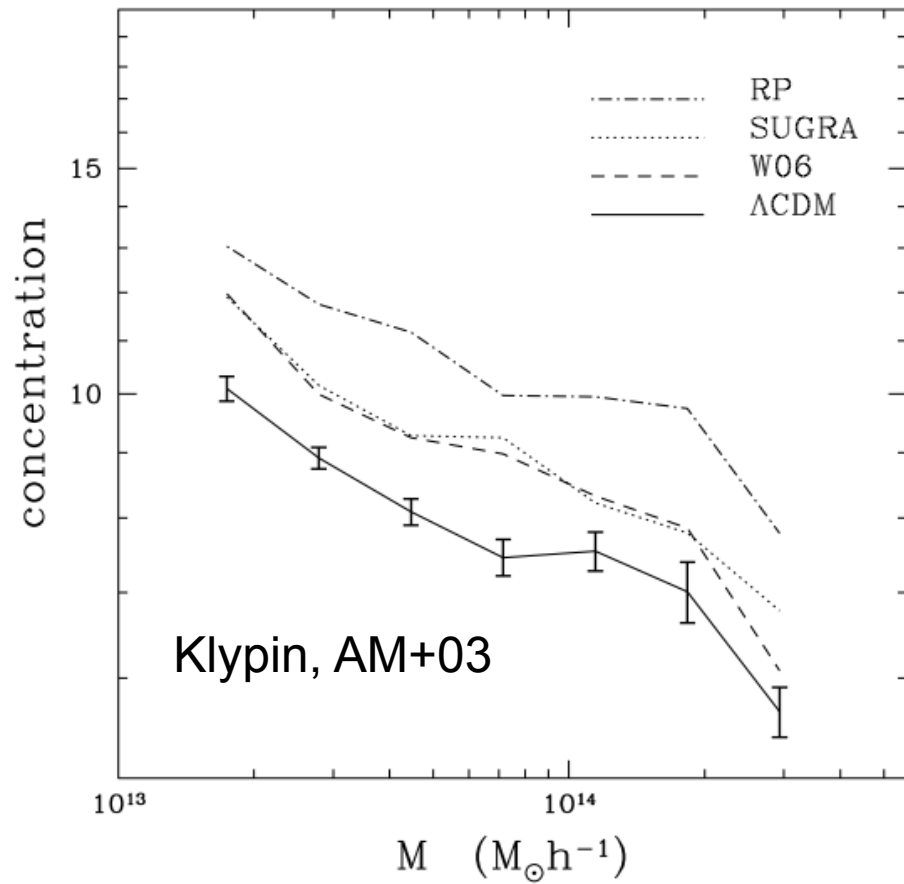
Strong and quick energy injection



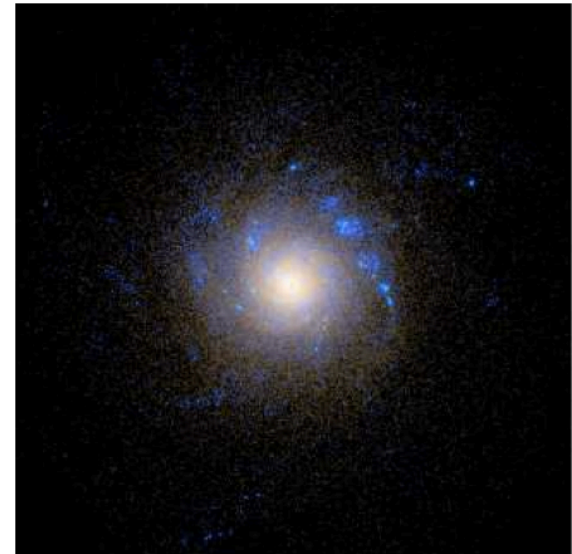
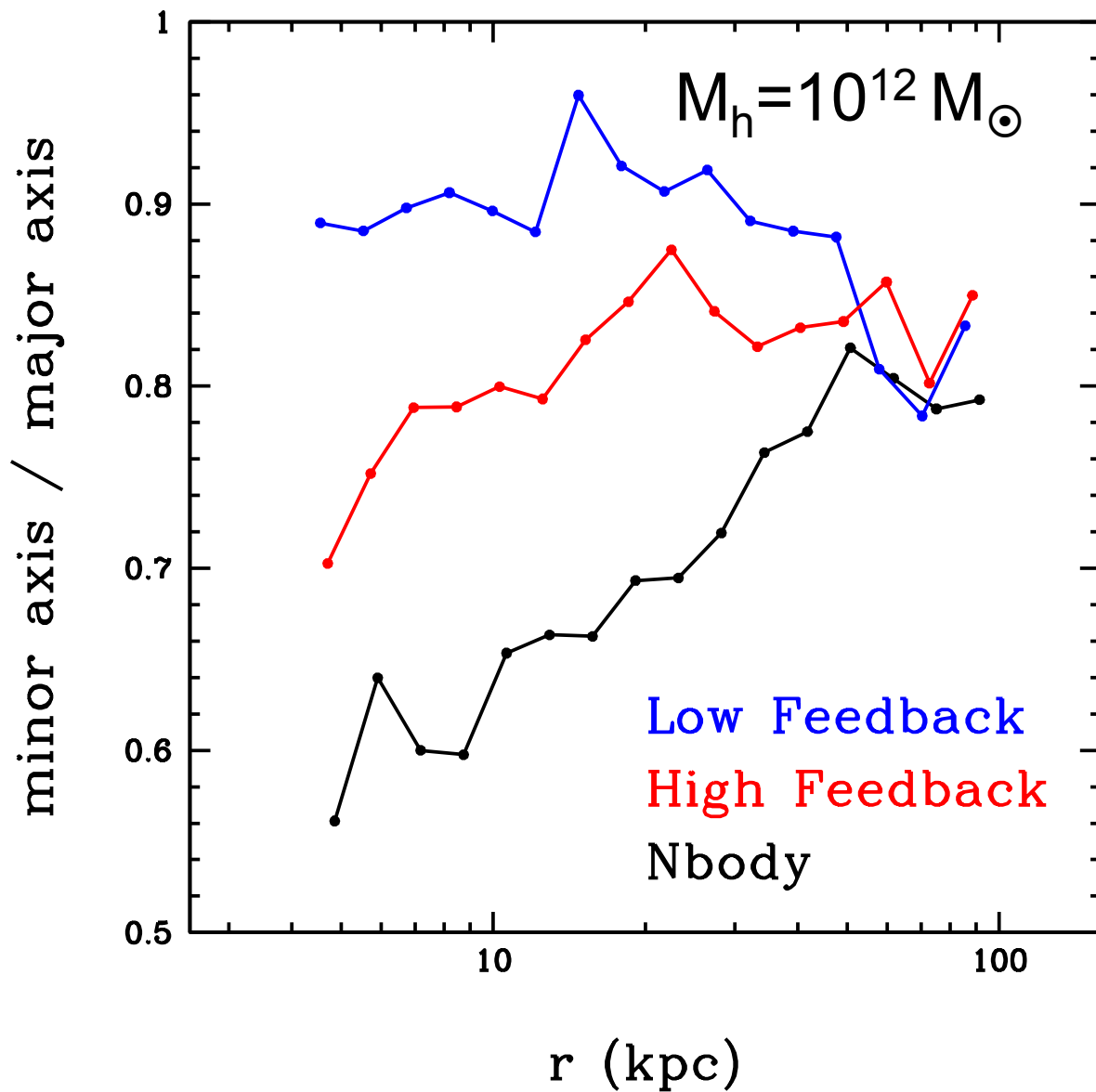
NON adiabatic expansion
Pontzen & Governato 2011

Movie from Stinson+12
MaGiCC project

Effects of different DE models can be washed out



Dark Matter halo shape



Velocity distribution
Vel. anisotropy
PSD proxy (ρ/σ^3)
etc...
Macciò+2012 in prep.

