

SOME ENCOURAGING SIGNS FOR GASOLINE CLUES

Chris Brook

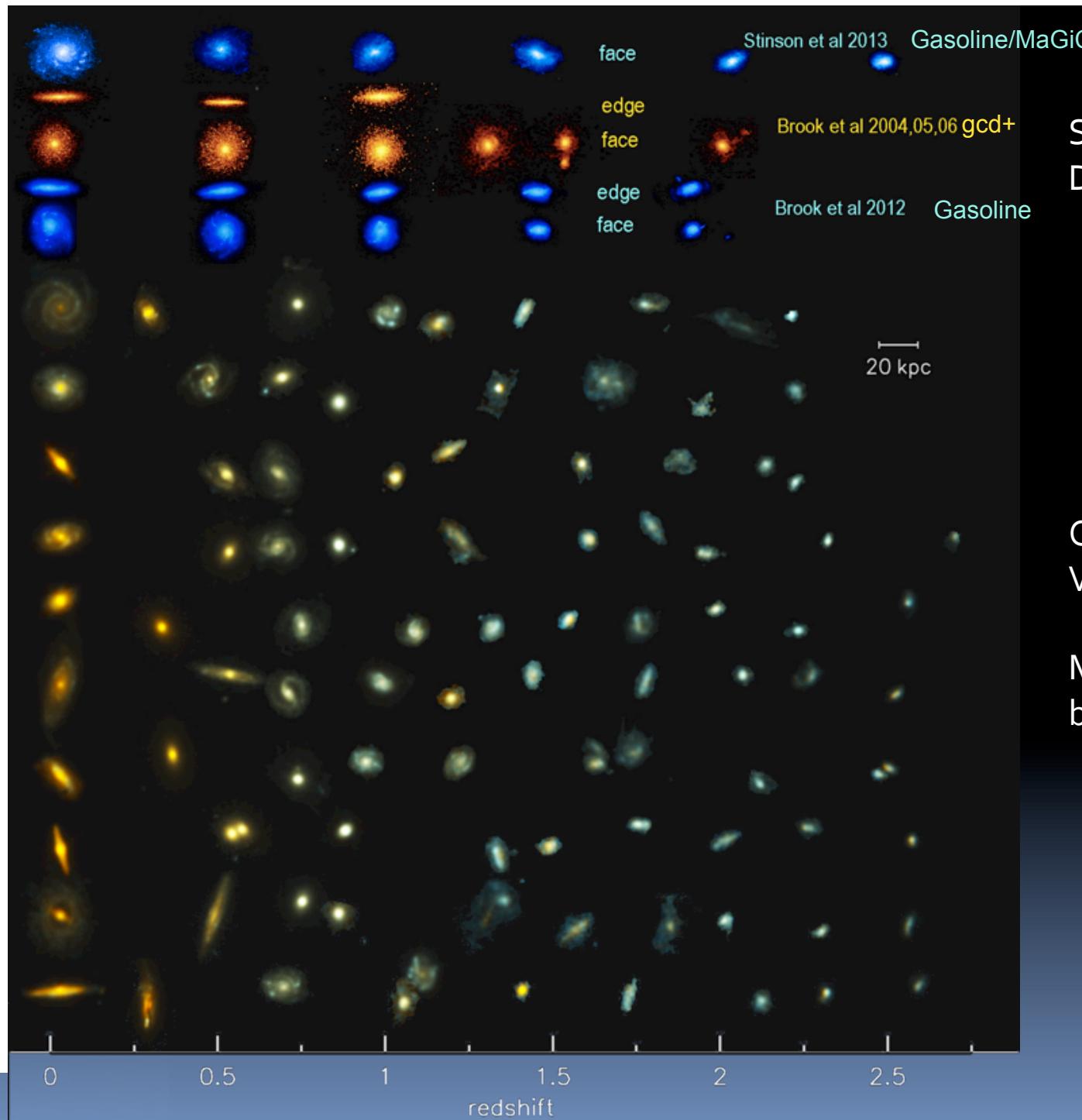
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DE MADRID

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Arianna Di Cintio (DARK), Mathias Schreiner (Copenhagen)
THE CLUES TEAM!



Simulations
Different codes and ICs

Observations:
Van Dokkum et al 2013

MW progenitors selected
by number density

Outline

Some plots from the Gasoline CLUES simulations

Higher resolution please?

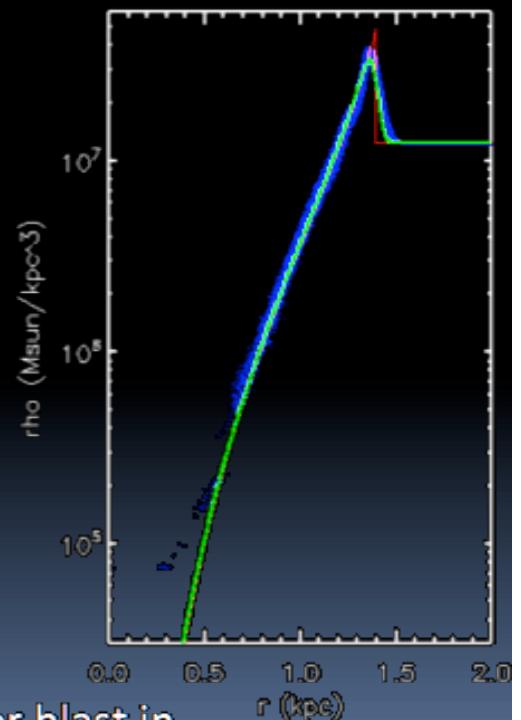
Some comparisons between Gasoline CLUES
and Gadget CLUES

Gasoline



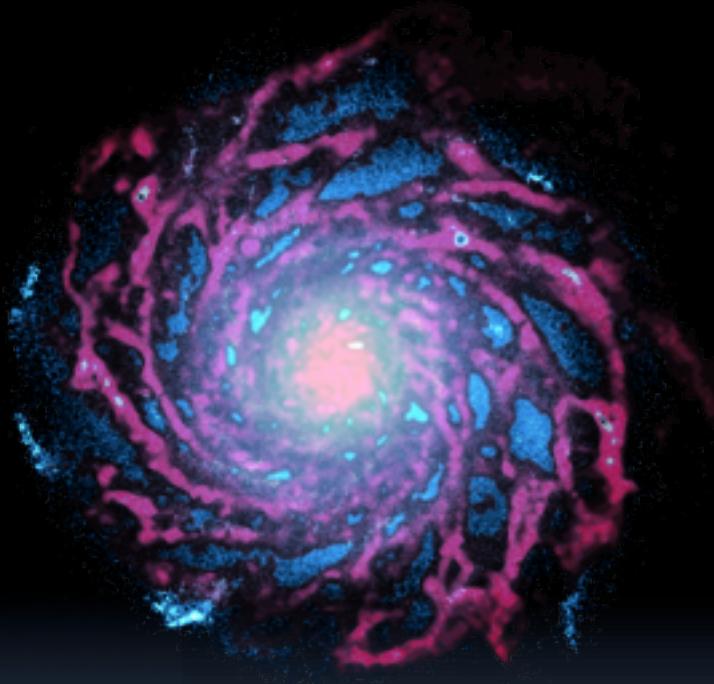
Current Version (2013):

- Fixed number of neighbours (e.g. 64 for Wendland C₂ kernel, Dehnen & Aly 2012)
- Single SPH smooth (no iterations)
- Standard density, geometric density forces
- Turbulent Diffusion (Shen, Wadsley & Stinson 2010)
- f correction to PdV work
- Multisteping power of 2 KDK plus Saitoh & Makino (2009) timestep adjustment

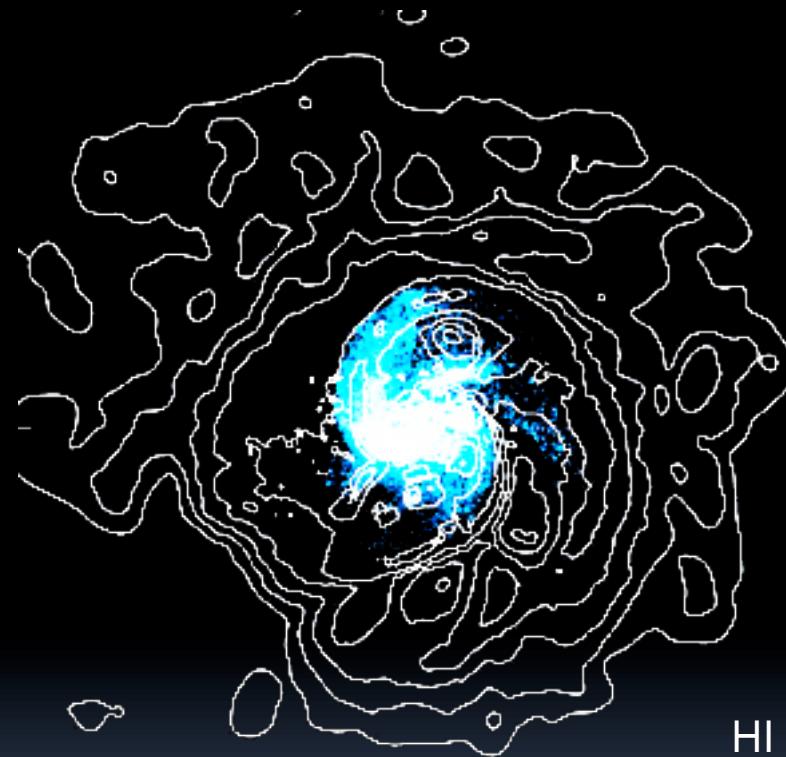


good integrator test: Sedov-Taylor blast in
T=0 K gas (128³) 0.08 % Energy error

This version of GASOLINE

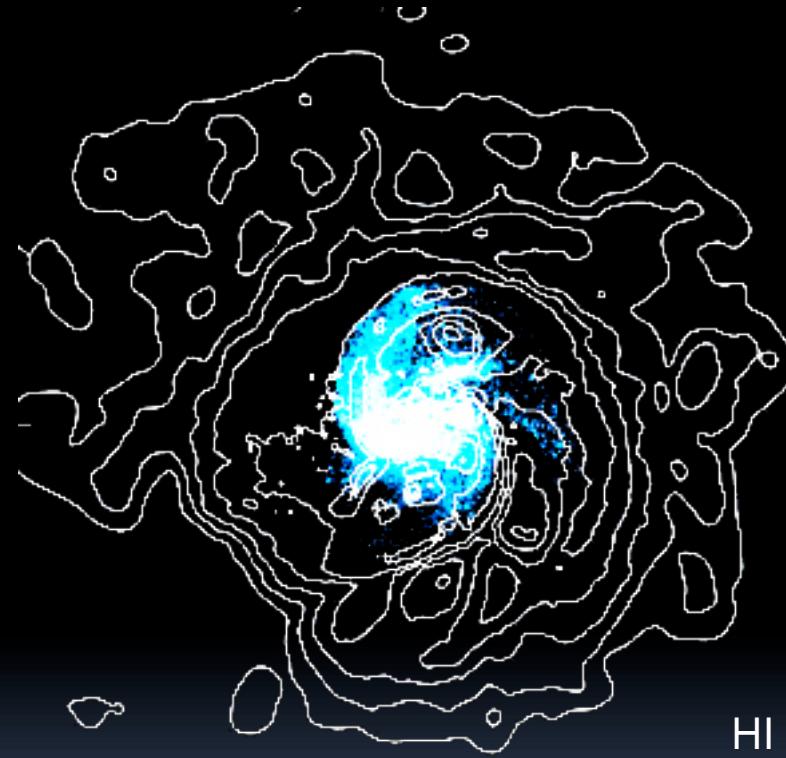


Eris simulation
Guedes et al. 2011



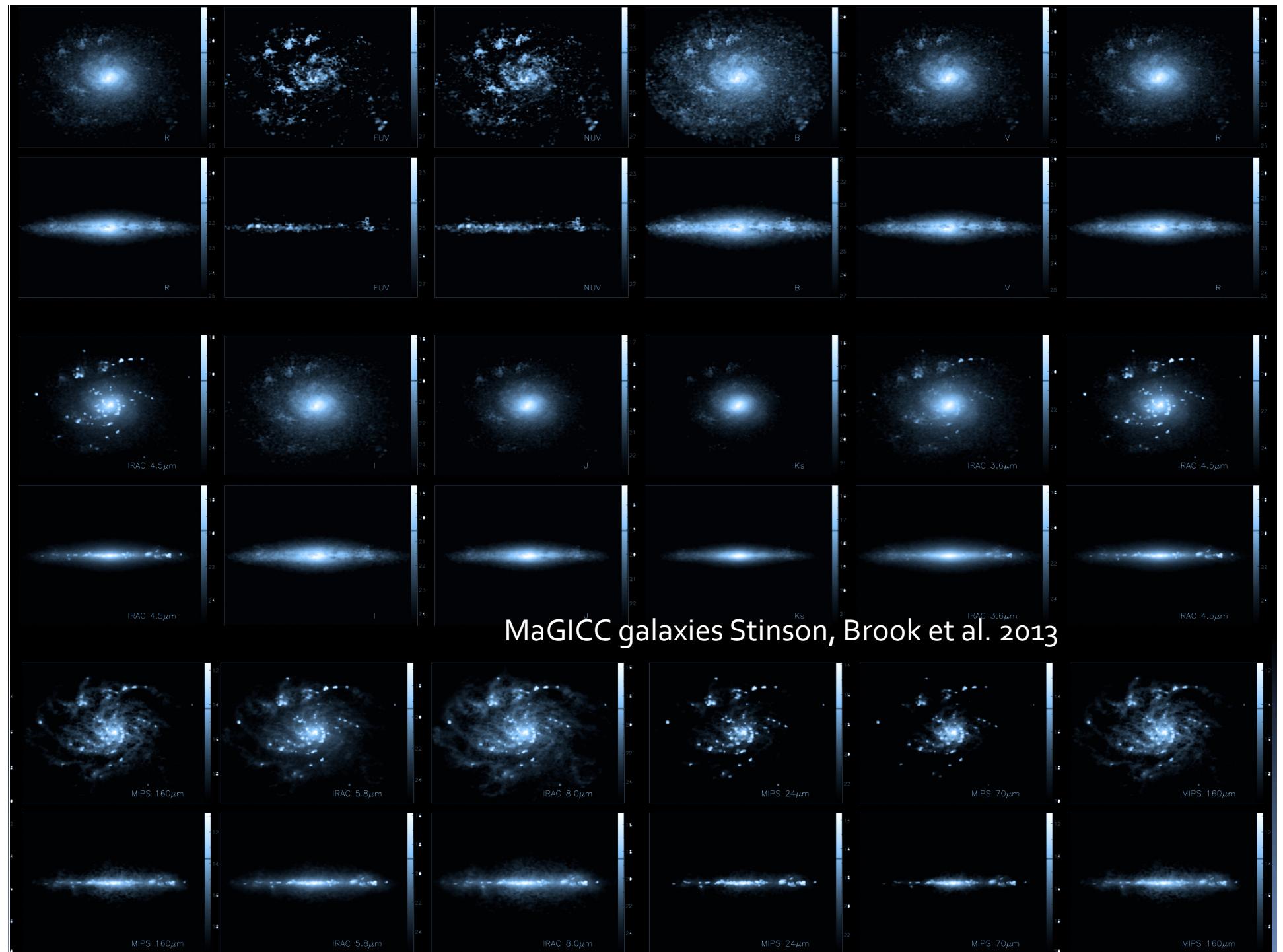
Bulgeless Dwarfs
Governato, Brook et al. 2010
Brook et al. 2011

