

How the **Intracluster Light** is going to change your life



 [@mireiamontesq](https://twitter.com/mireiamontesq)

Mireia Montes



How the **Intracluster Light** is going to change your life

In short: No, it won't



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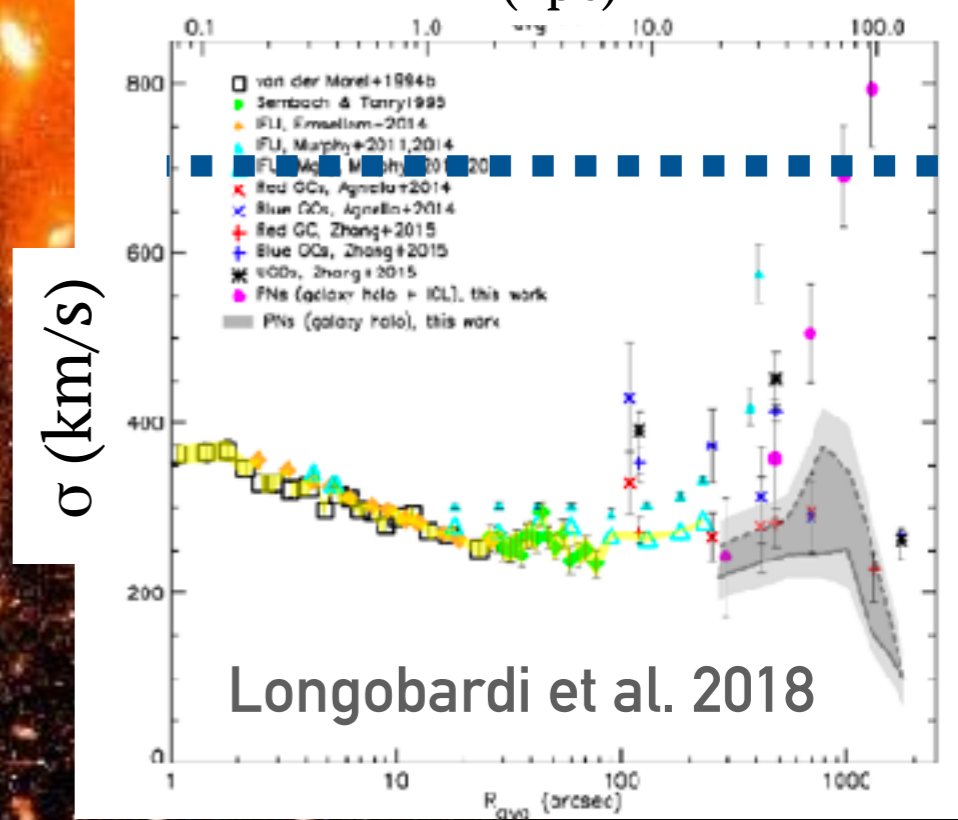
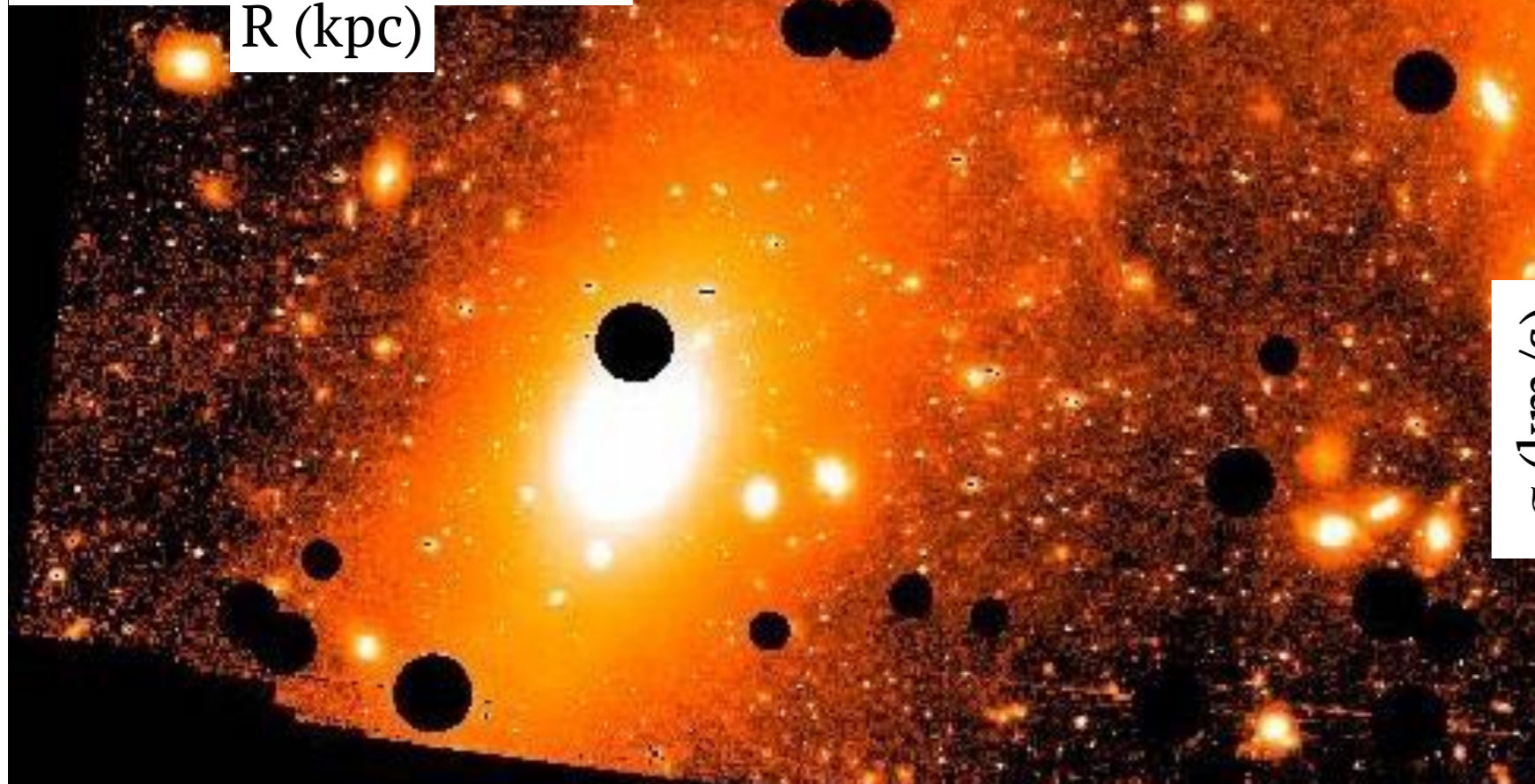
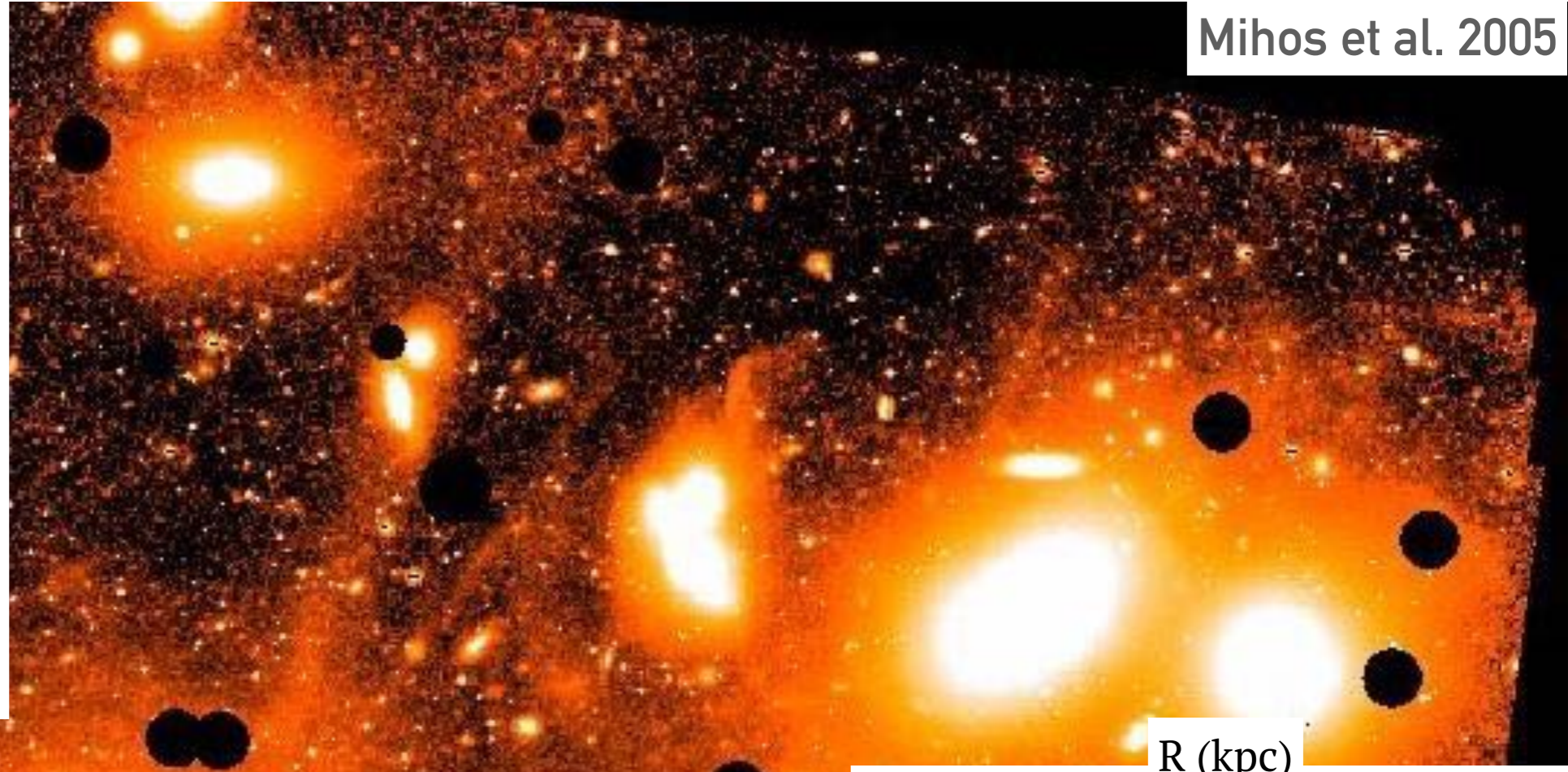
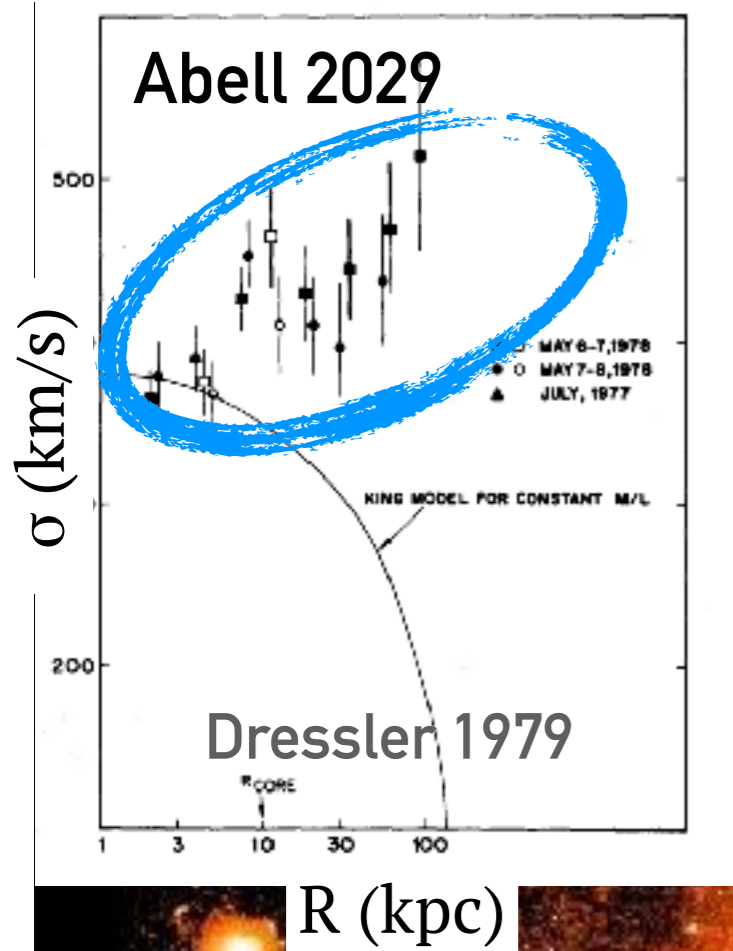
Know the Enemy