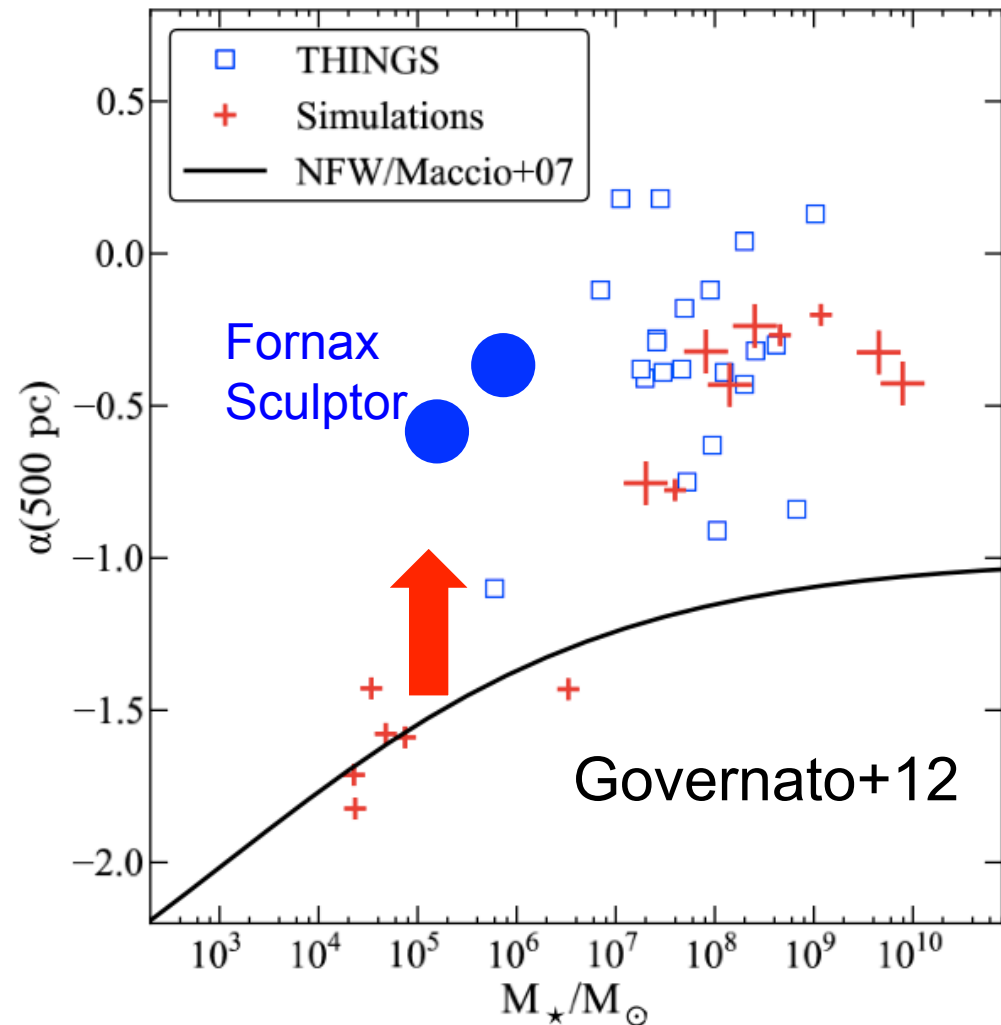
The halo is less triaxial and more spherical

A sweat spot?

$$\frac{M_b}{M_{dm}} \rightarrow 0$$

Hydro \rightarrow *Nbody*

Possibly not enough
baryons/feedback
in local faint dwarf galaxies
to remove the CDM cusp



Walker & Penarrubia+11

Conclusions

Baryons do matter

On small and intermediate scales they can alter the DM properties (see also Joop's talk)

Pure Nbody simulations in any cosmological model could be misleading

DM & DE should be 'coupled' with baryons
(Camilla's PhD thesis)