This version of GASOLINE

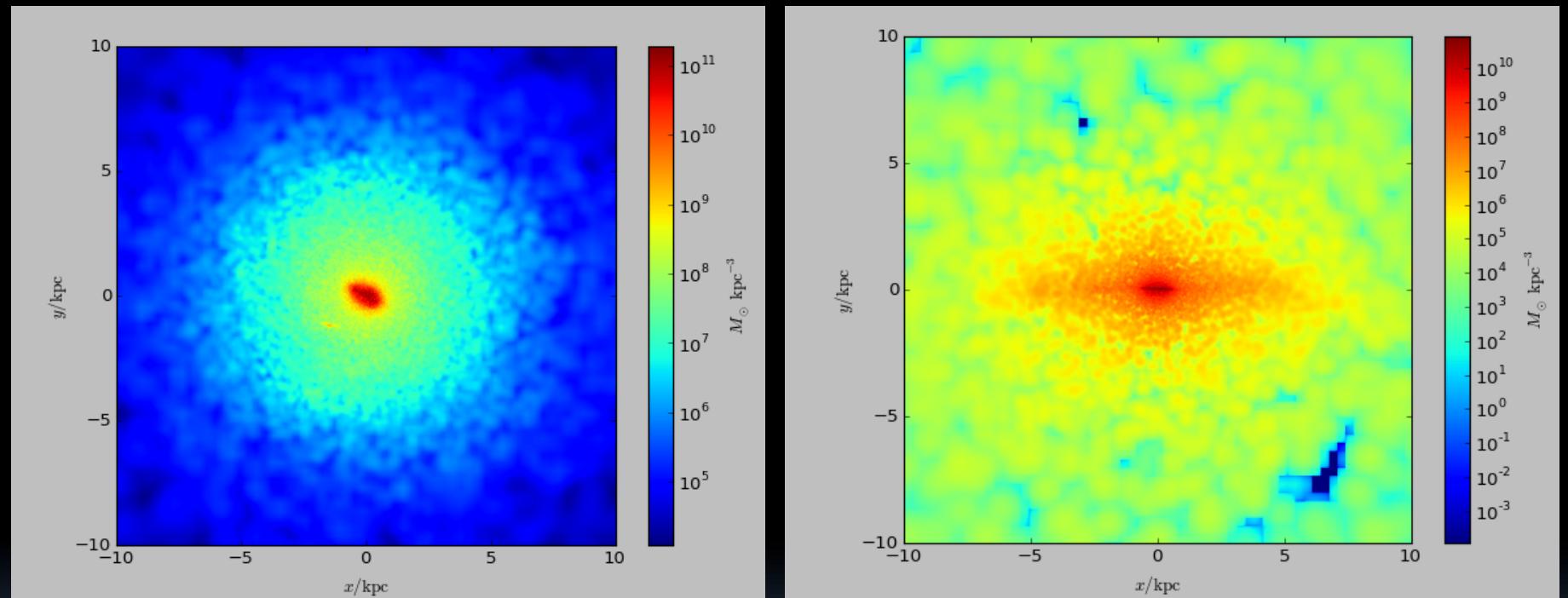


HI map

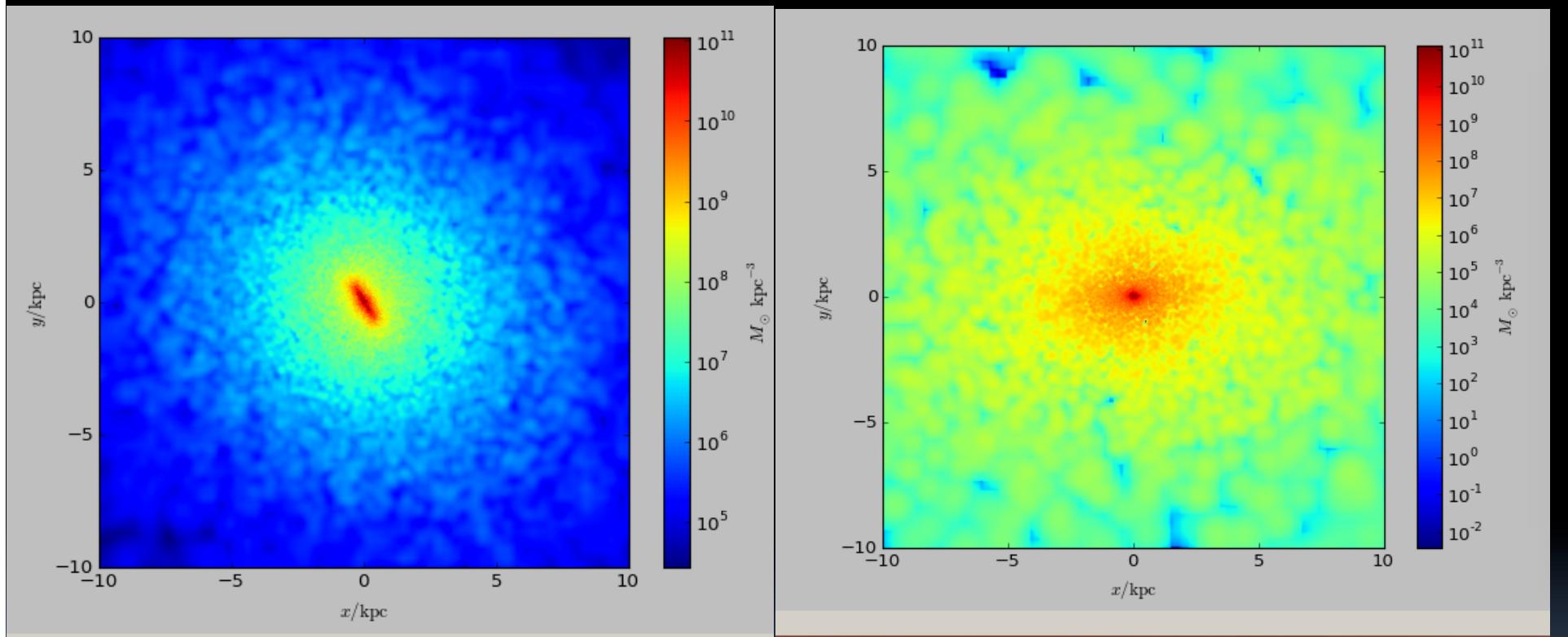
Gas cooling is also affected by UV and soft X-ray emission from nearby massive stars (e.g. Cantalupo 2010; Kannan et al. 2014); -adding metal line cooling, without their potential counterparts, such as radiative ionization by local sources. ??
(Feldmann & Mayer 2015)



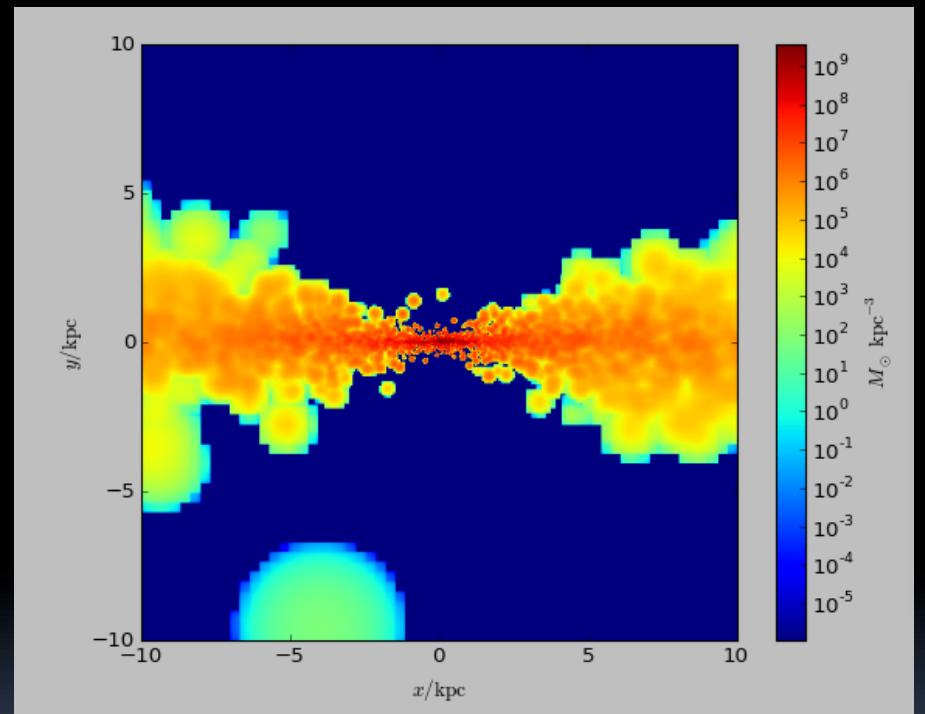
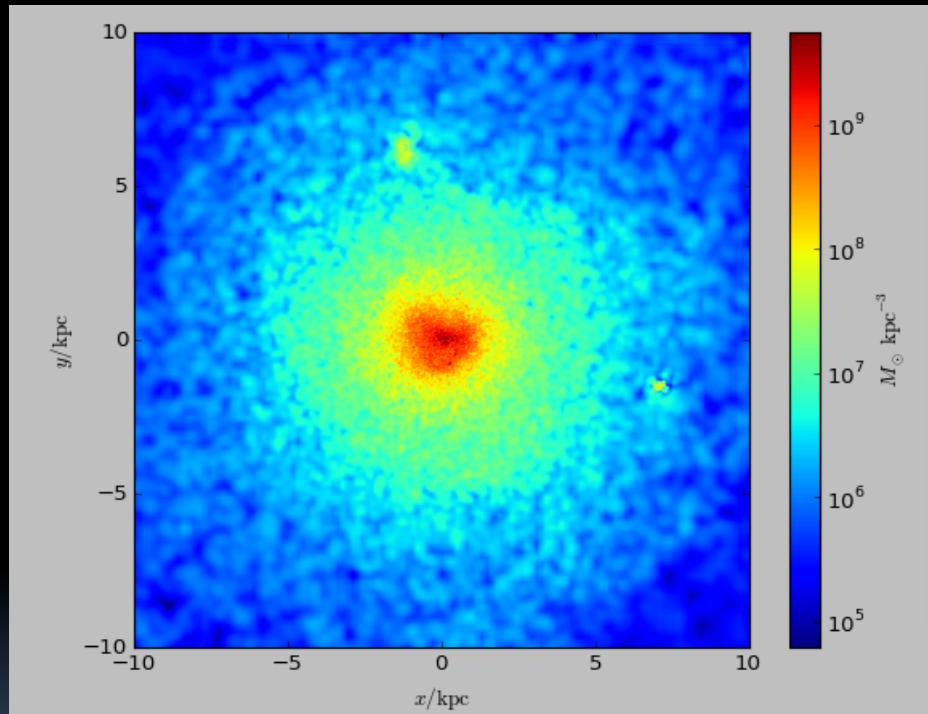
GASOLINE CLUES WMAP3 “MW”