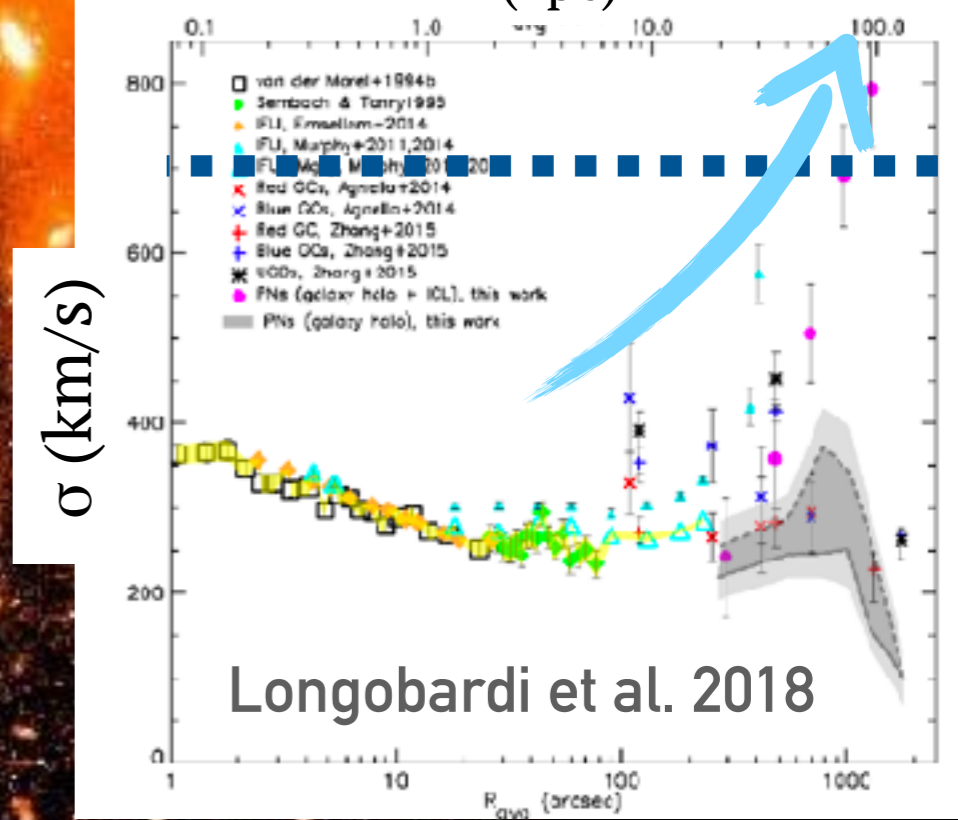
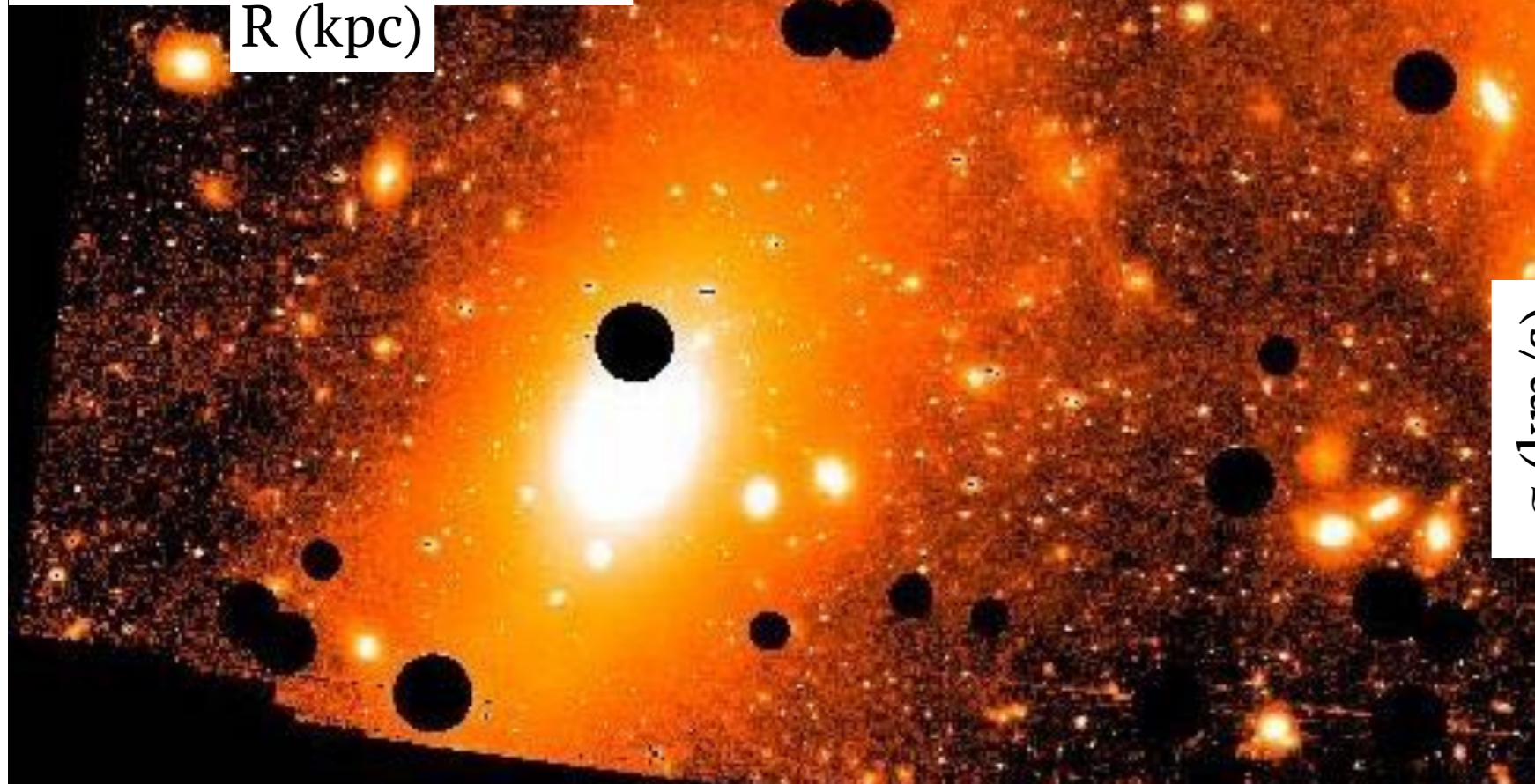
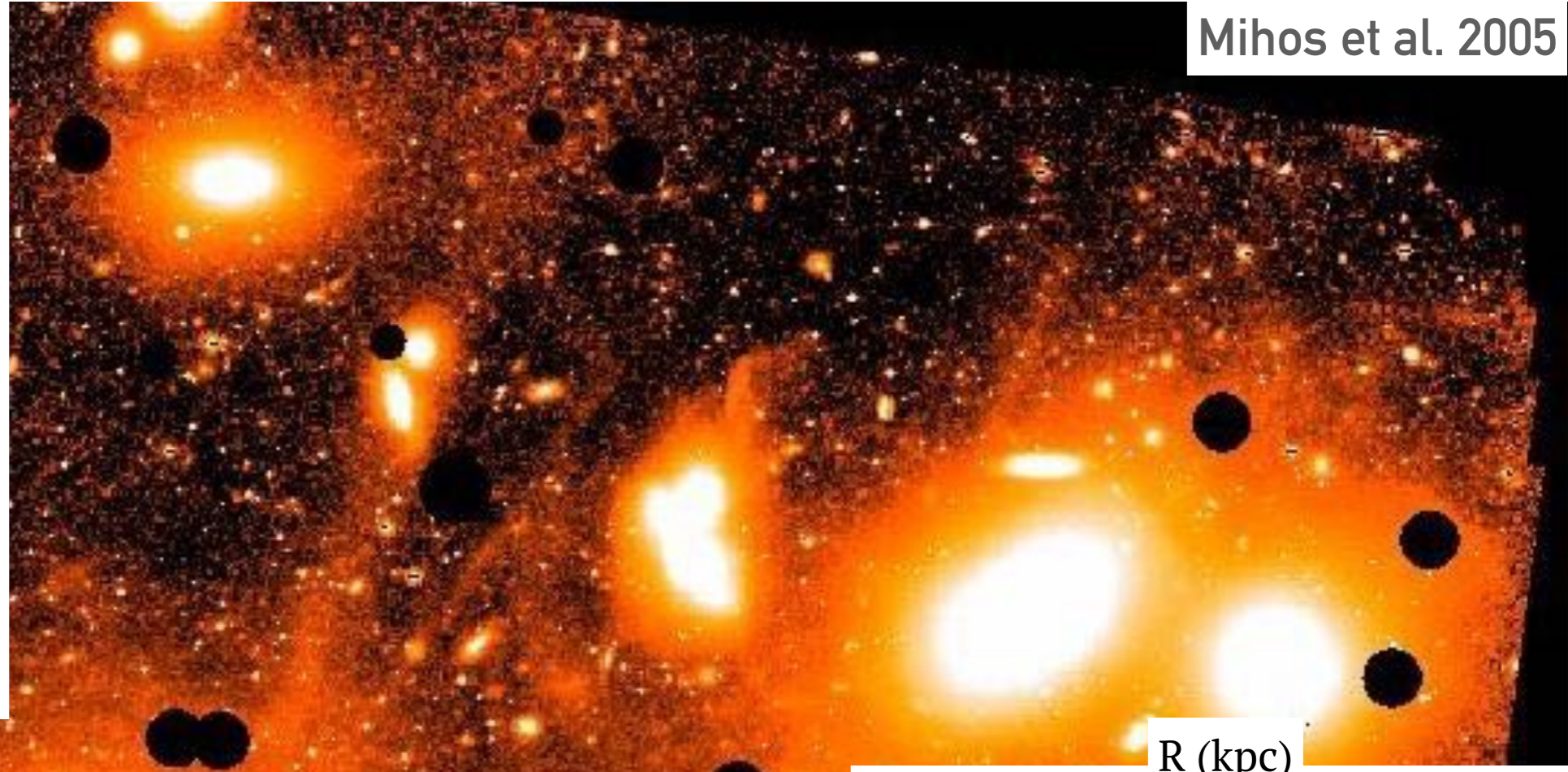
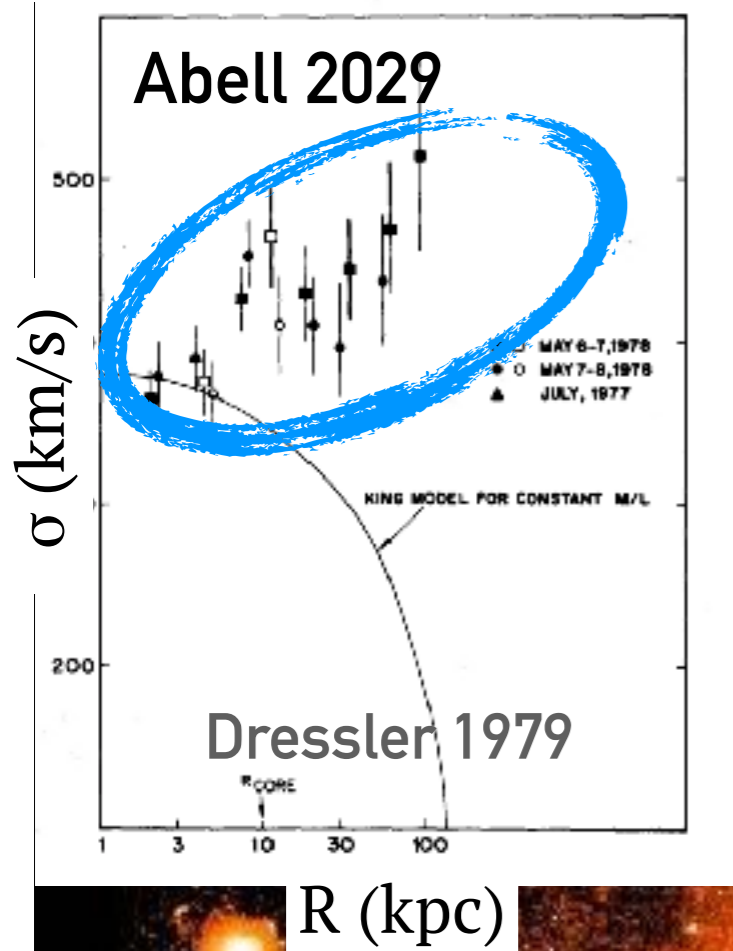
 @mireiamontesq

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What is the ICL?



What is the ICL?



Why study the ICL?



This is a movie

Encodes merger histories
of cluster of galaxies

Why study the ICL?



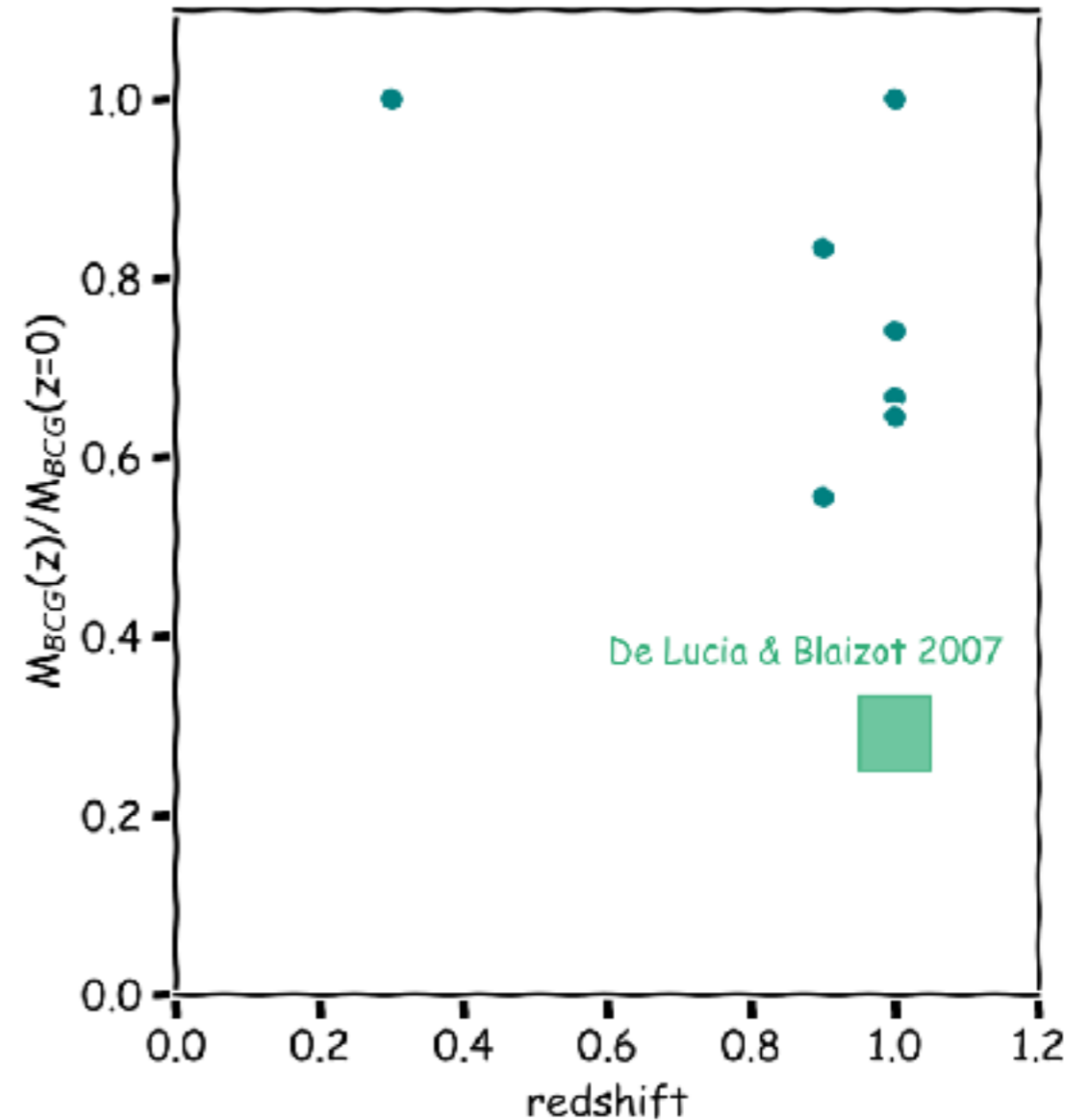
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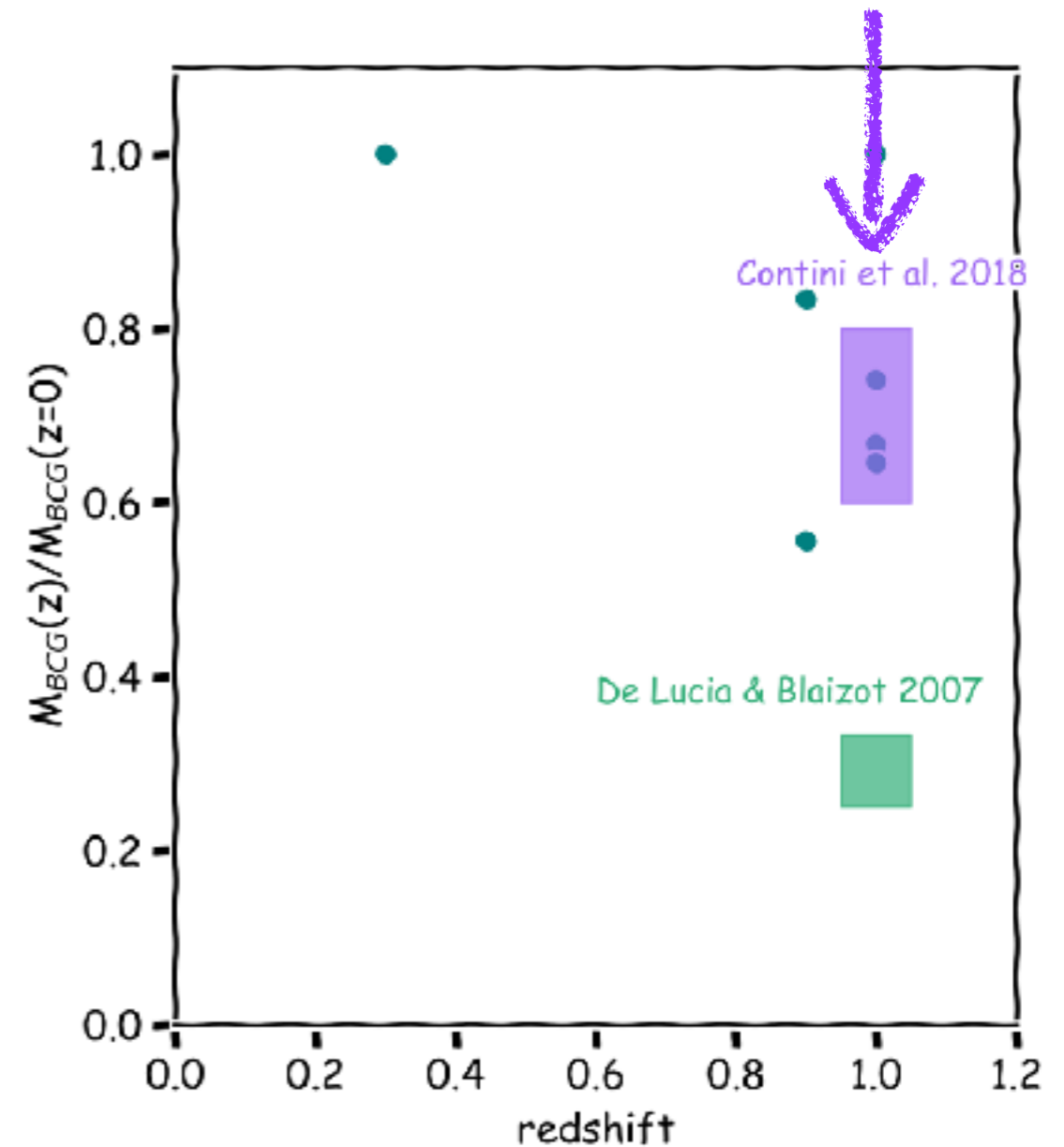