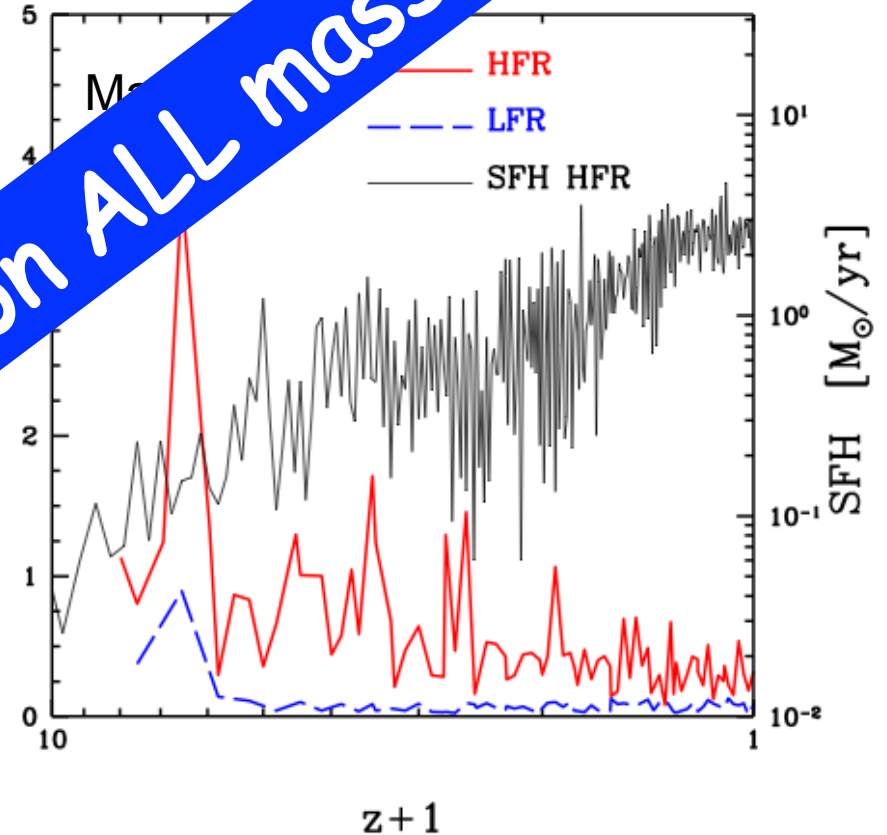
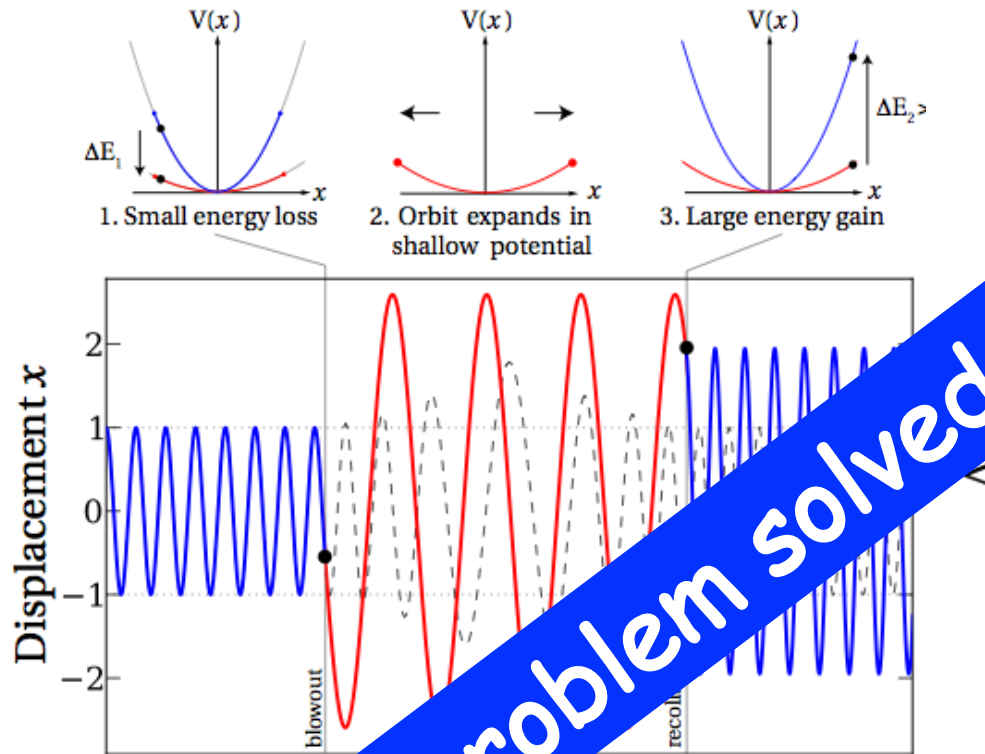
DM less affected in faint dwarf galaxies

THANK YOU

Two main mechanisms:

1) Strong and quick energy injection

2) Fluctuation of the DM potential well



Adiabatic expansion
 Milosavljević & Governato 2011

Strong feedback shakes the
 DM potential well
 Macciò, Stinson+2012

Is the problem solved on ALL mass scales?

DM
GAS

Nbody= gravity

Hydro + cooling
+ Star Formation
+ feedback