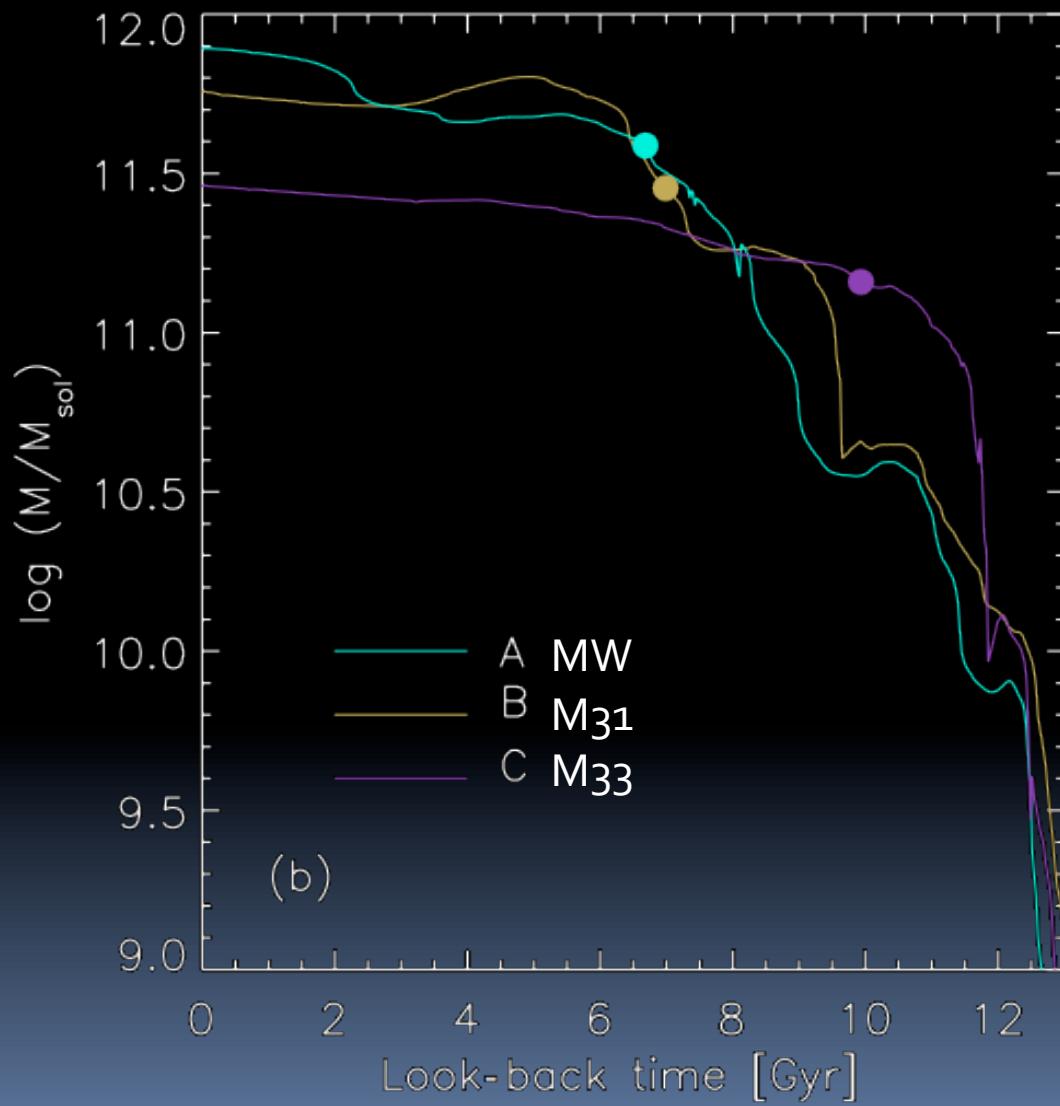
GASOLINE CLUES WMAP3 “M₃₁”



GASOLINE CLUES WMAP3 “M33”

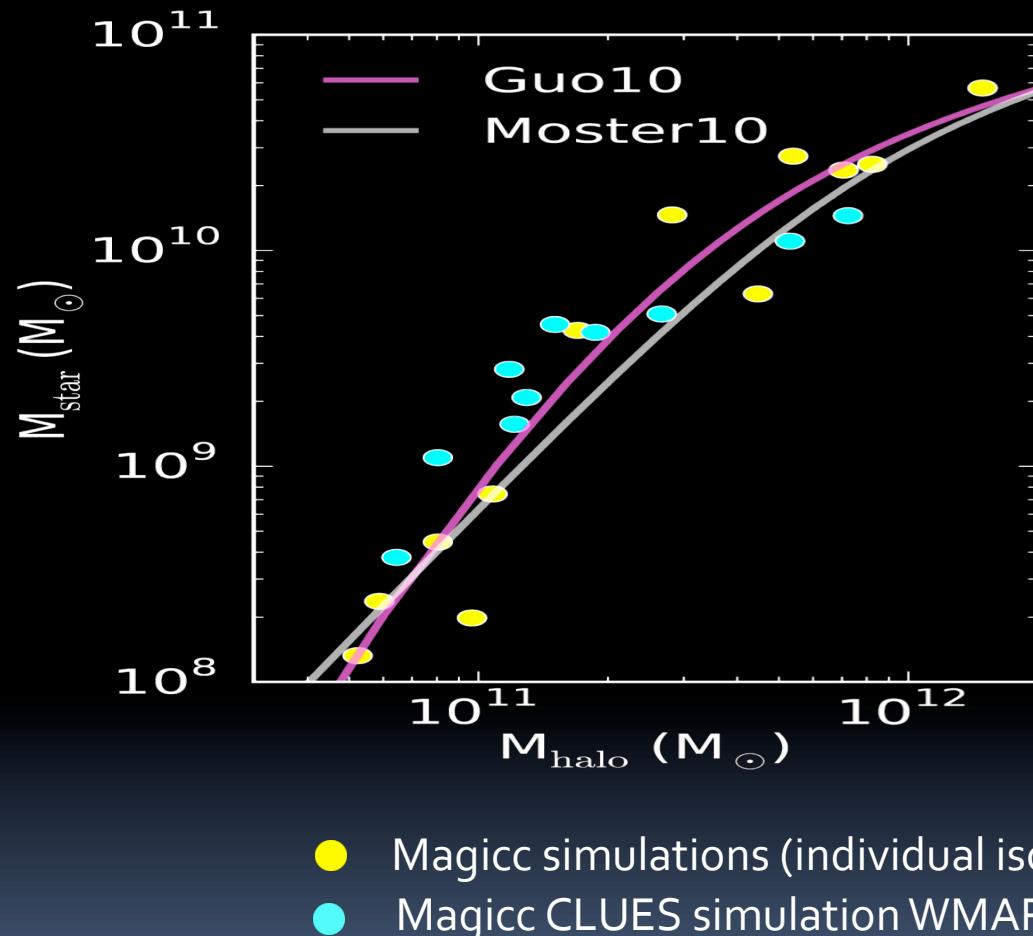


CLUES WMAP 3



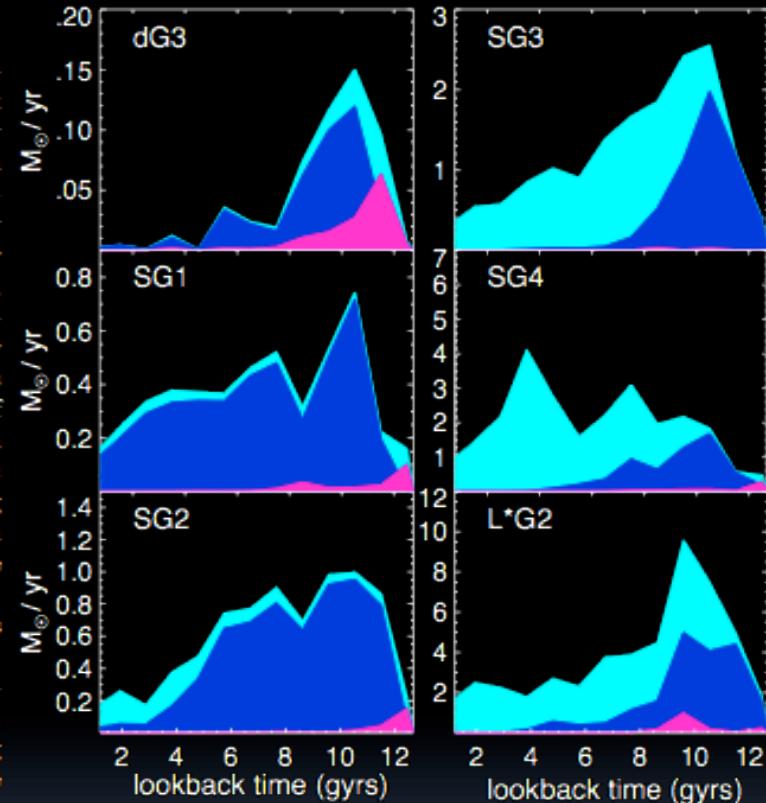
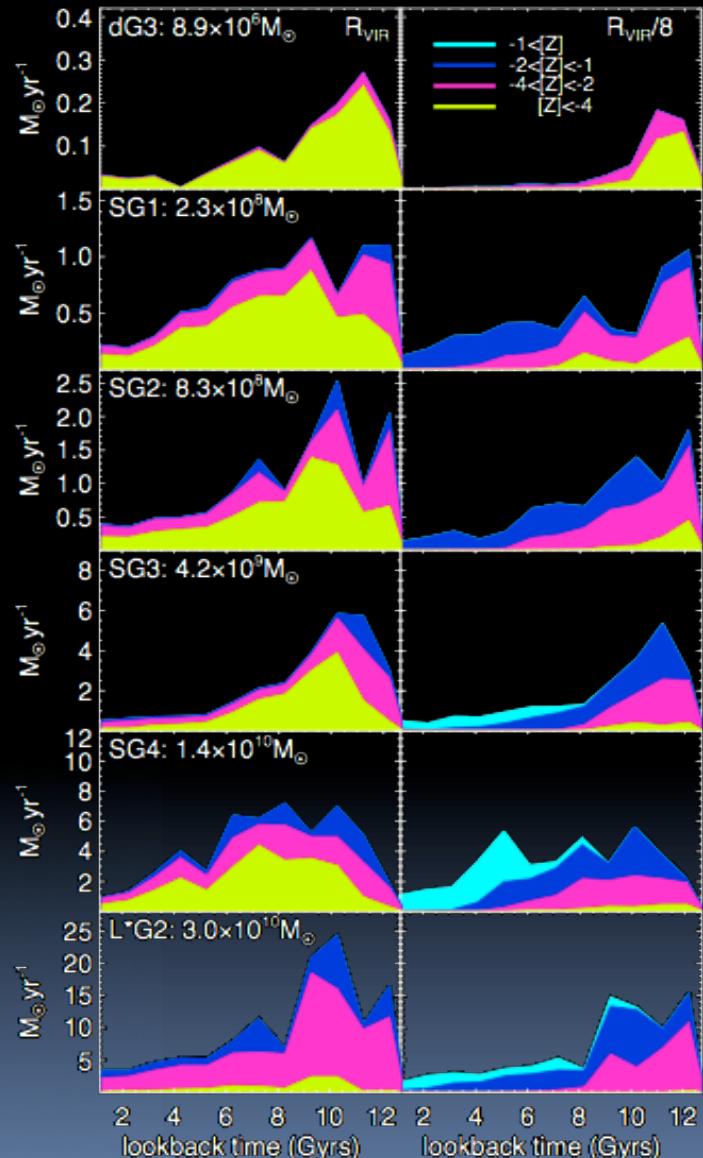
Gasoline CLUES

A



Santos-Santos, Brook et al. 2015 (submitted)

Different Baryon Cycles?