Buildup of the BCG

Whiley et al. 2008; Collins et al. 2009; Stott et al. 2010;
Lidman et al. 2012; Lin et al. 2013; Oliva-Altamirano et
al 2014; Burke et al. 2015; Zhang et al, 2016

Why study the ICL?

If formation of ICL



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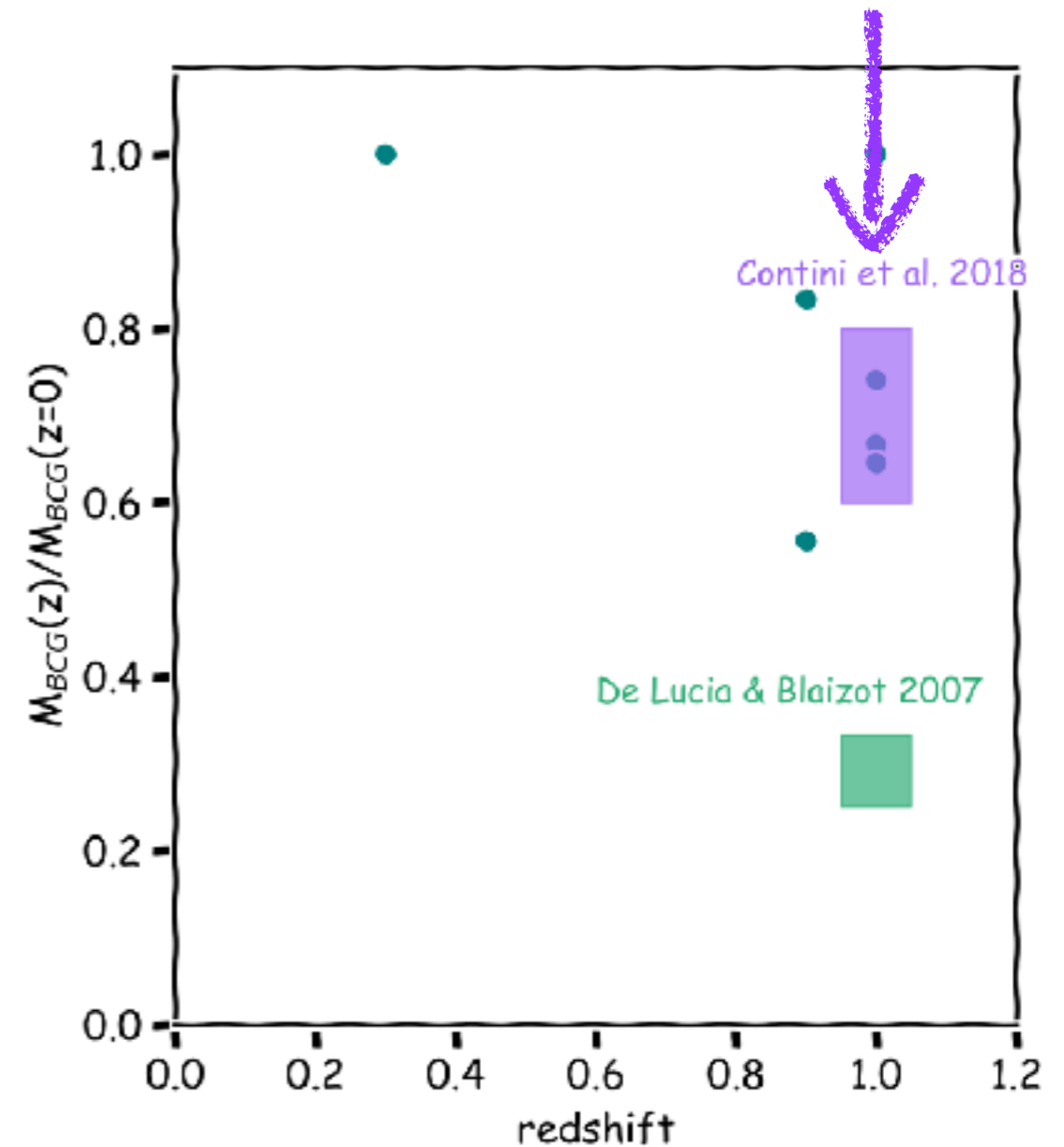
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See also sims by Conroy et al. 2007

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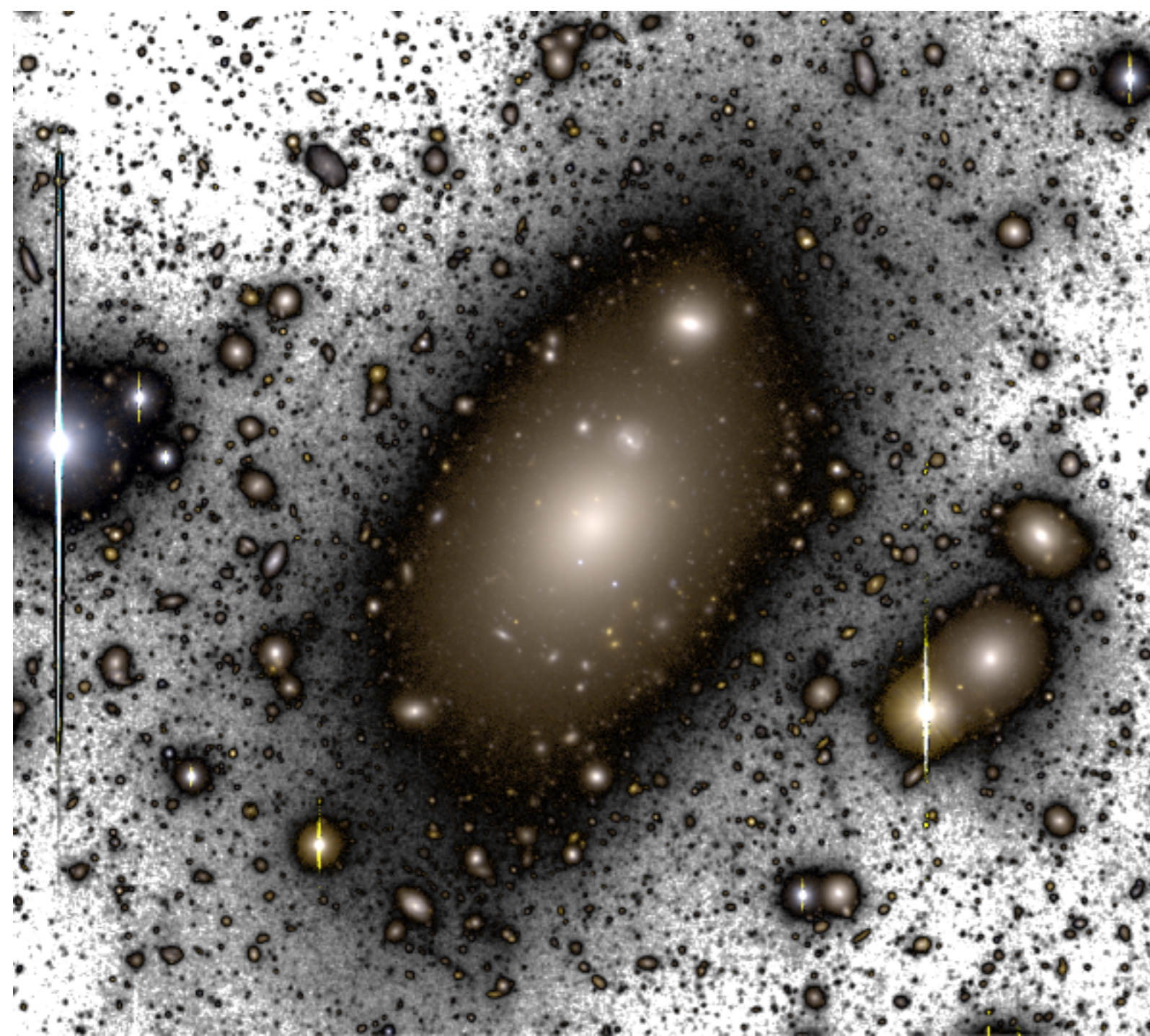
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See also sims by Conroy et al. 2007

Montes 2019 (arXiv: 1912.01616)

It is not a picnic...

700" x 700"

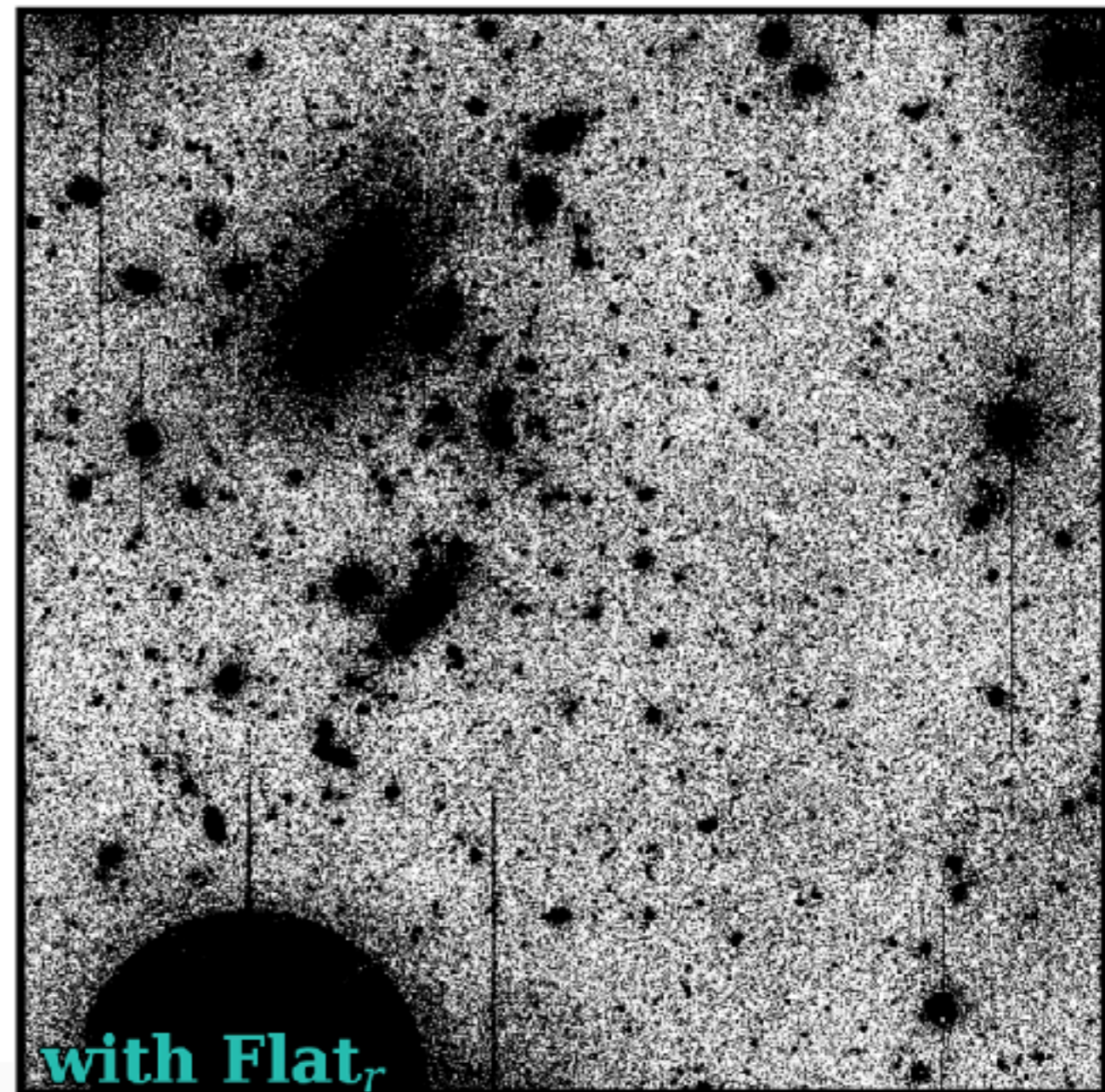
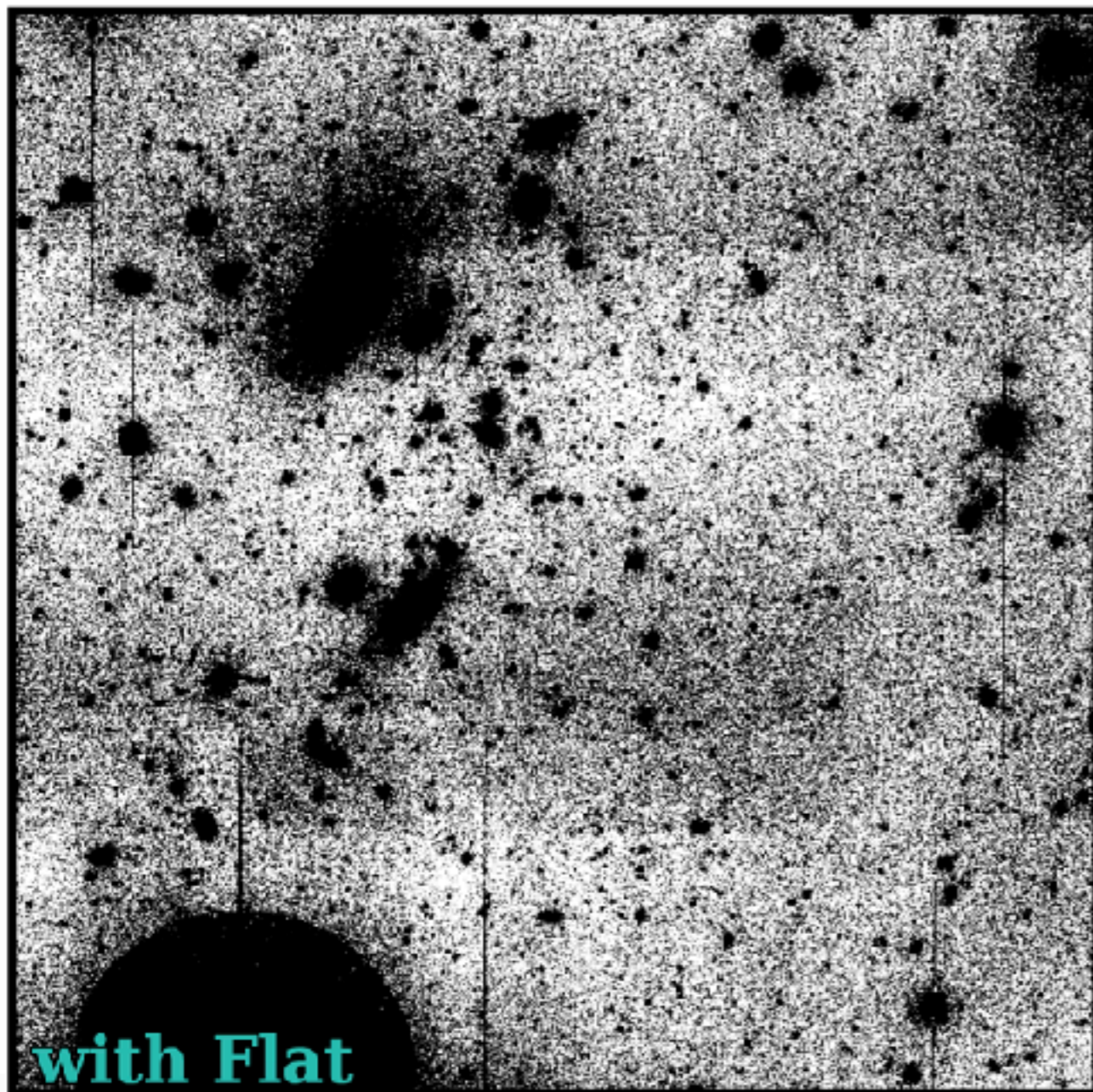


Faint and extended
($\mu_v > 26.5$ mag/arcsec²)

Abell 85: Montes et al. 2020, submitted

- Accurate flat-fielding
- Careful background subtraction
- Scattered light from stars
- Cirrus

It is not a picnic...

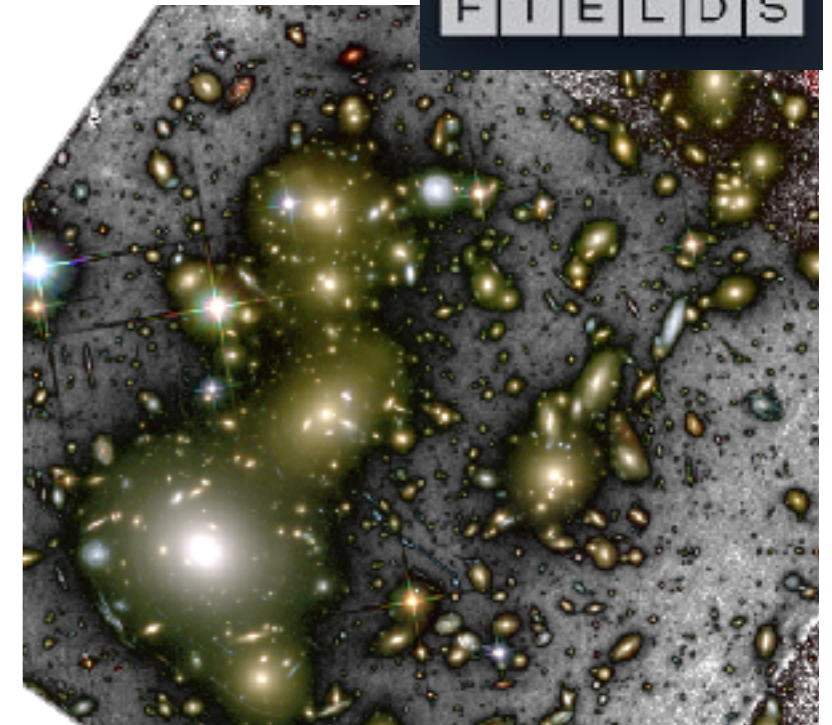
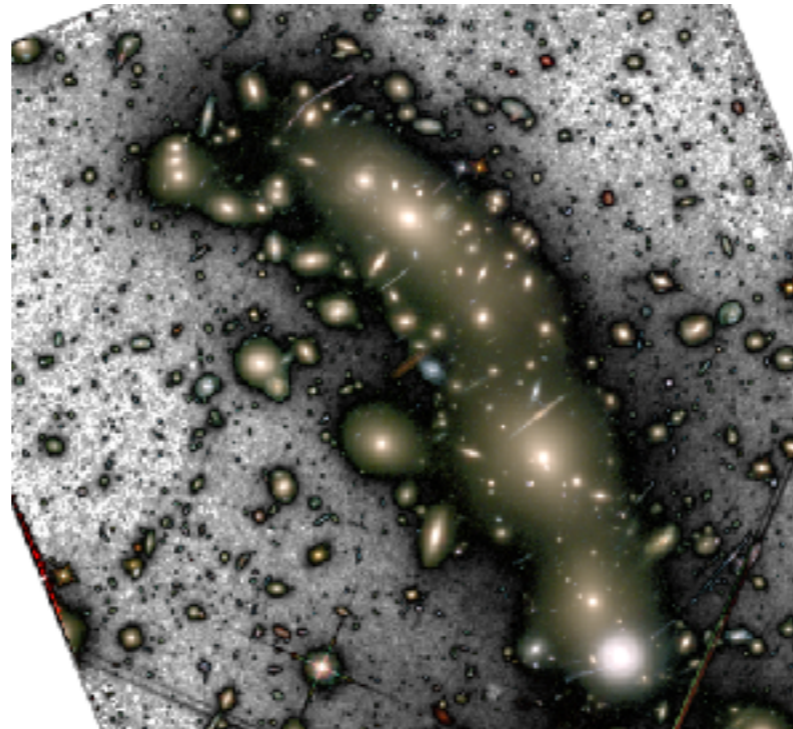
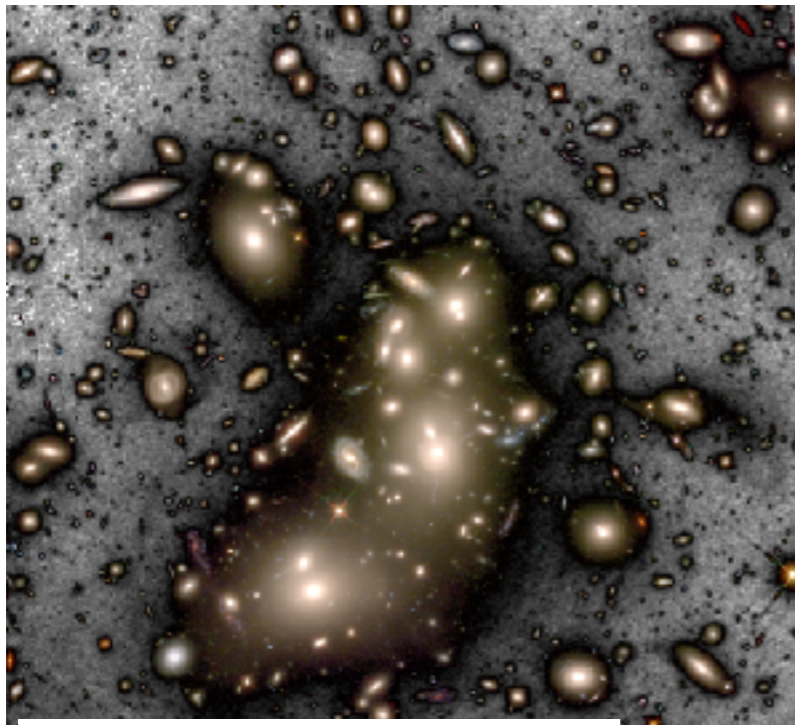


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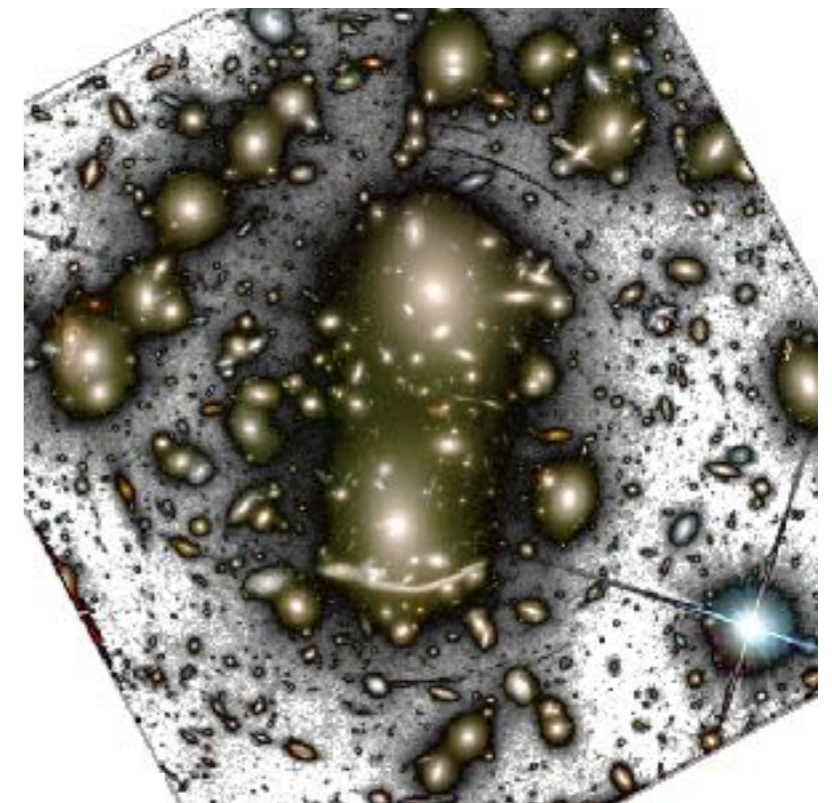
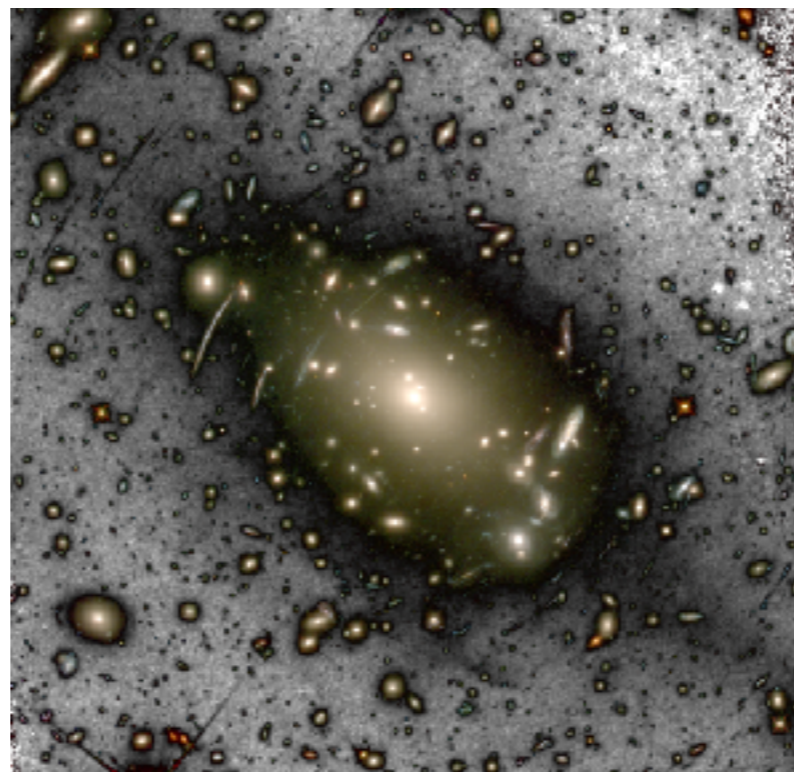
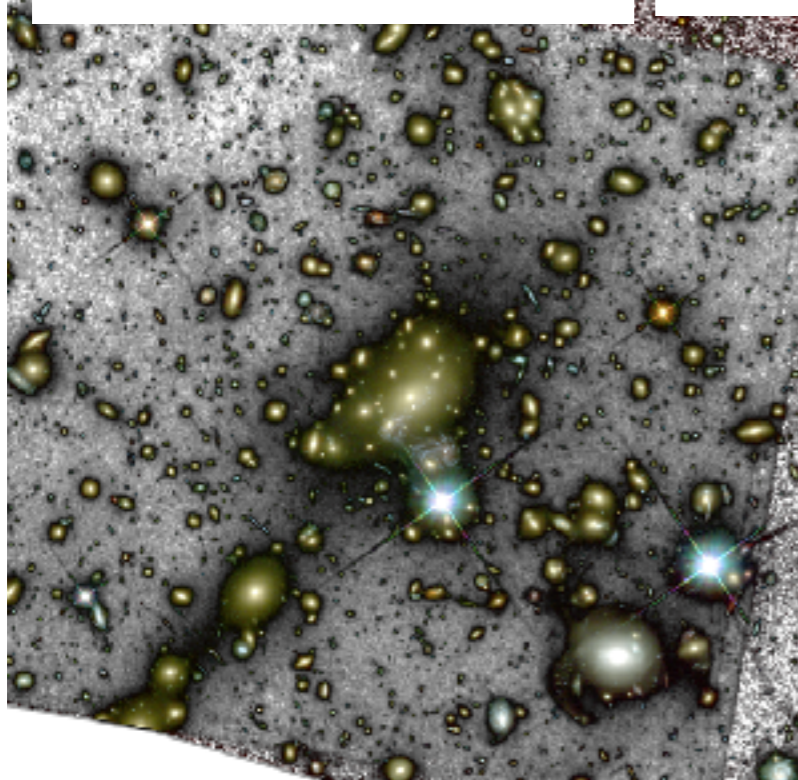
i-band