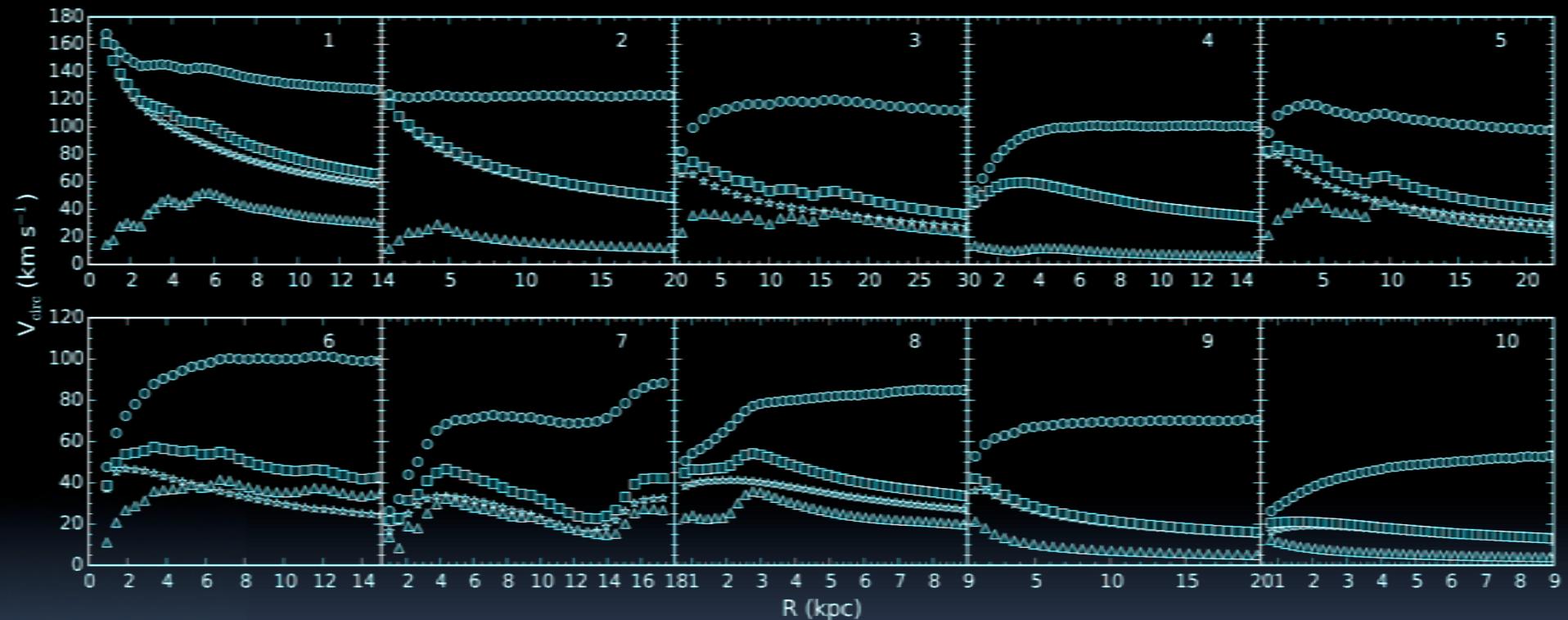


Brook, Stinson et al. 2014

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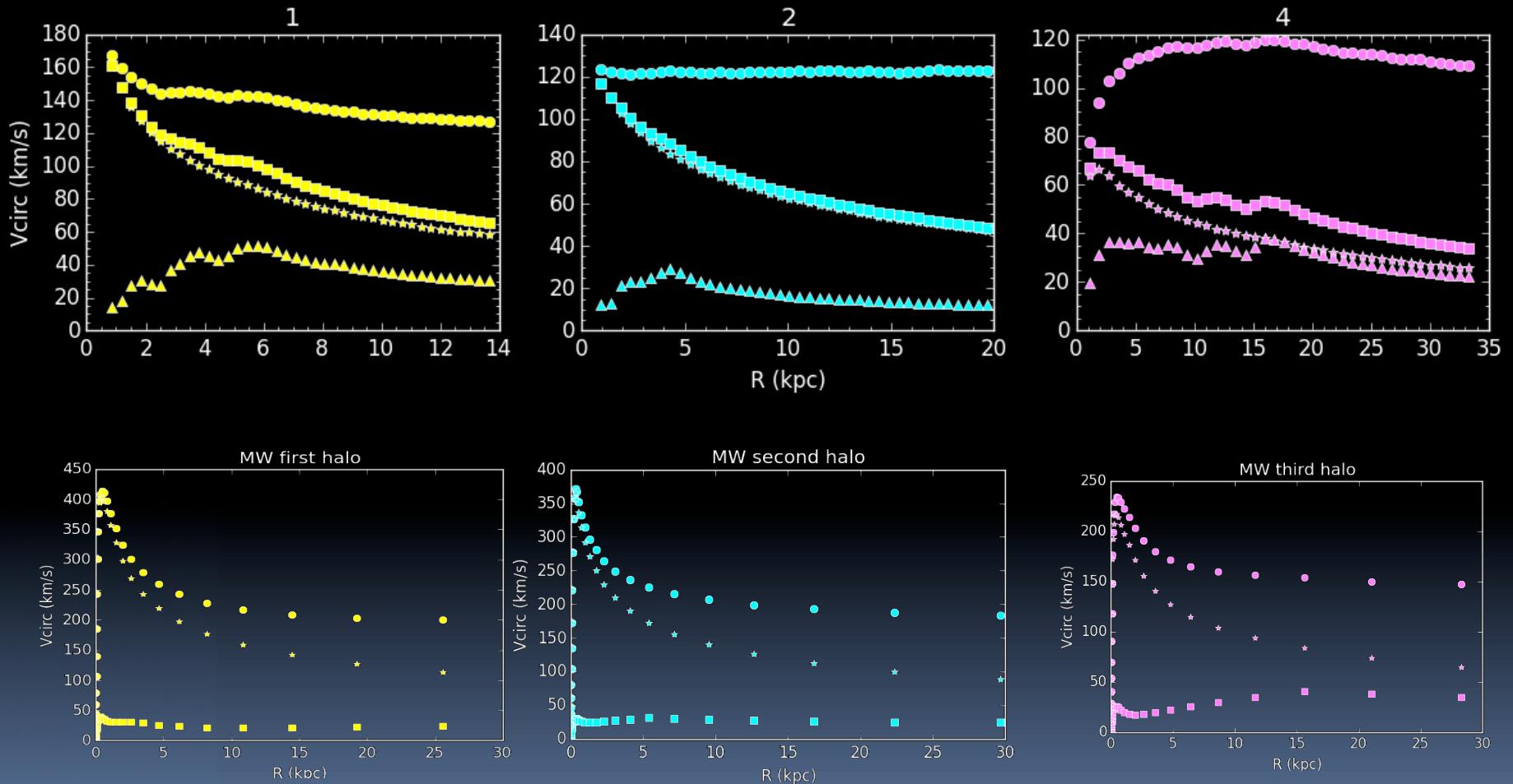
Gasoline CLUES

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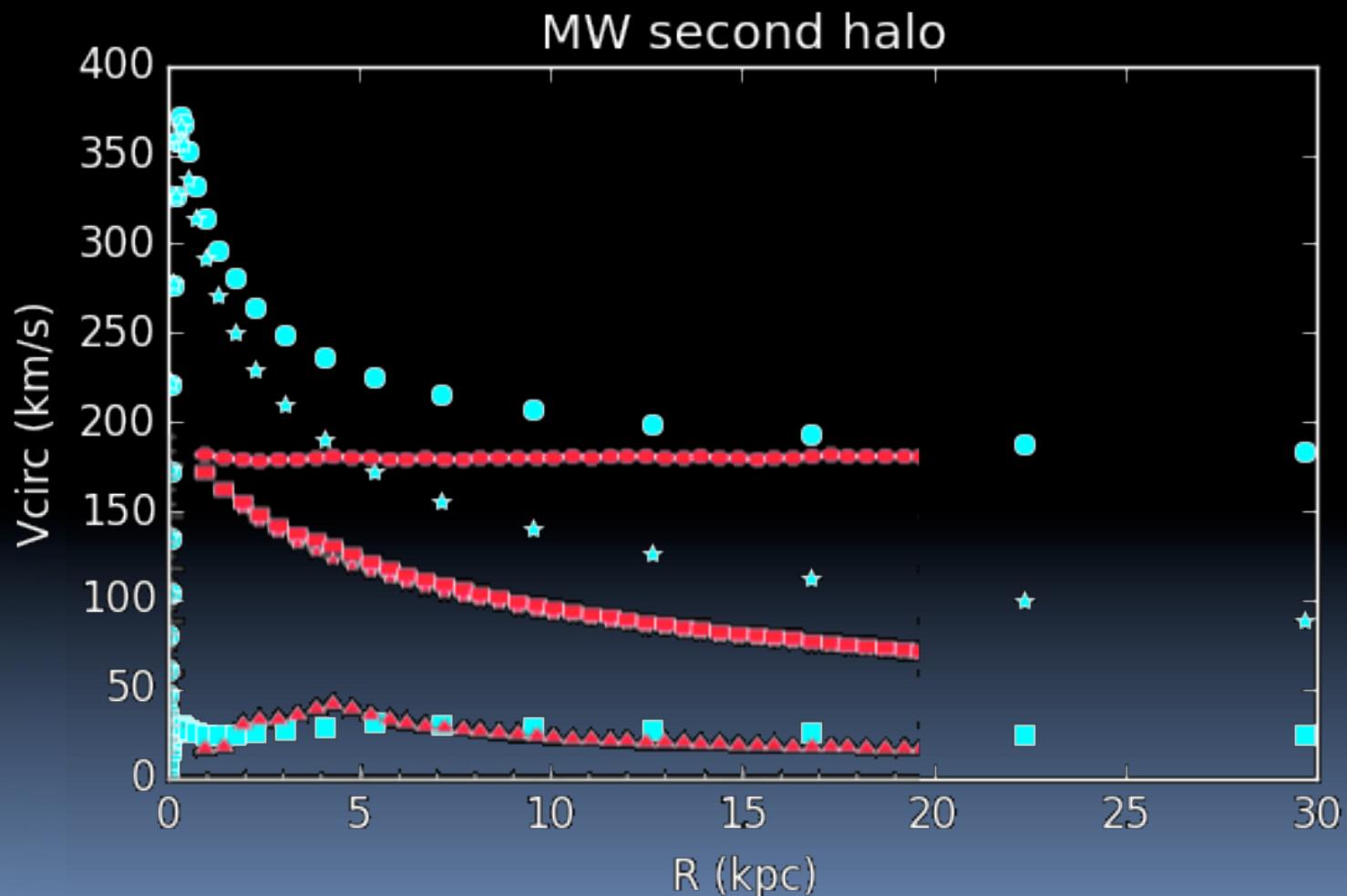


Santos-Santos, Brook et al. 2015 (submitted)