Gradient of 1% across the CCD

Hubble Frontier Fields



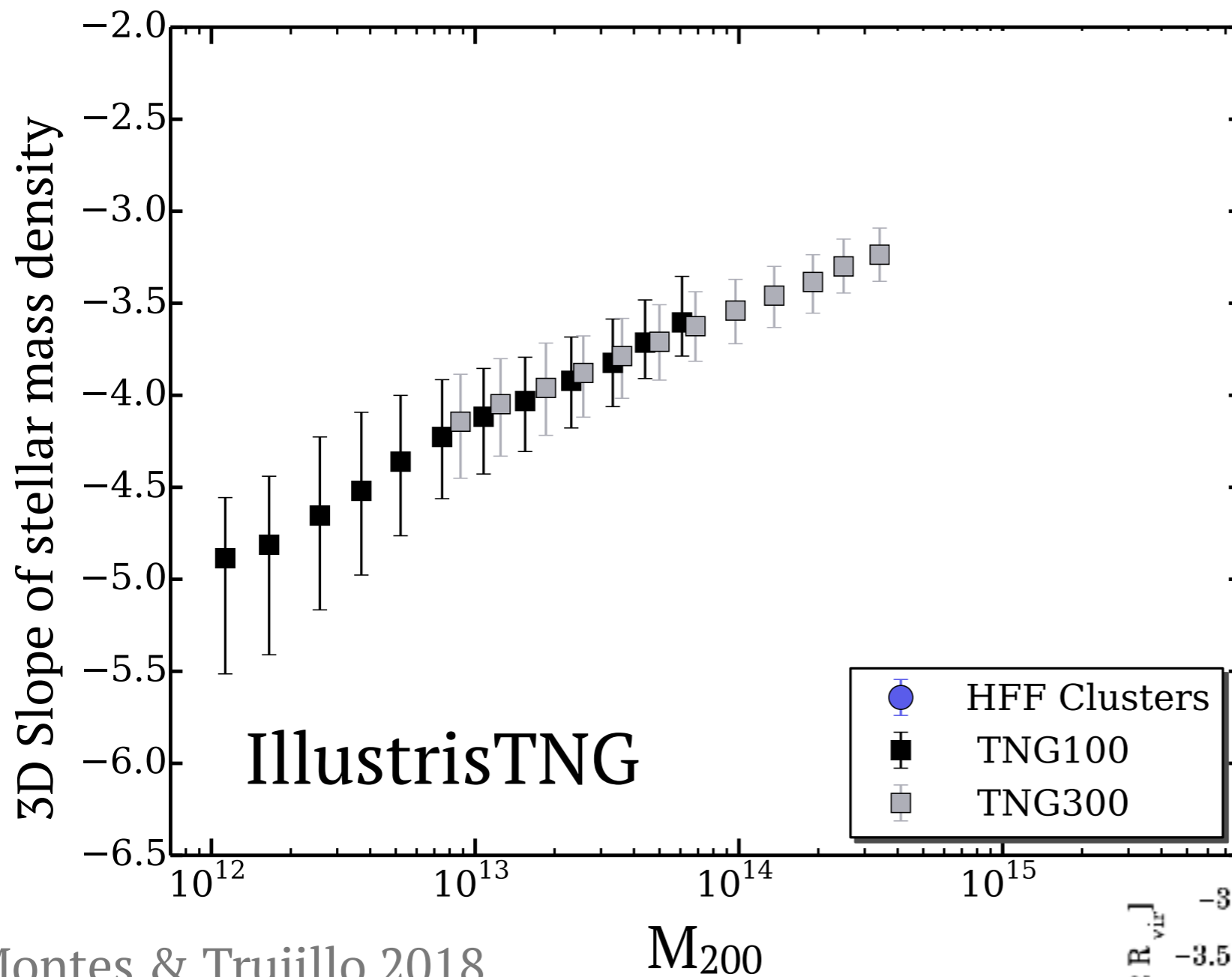
$0.3 < z < 0.55$ F435W, F606W, F814W, F105W, F125W, F140W, F160W



$\sim 31 \text{ mag/arcsec}^2$ ($3 \times 3 \text{ arcsec}^2$, 5σ)

Montes & Trujillo 2014, 2018



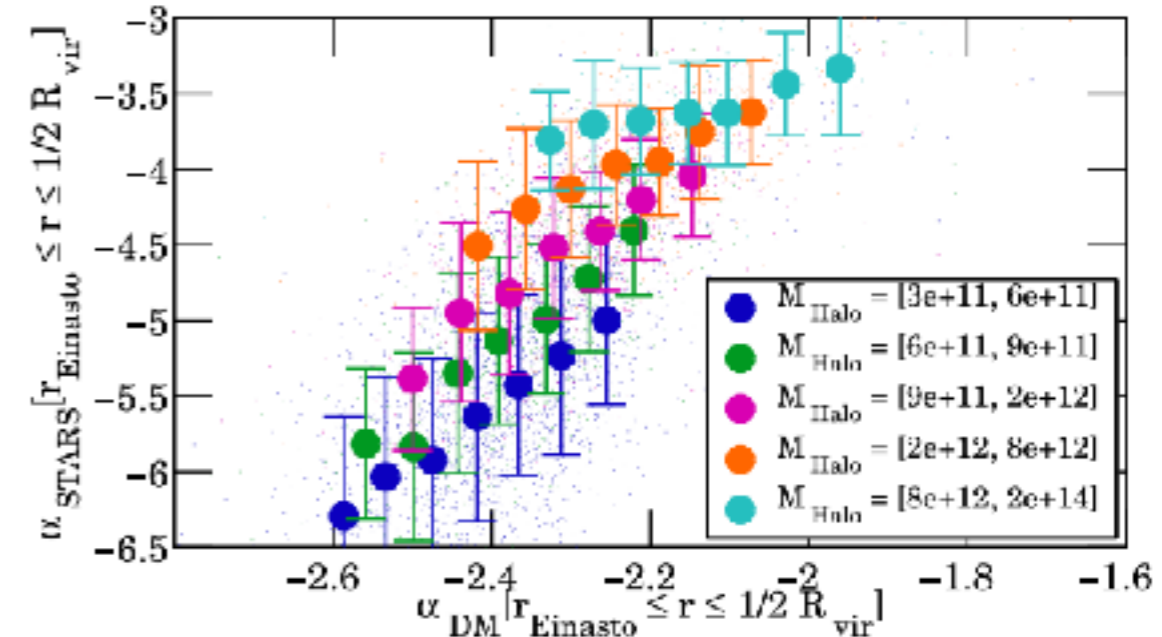


Slope of the stellar mass density profile of the halo (3D) correlates with the total halo mass

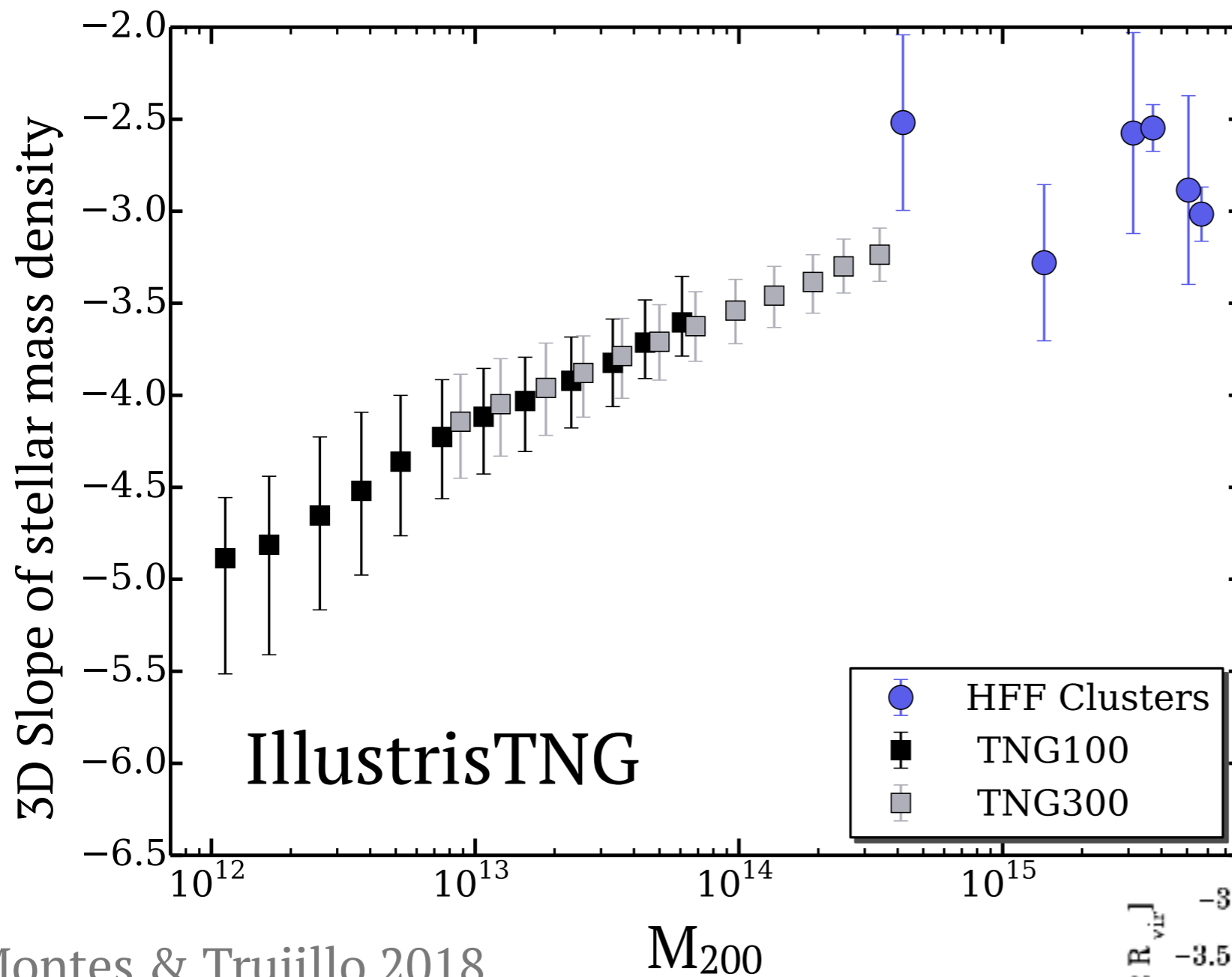
Pillepich+2014, 2018

Montes & Trujillo 2018

slopes of the radial mass density distribution as shallow as the dark matter's!!



Pillepich+2014

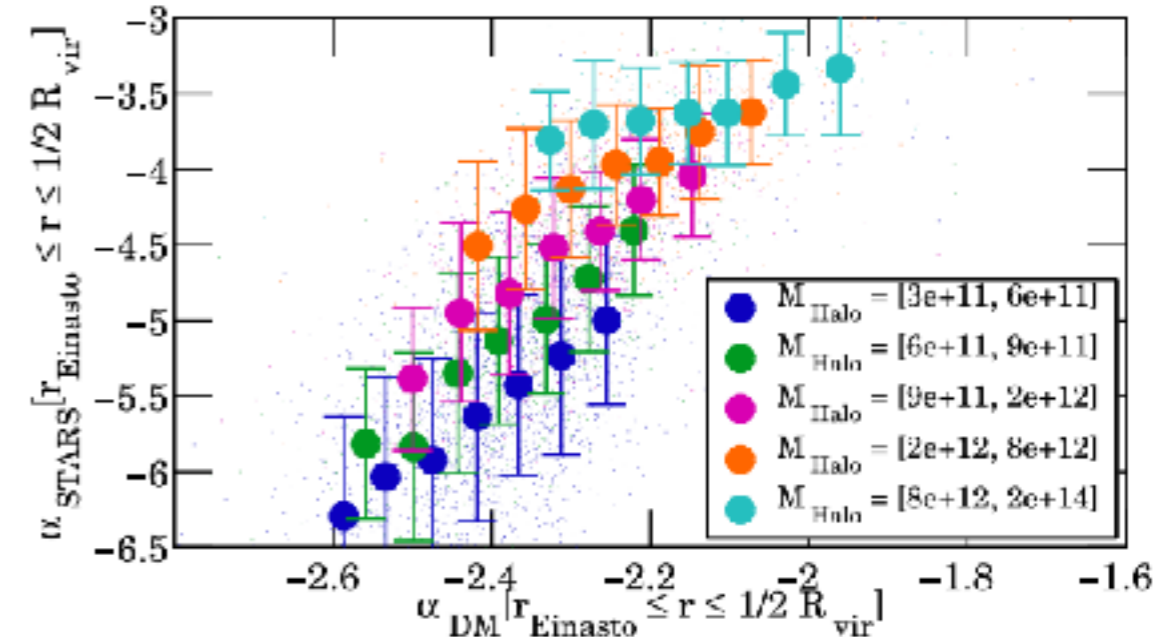


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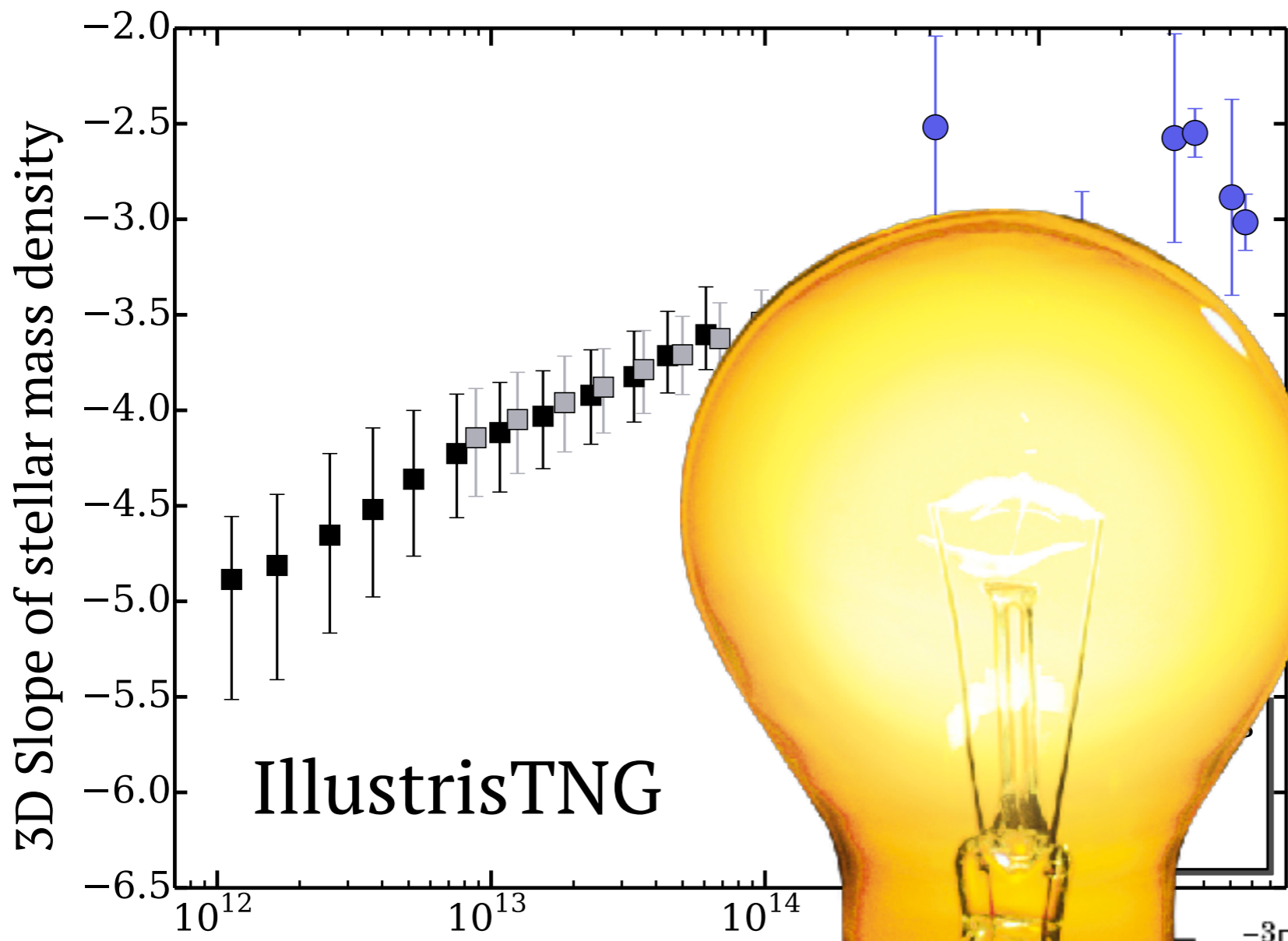
Pillepich+2014, 2018

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Pillepich+2014



IllustrisTNG

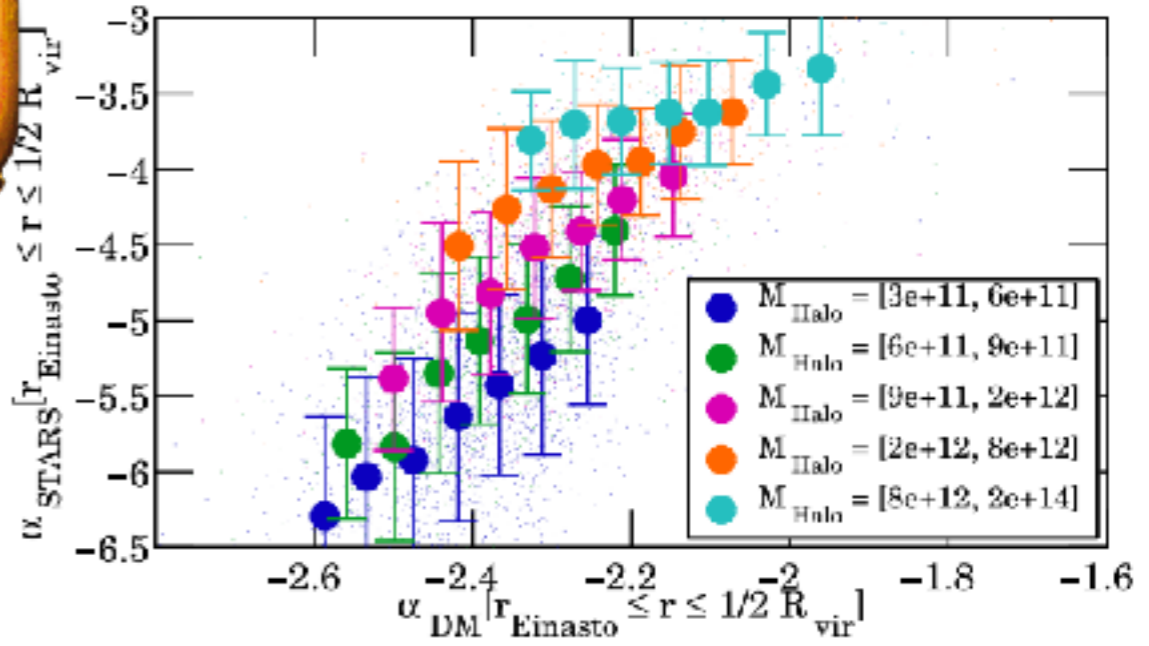
Montes & Trujillo 2018

M_{200}

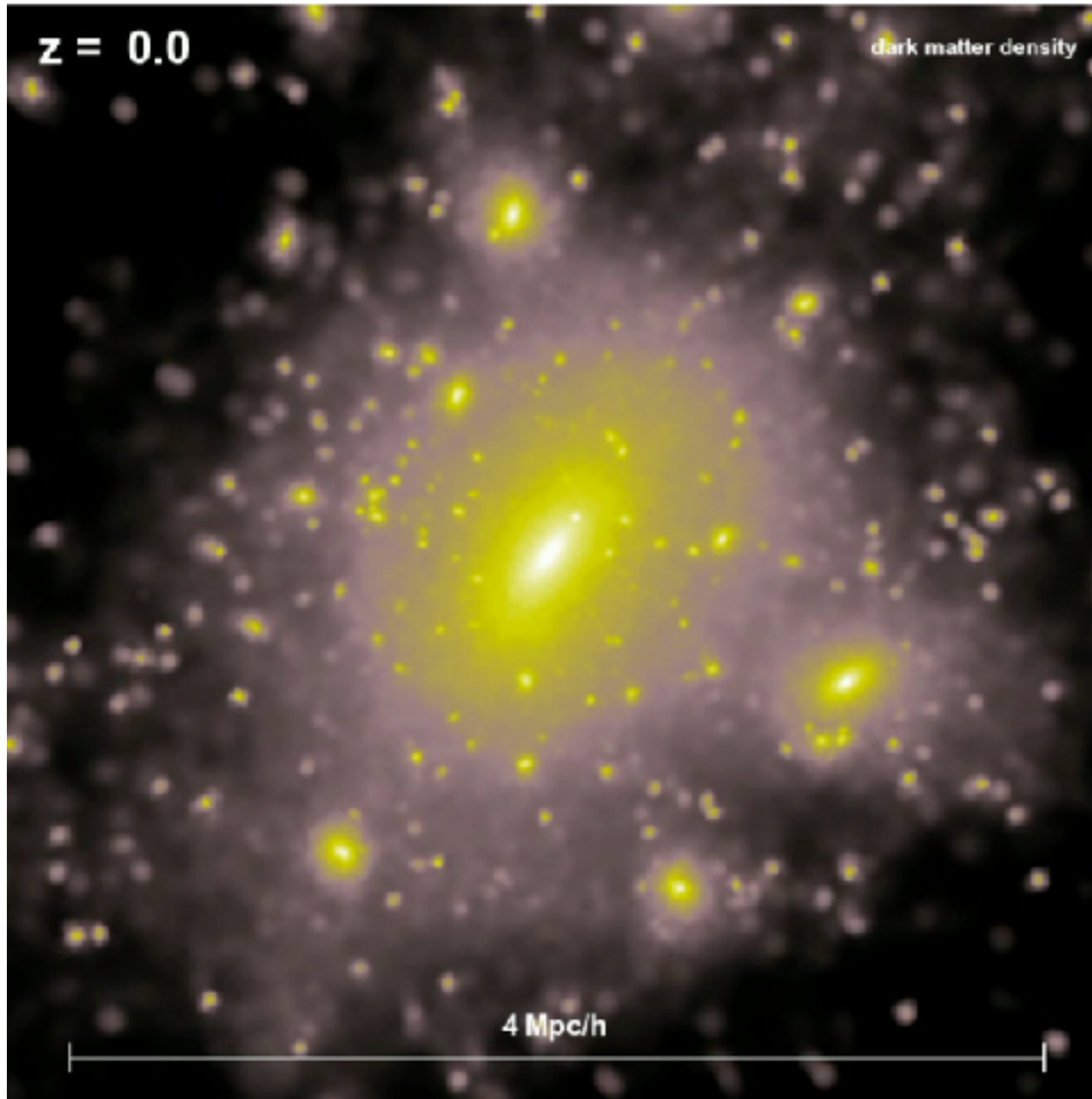
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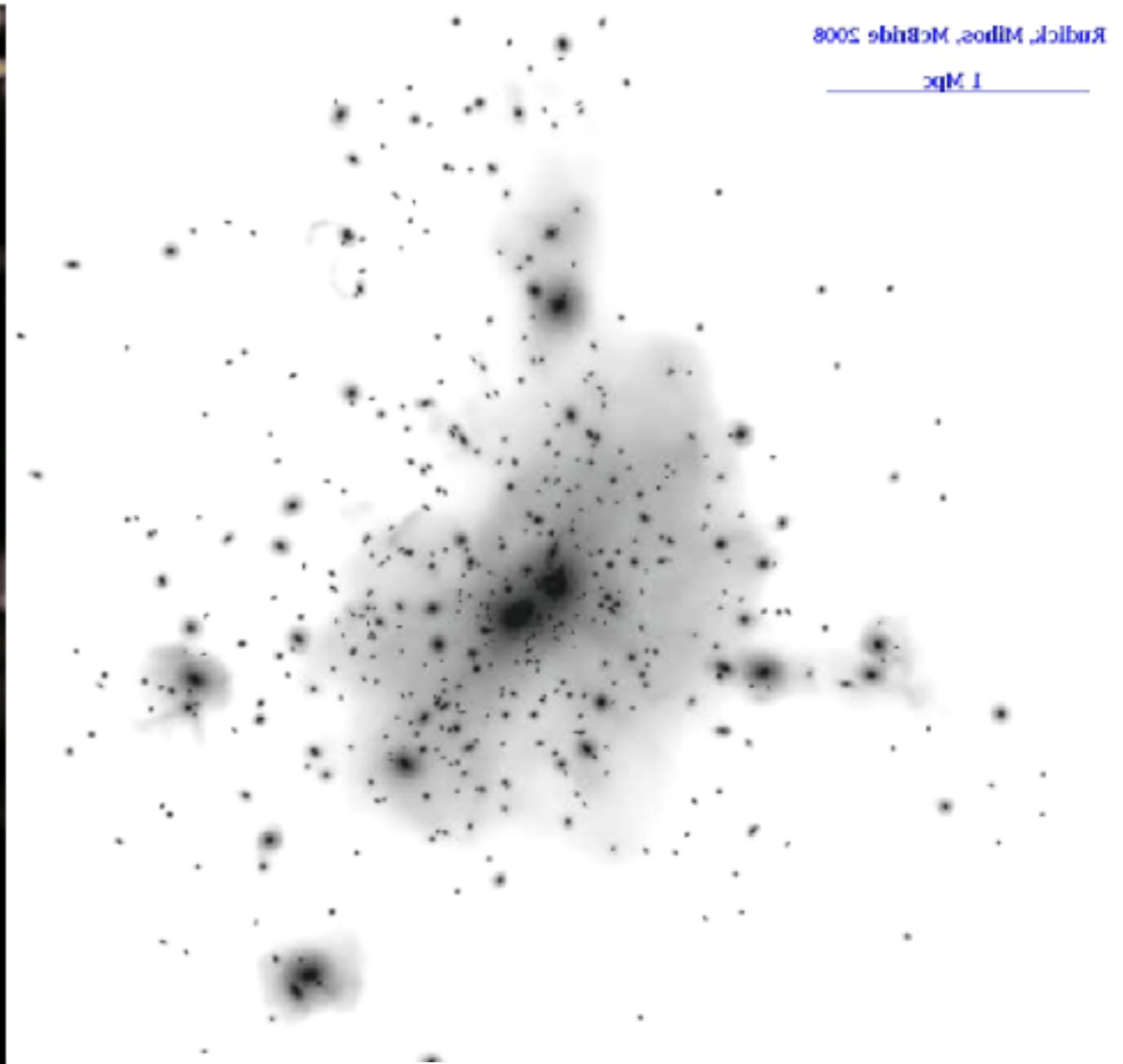
Pillepich+2014, 2018