Gasoline CLUES vs Gadget CLUES

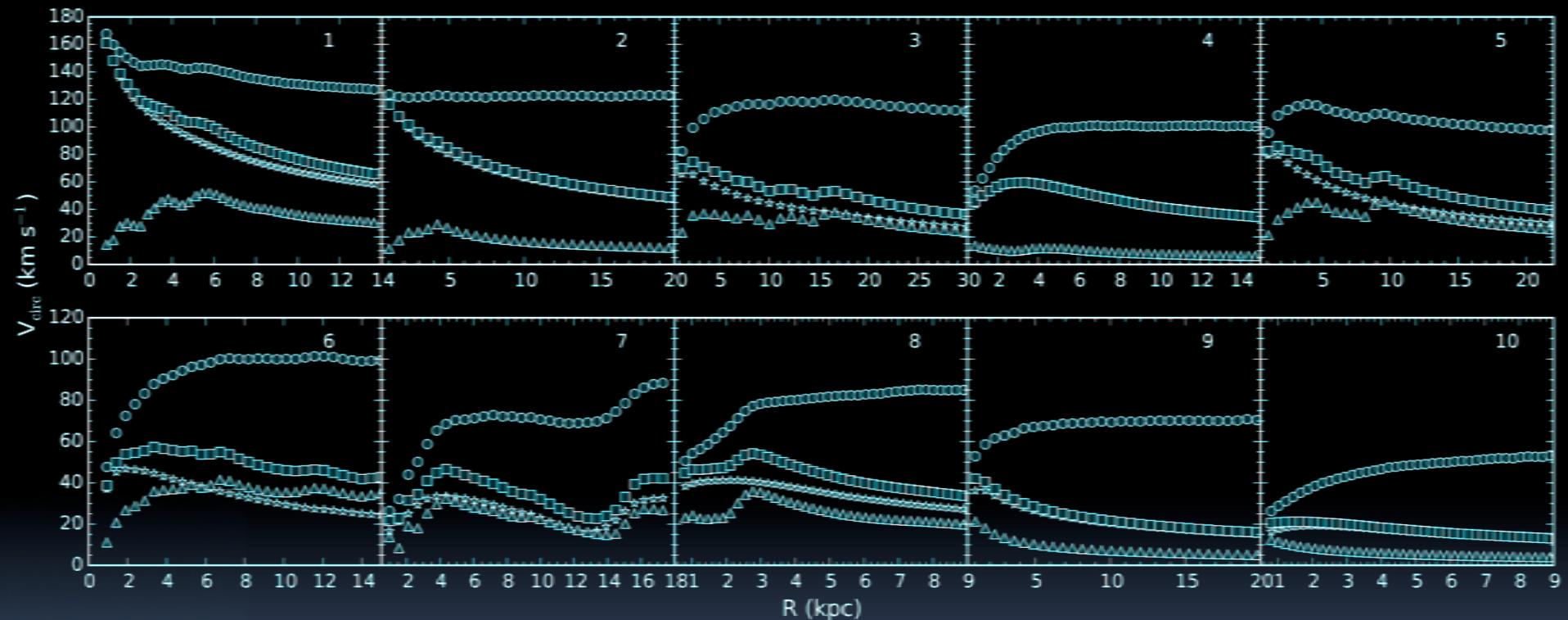


Gasoline CLUES vs Gadget CLUES



Gasoline CLUES

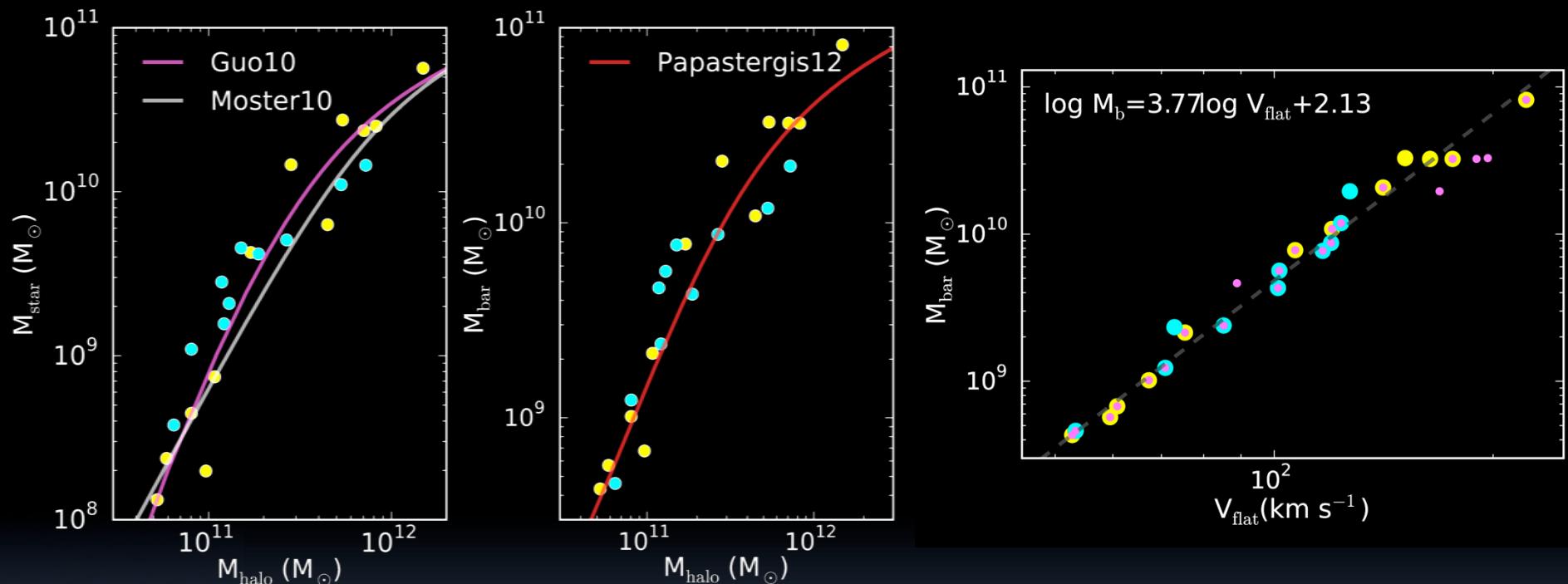
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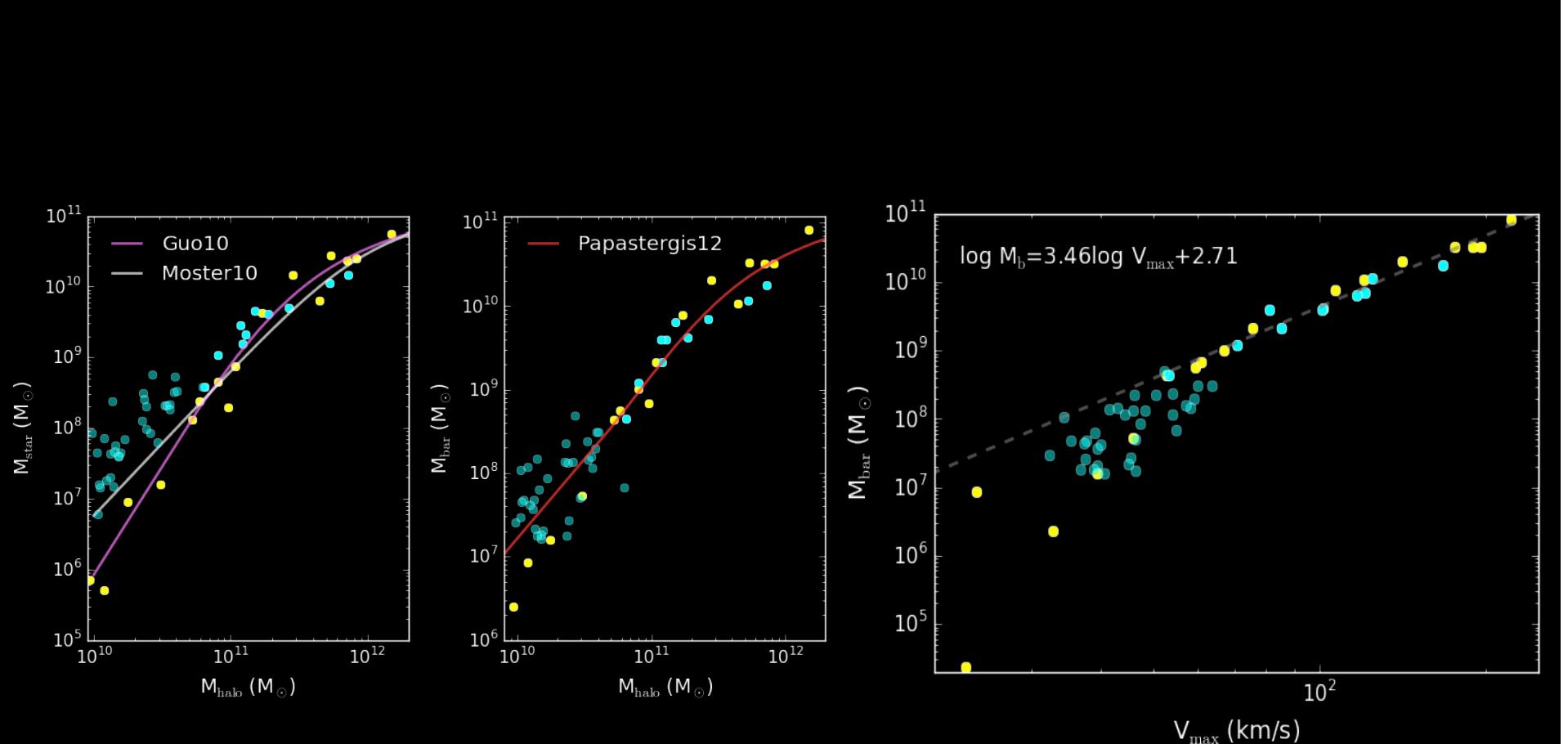
Santos-Santos, Brook et al. 2015 (submitted)

Gasoline CLUES

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- Magicc simulations (individual isolated galaxies)
- Magicc CLUES simulation WMAP3 4096

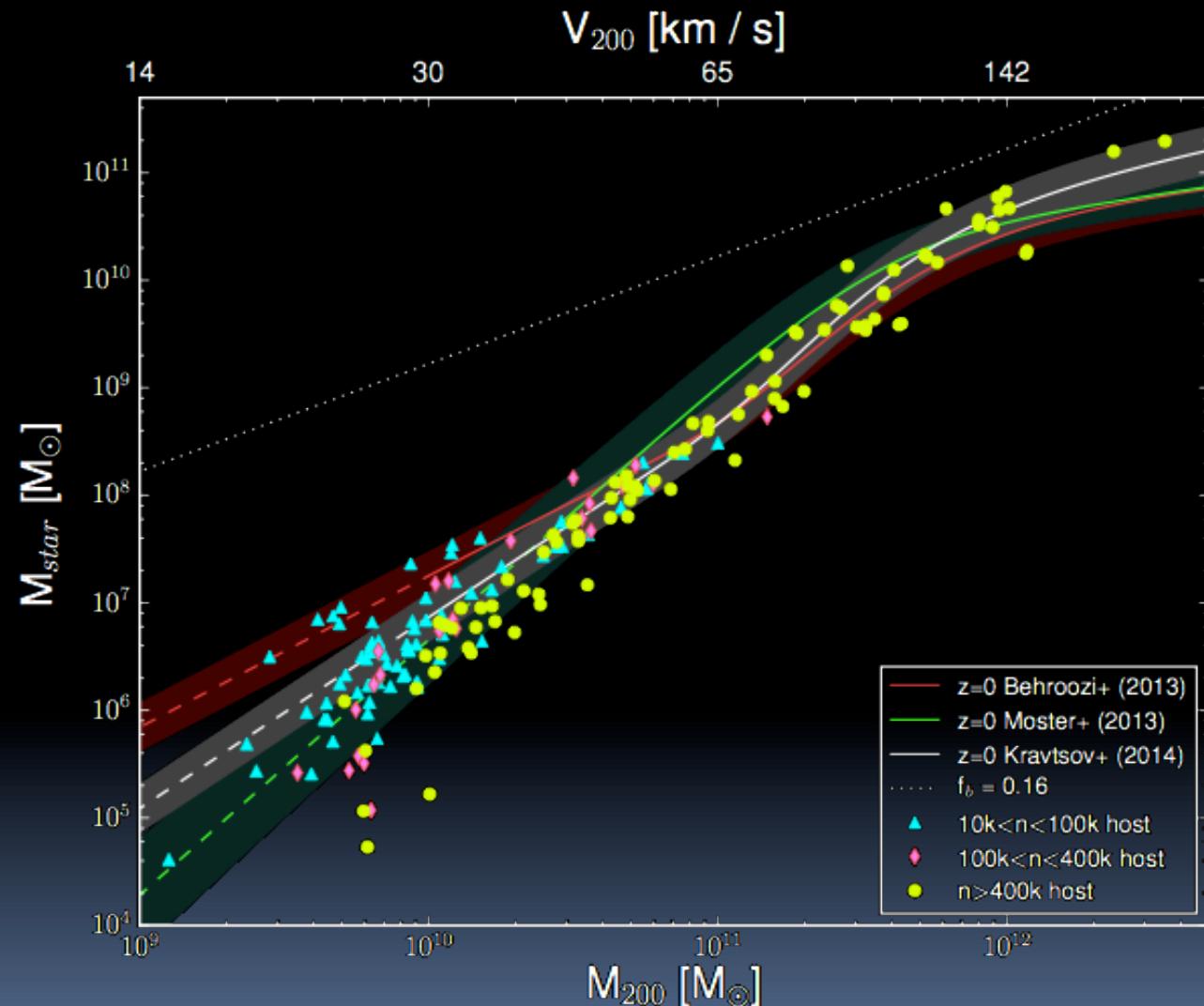


CLUES 4096 Gasoline
 $M_{\text{star}} = 1.3 \times 10^4 M_{\odot}$, $M_{\text{gas}} = 1.8 \times 10^4 M_{\odot}$ and $M_{\text{dm}} = 2.9 \times 10^5 M_{\odot}$

- Magicc simulations (individual isolated galaxies)
- Magicc CLUES simulation WMAP3 4096

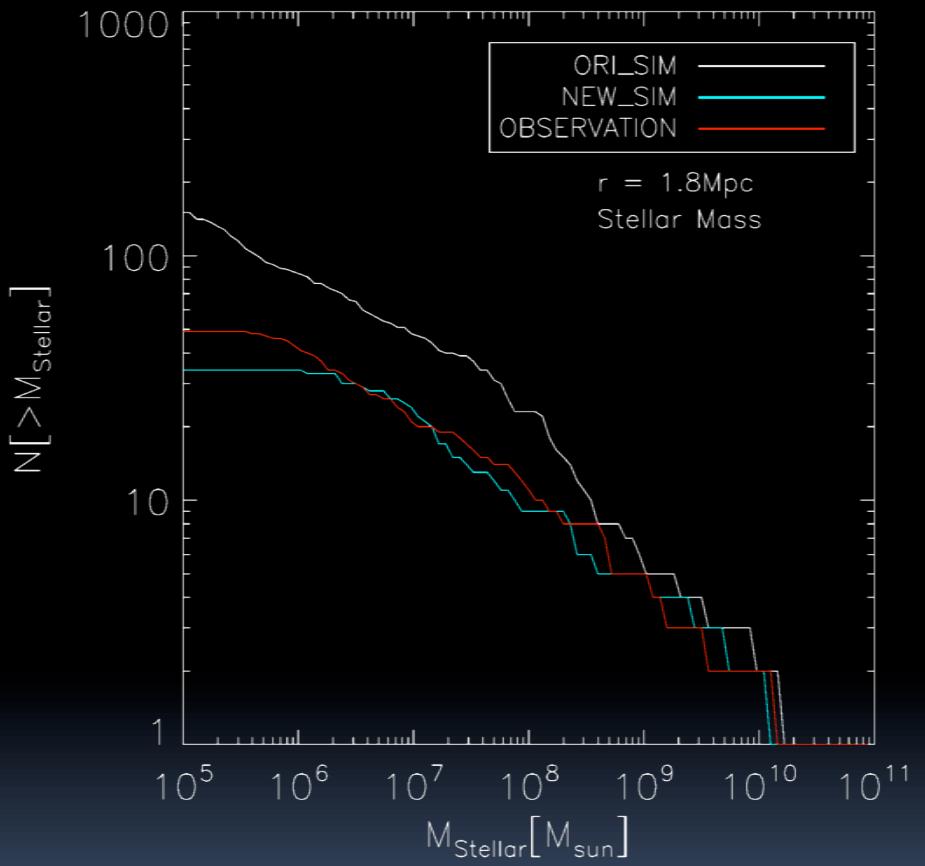
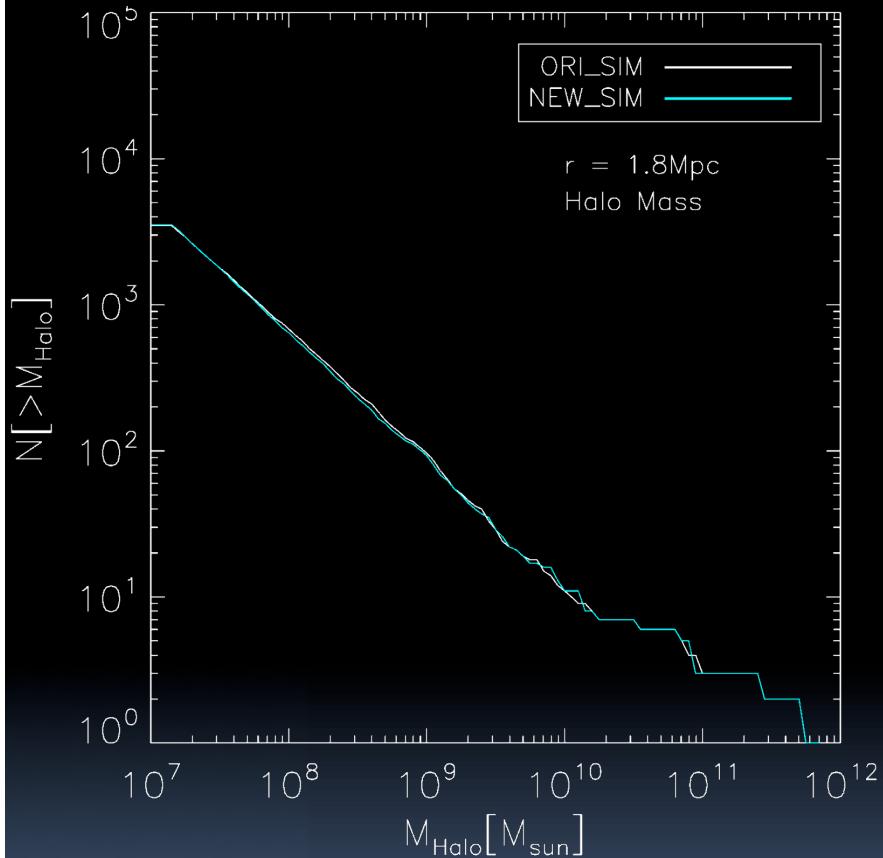
NIHAO project