Pillepich+2014

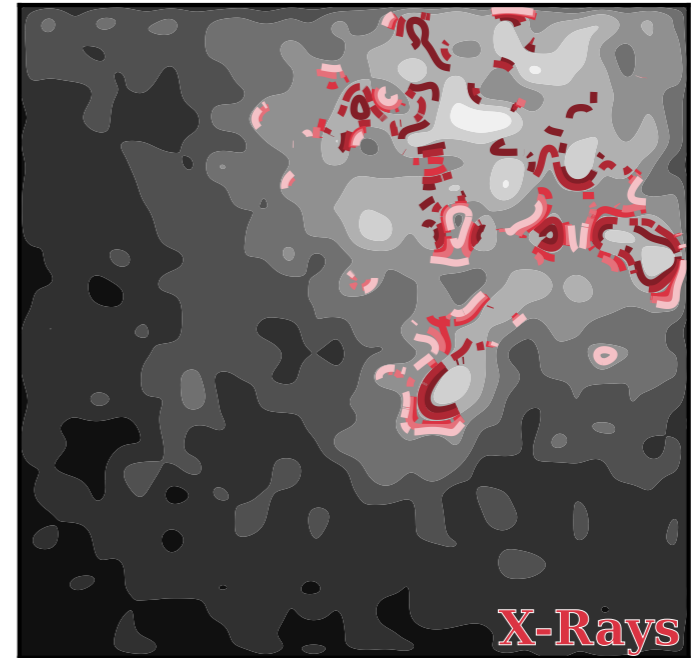
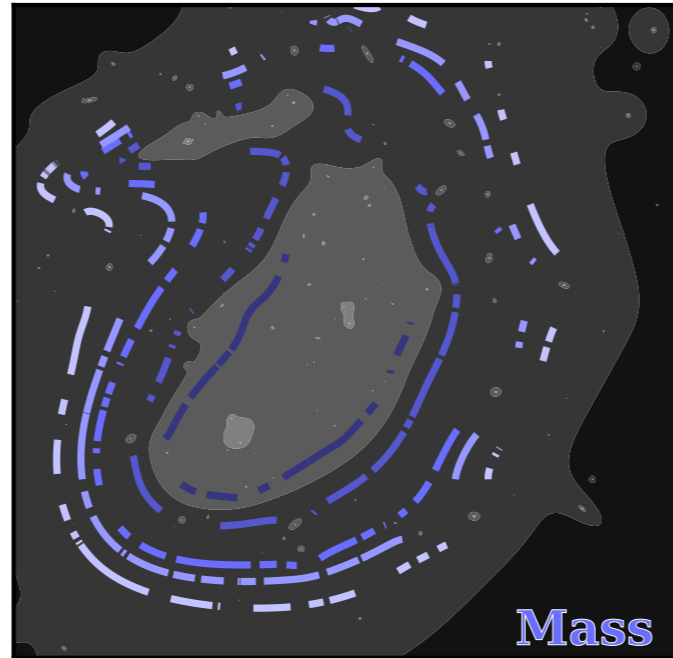
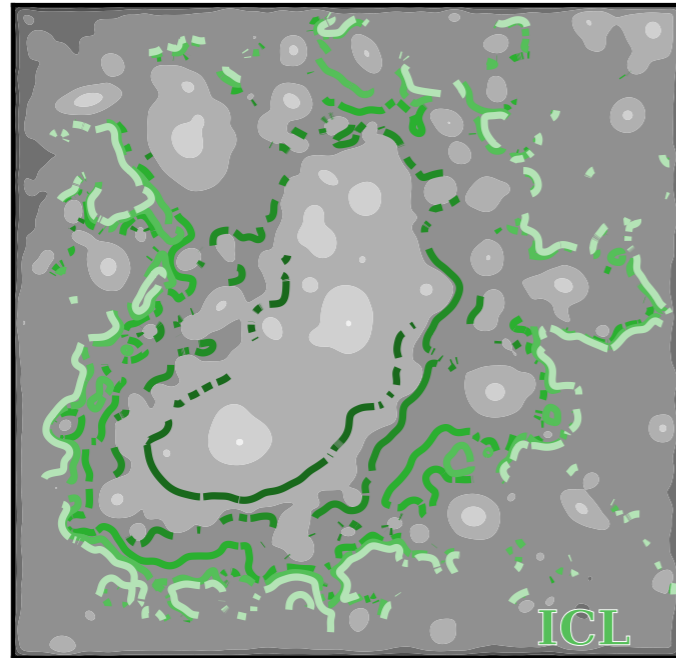


DM only



Stars

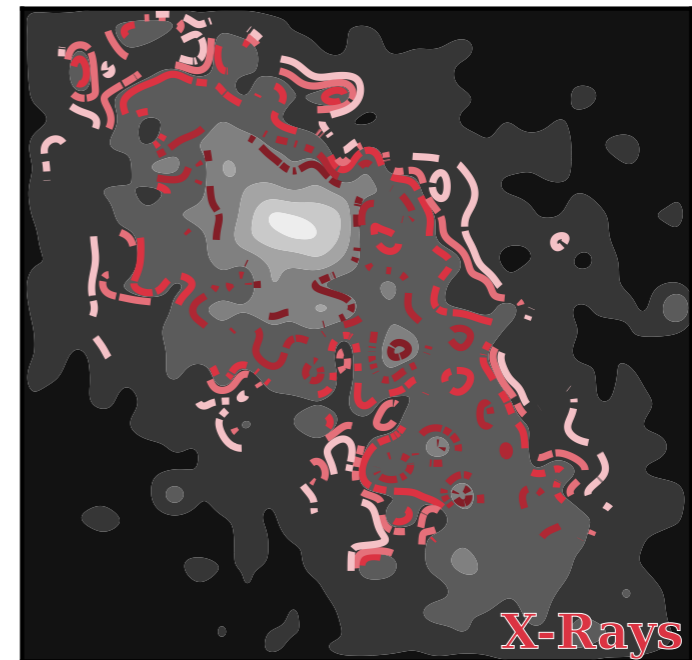
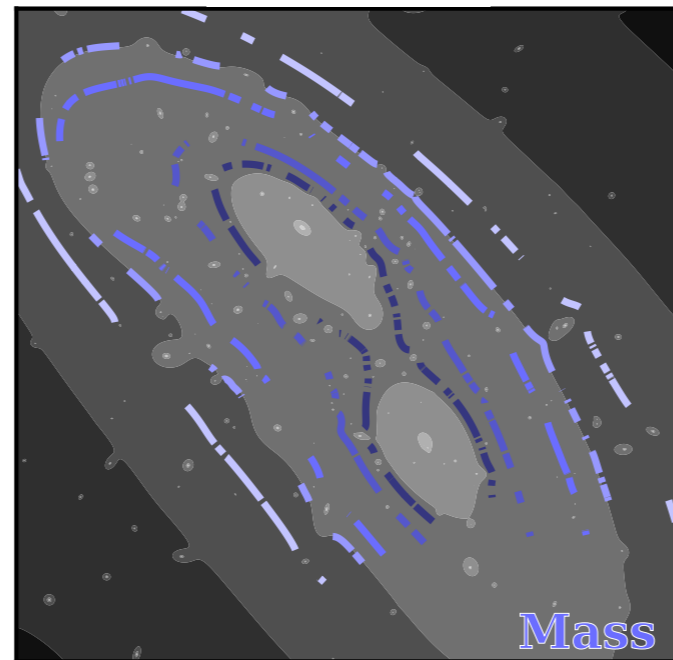
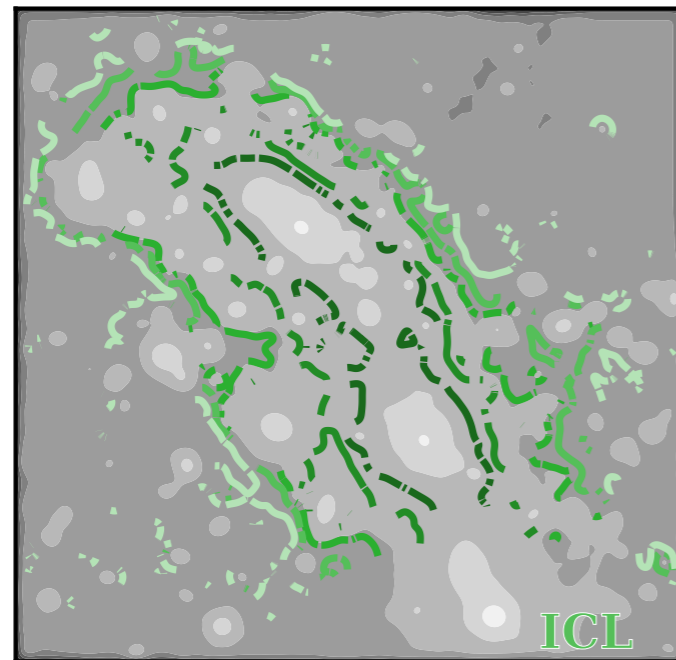
A2744