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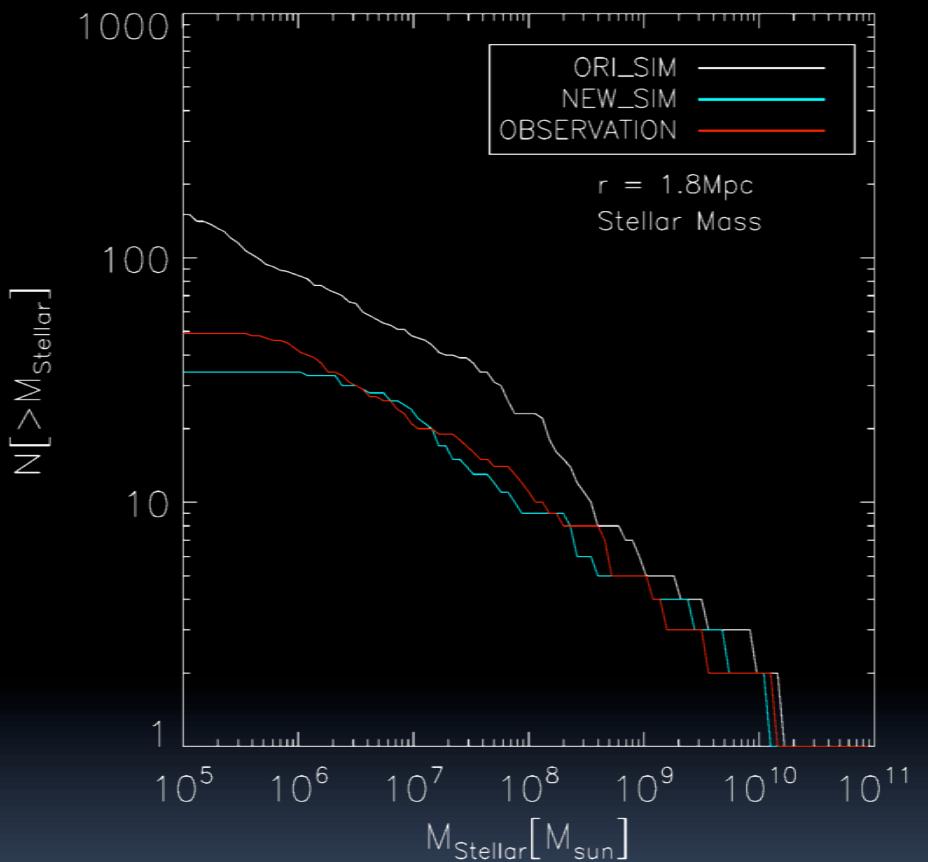
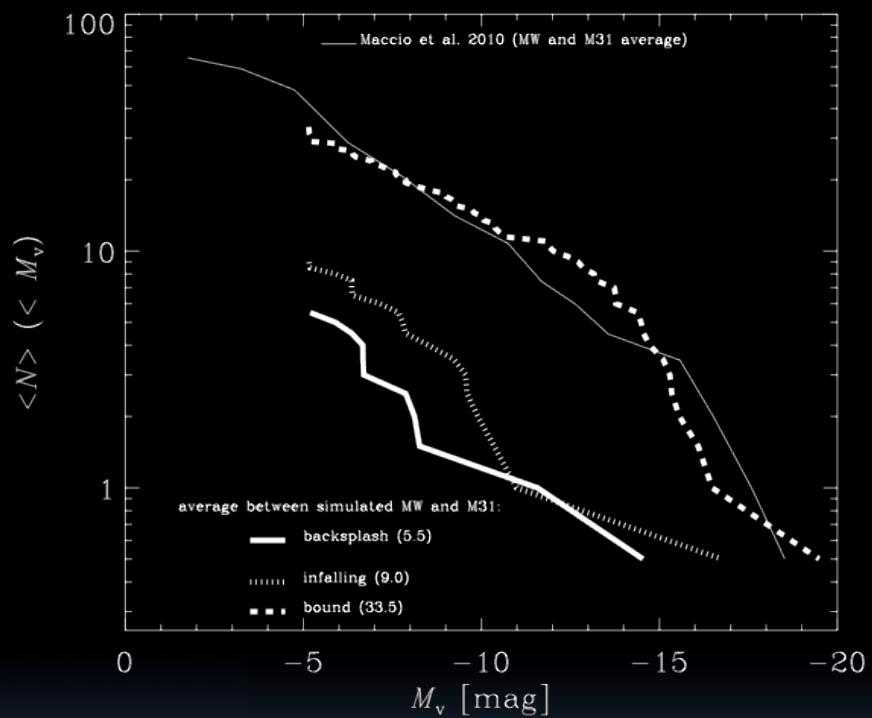


Wang, Dutton, Stinson et al. 2015 (submitted)

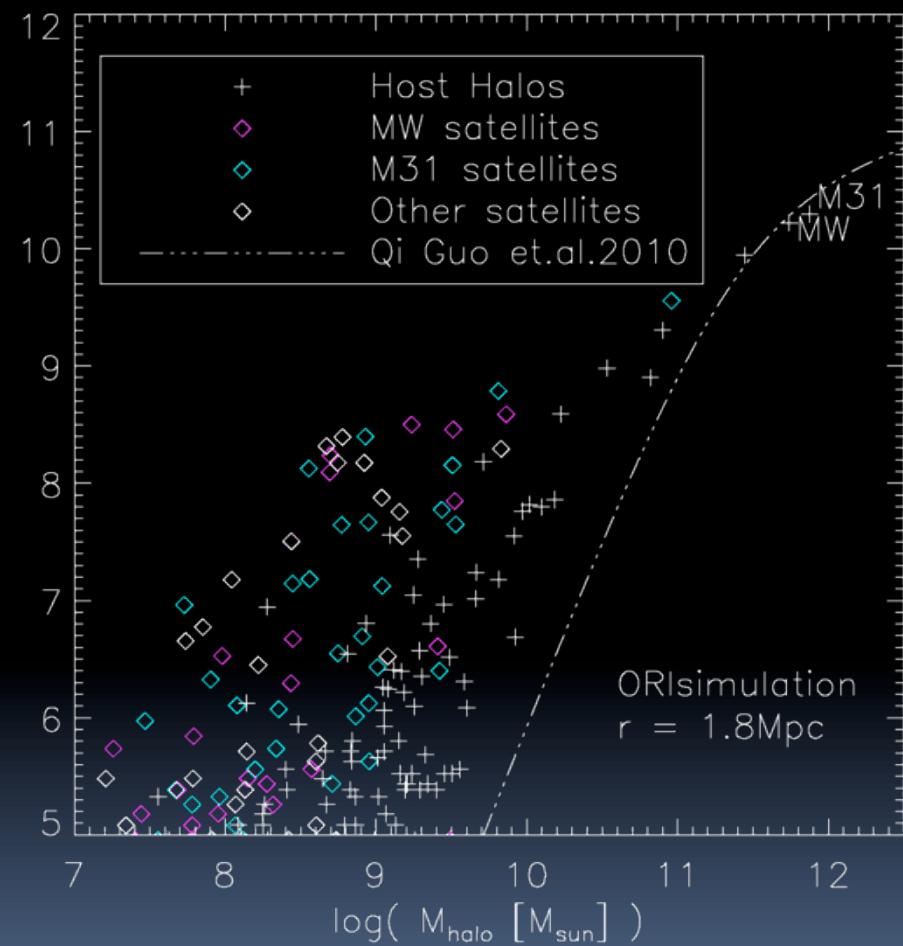
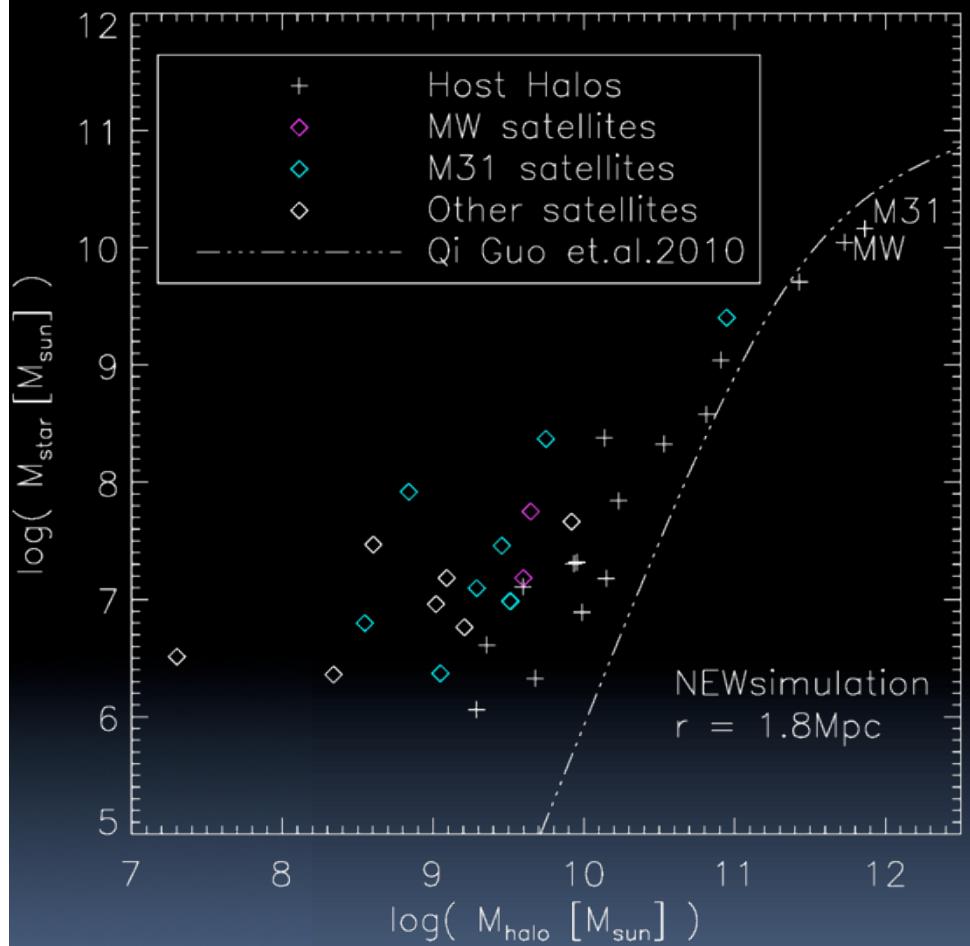
Gasoline CLUES vs Gadget CLUES



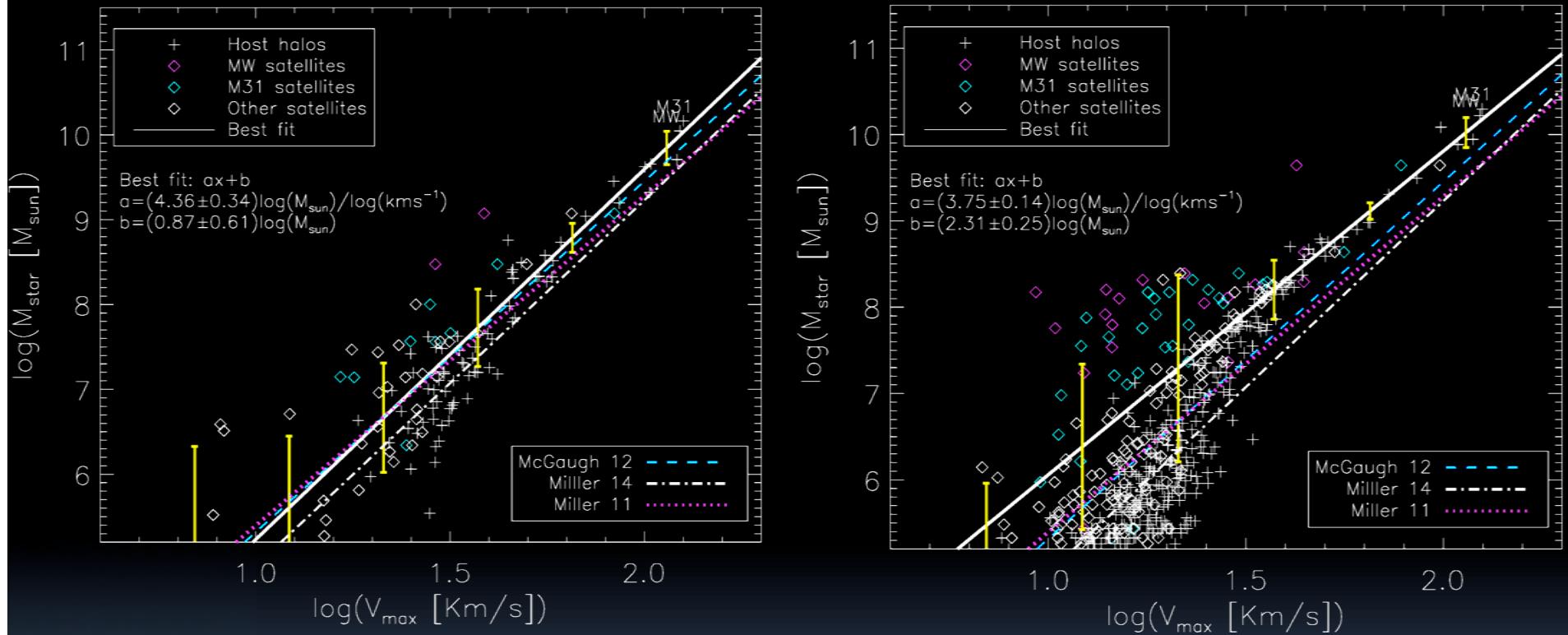
Gasoline CLUES vs Gadget CLUES



Gasoline CLUES vs Gadget CLUES (Stinson 06 vs Springel & Hernquist 01)

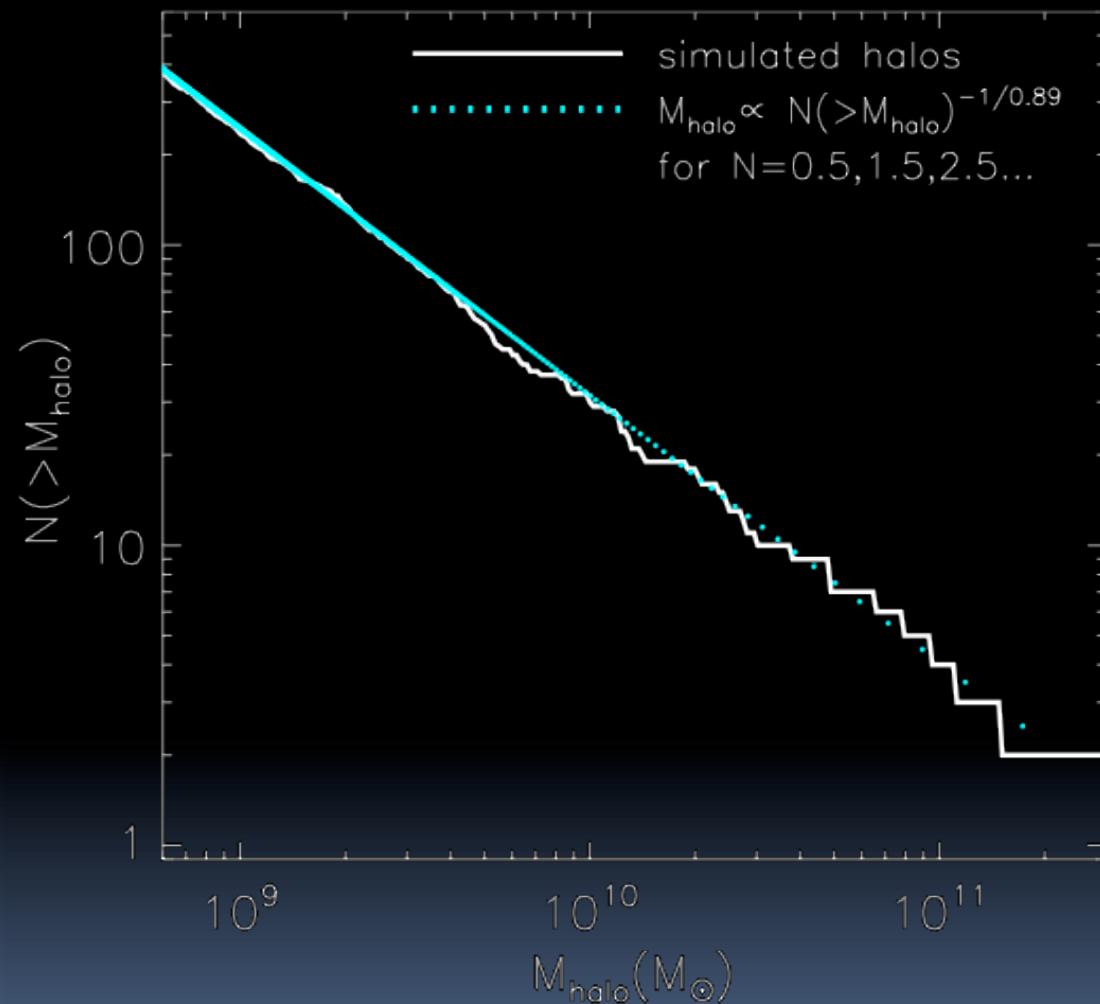


Gasoline CLUES vs Gadget CLUES (Stinson 06 vs Springel & Hernquist 01)



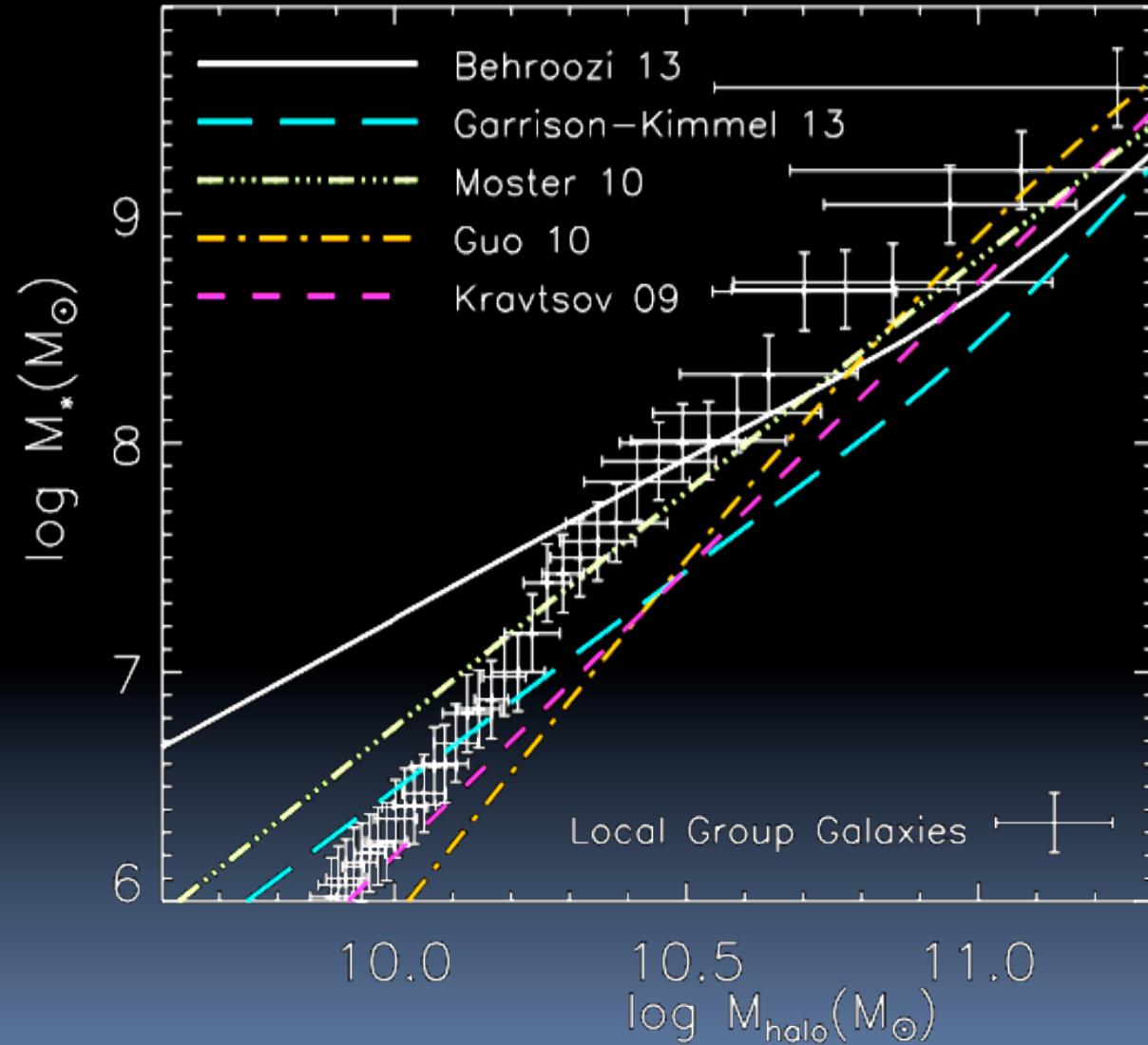
Tully-Fisher relation

Local Group Abundance Matching

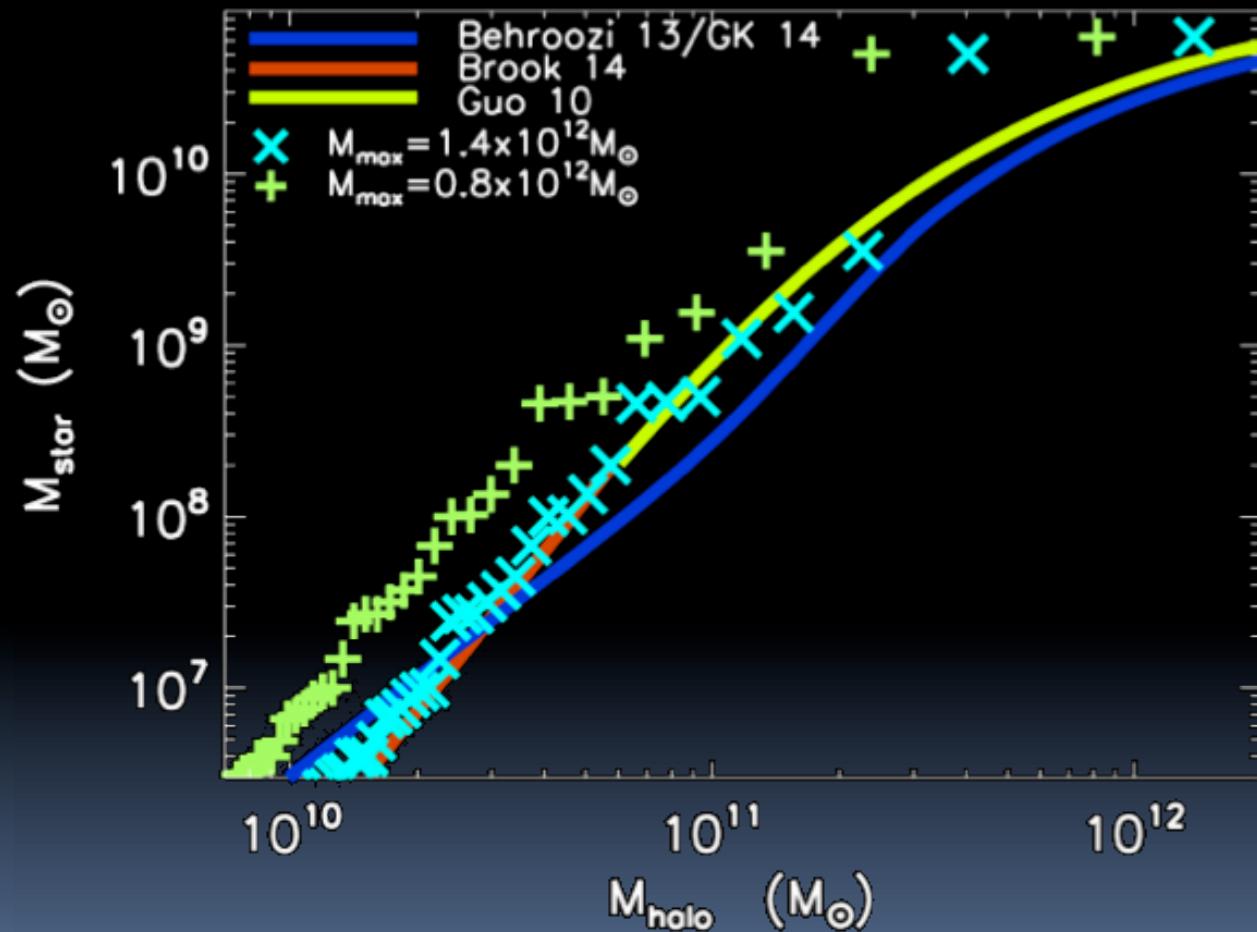


Brook et al 2014

Local Group Abundance Matching

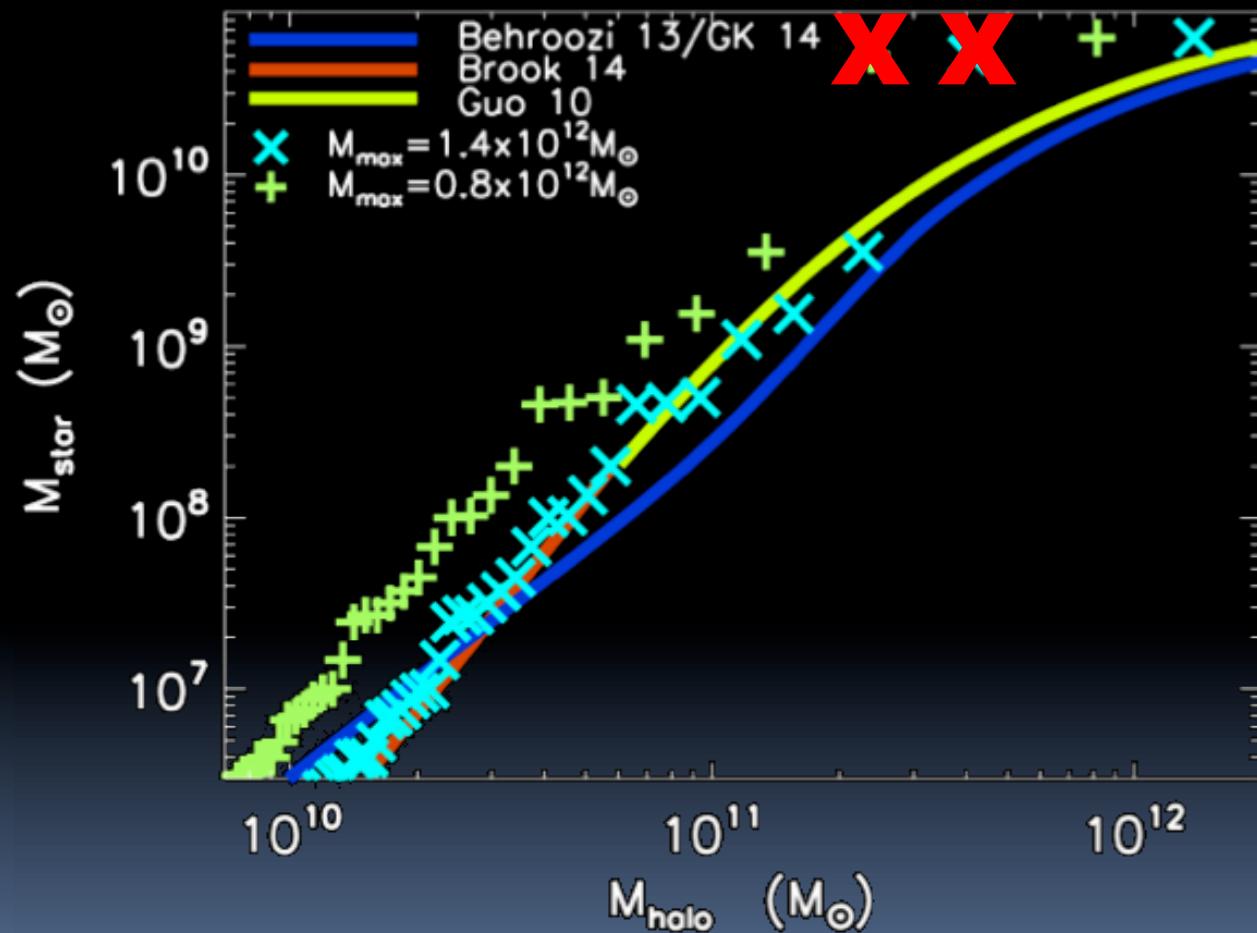


Local Group Abundance Matching

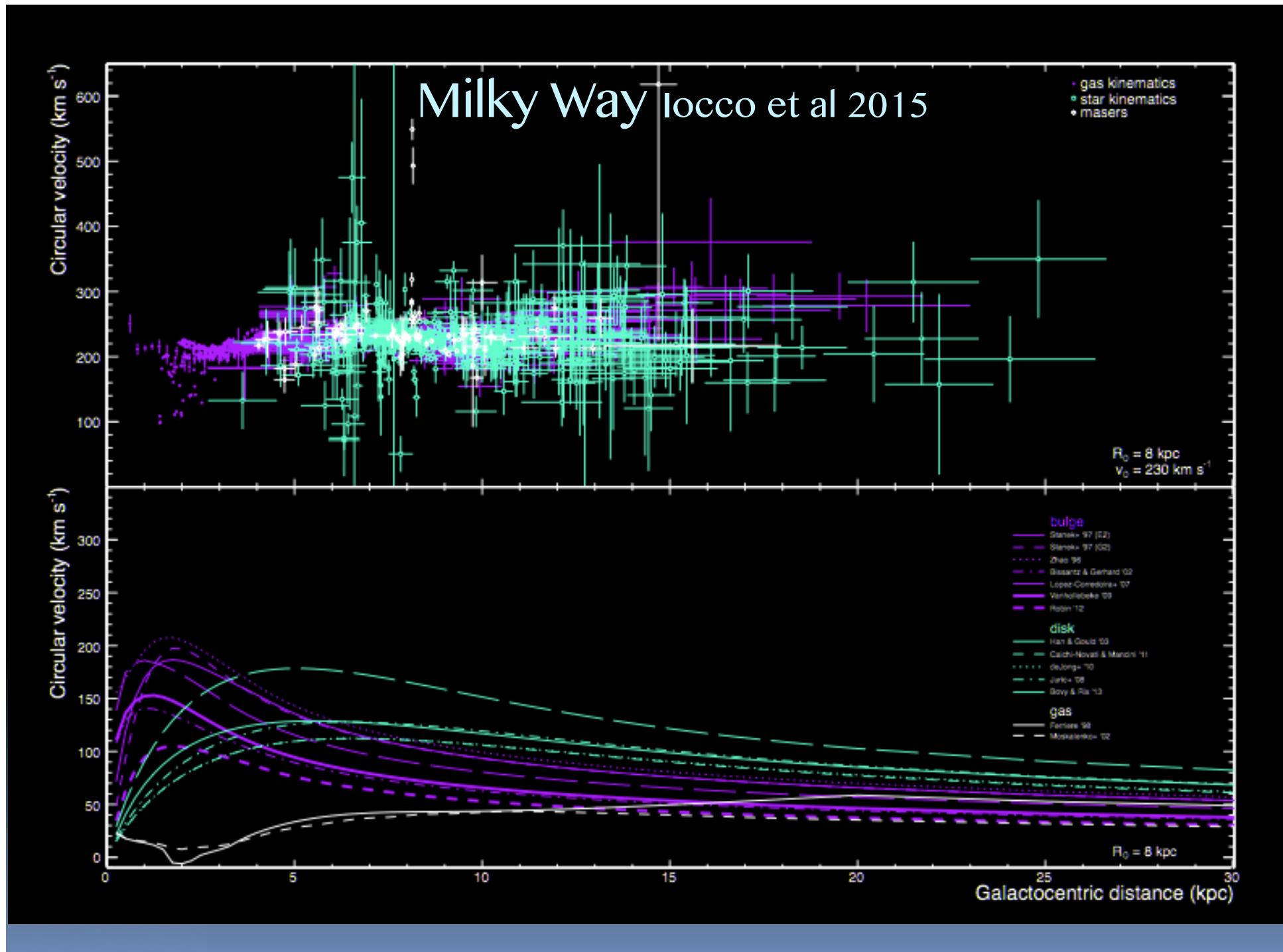


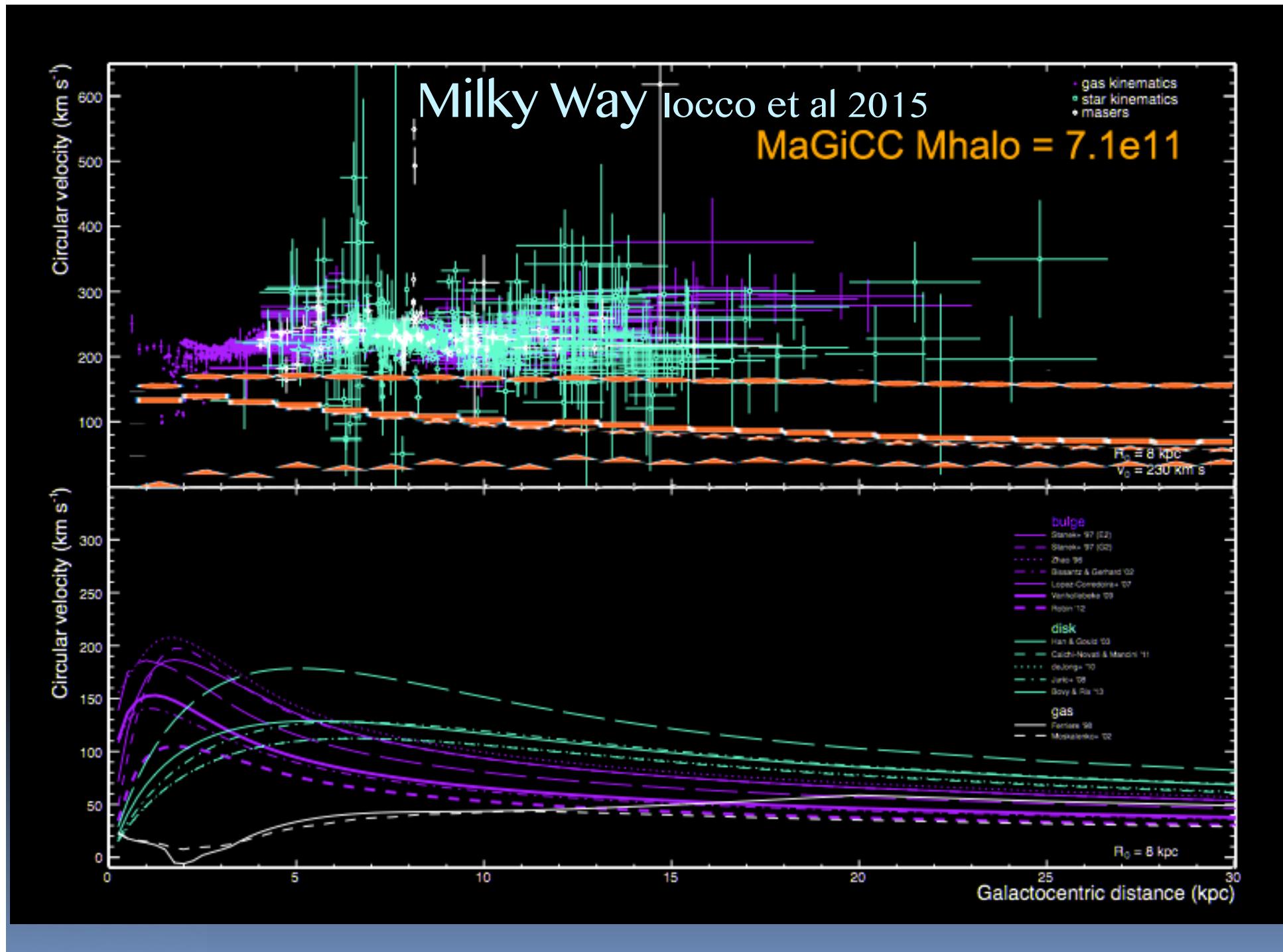
Brook et al 2014, Brook & Di Cintio 2015

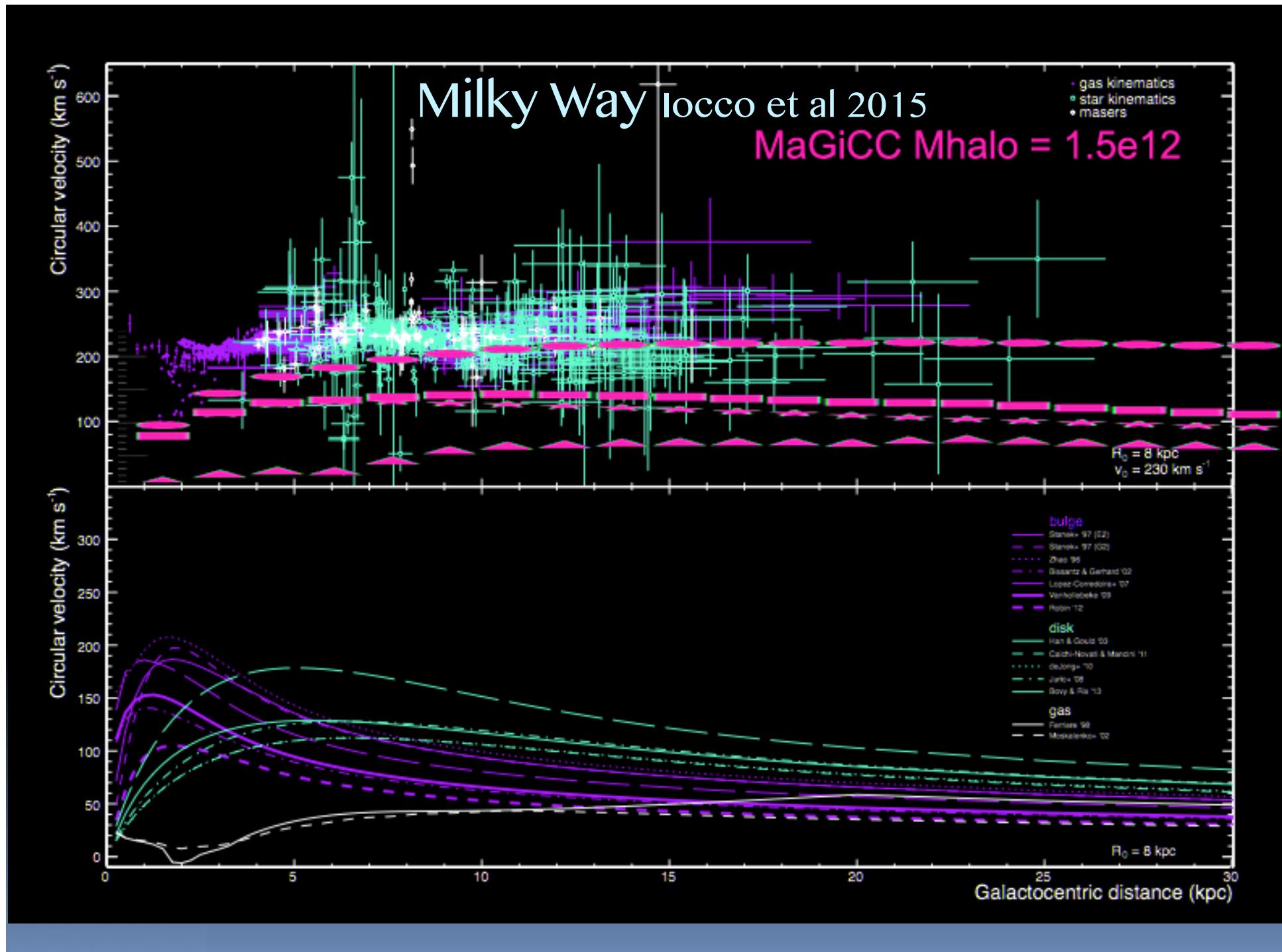
Local Group Abundance Matching



Brook et al 2014, Brook & Di Cintio 2015







Conclusions

- Hydro CLUES simulations are very encouraging
- Many observations can be explored
- Higher resolution will get us down to well resolved dwarf galaxies