ICL

MASS

X-rays



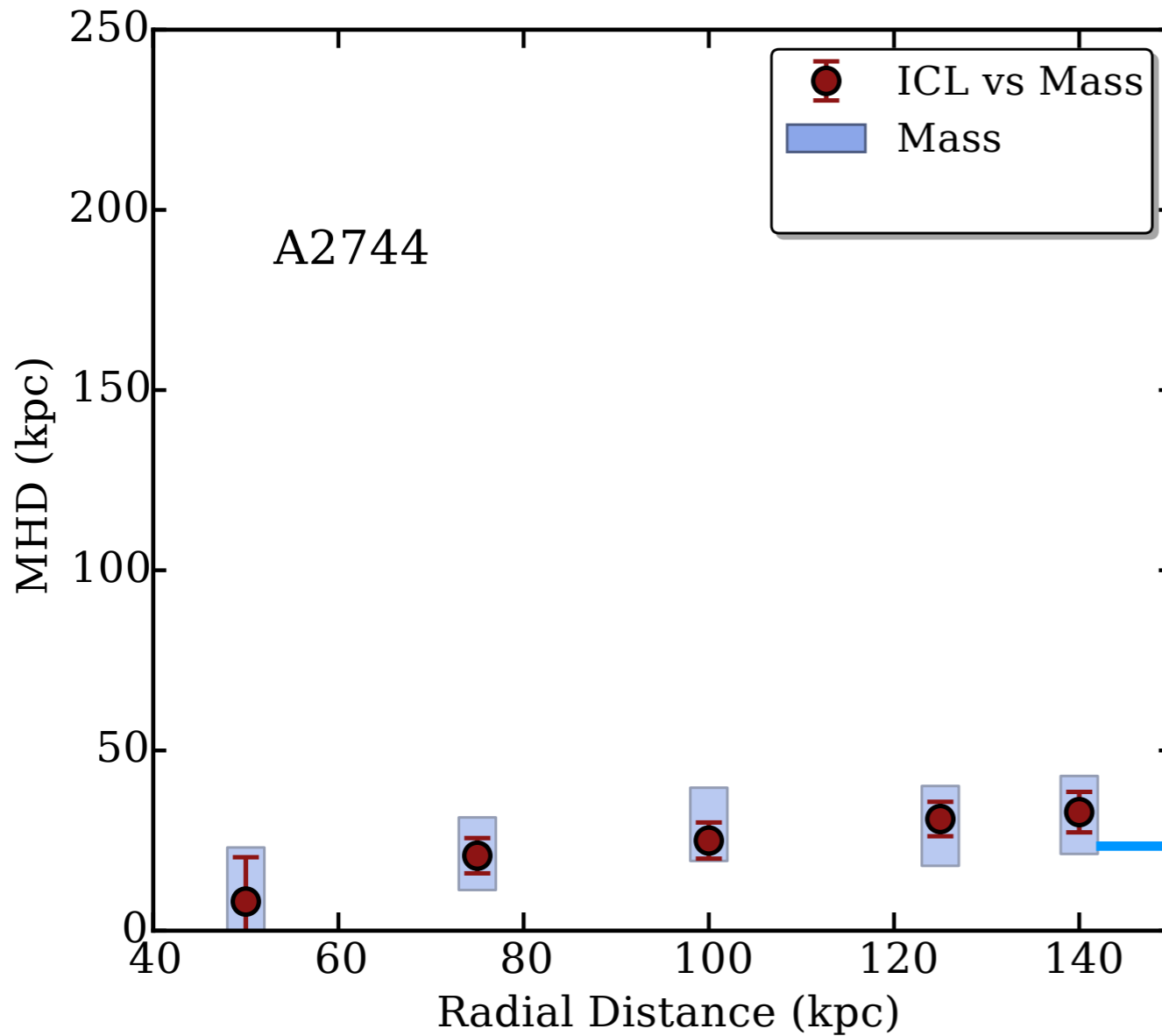
F160W

M0416

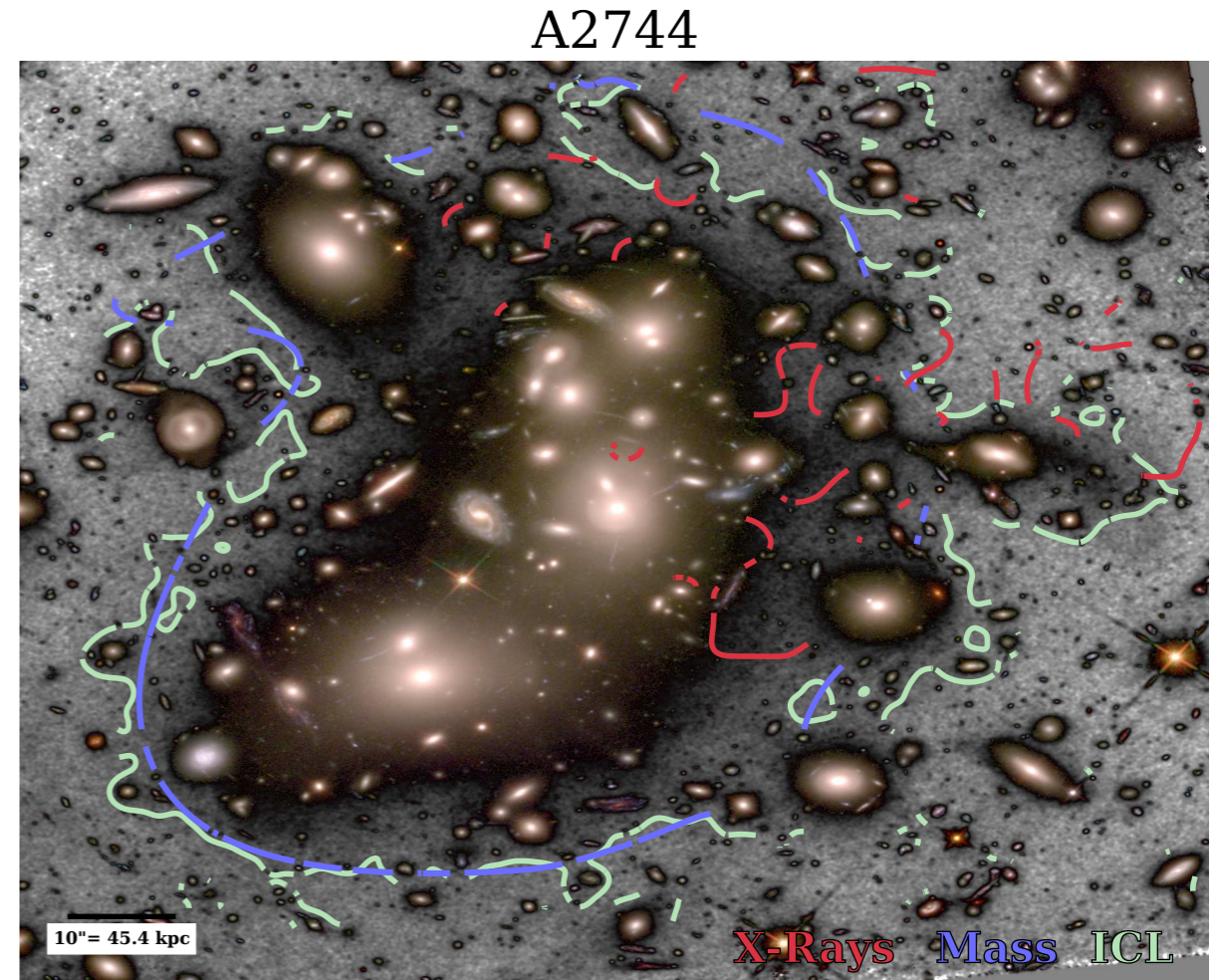
50 75 100 125 140 kpc

Modified Hausdorff Distance

mean difference in distance between tracer and model, in kpc

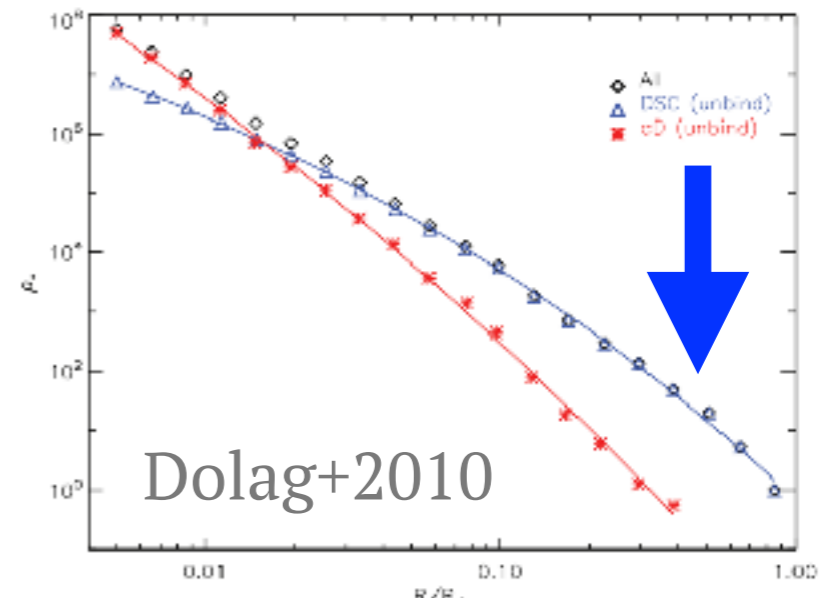


~10 mass models/cluster

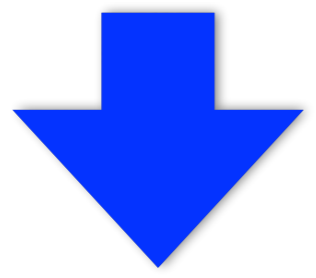


Different models => uncertainties in the mass maps

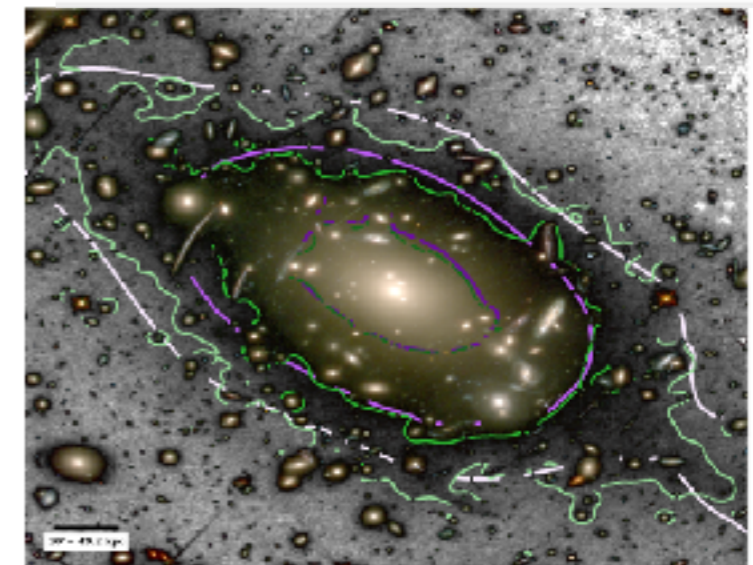
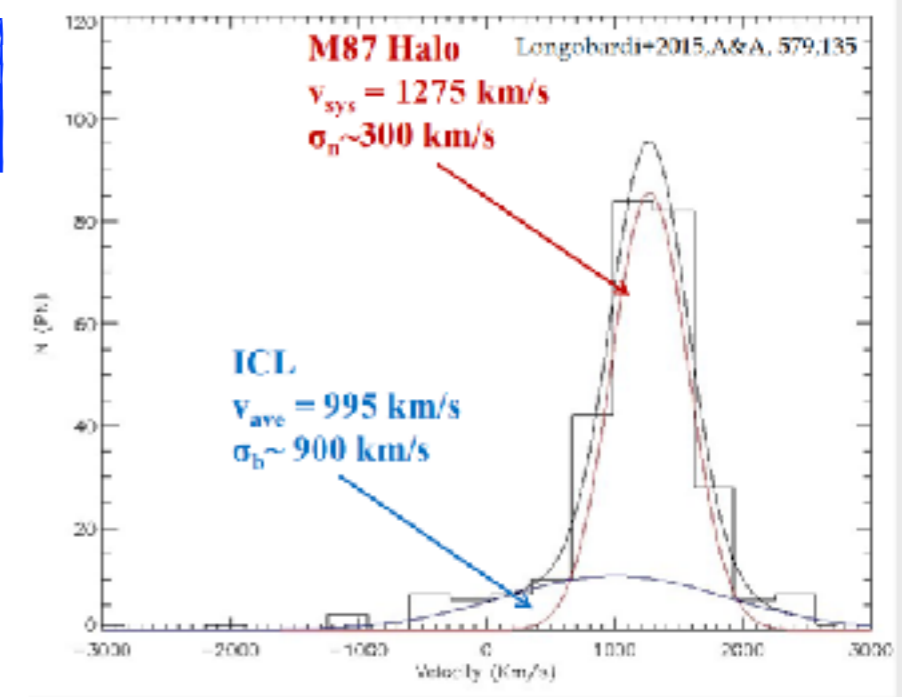
Satellites in massive halos tend to deposit their stars at large radii (Cooper+2015)



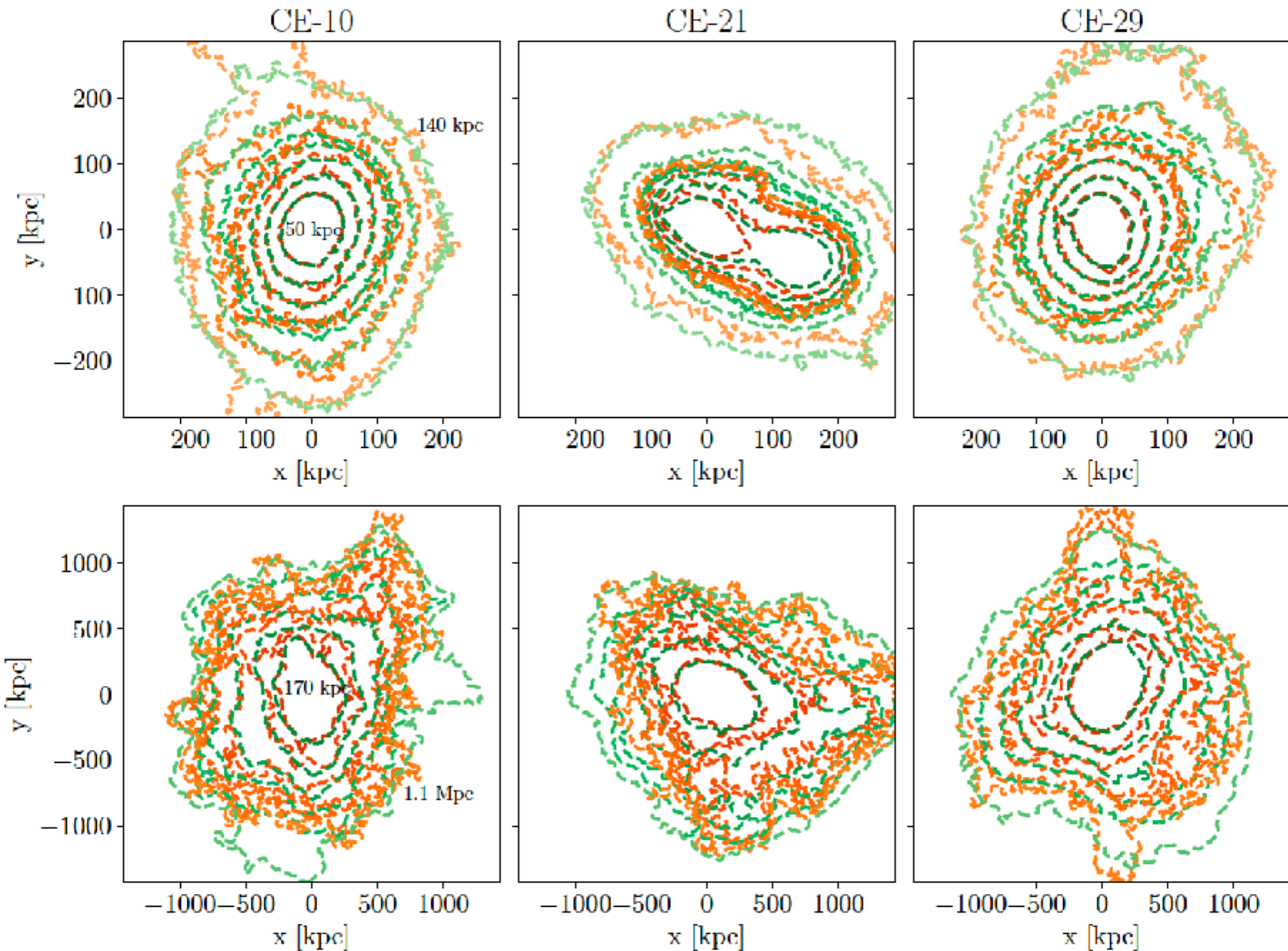
Those stars follow the potential of the cluster...



ICL tracer of DM!



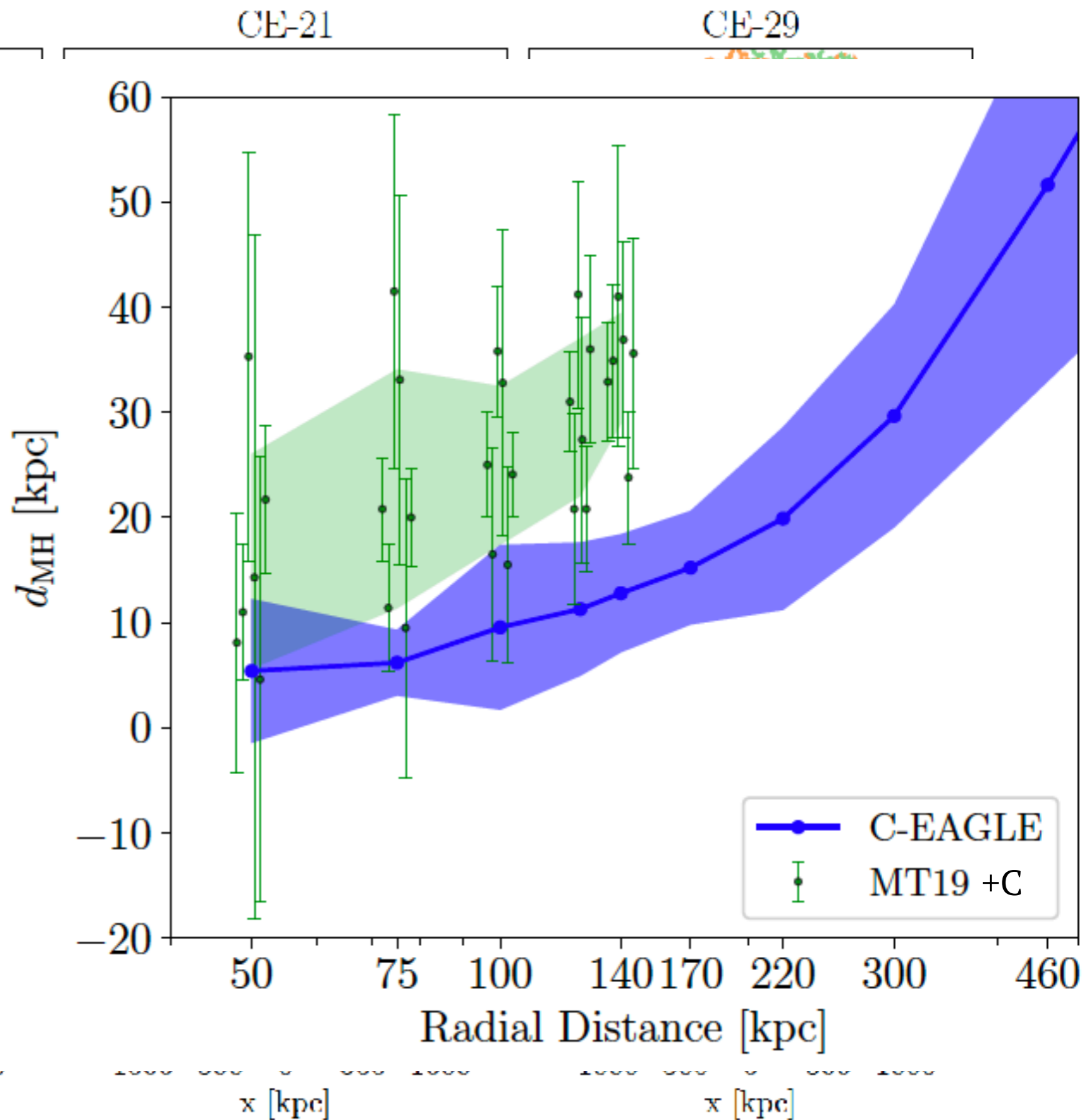
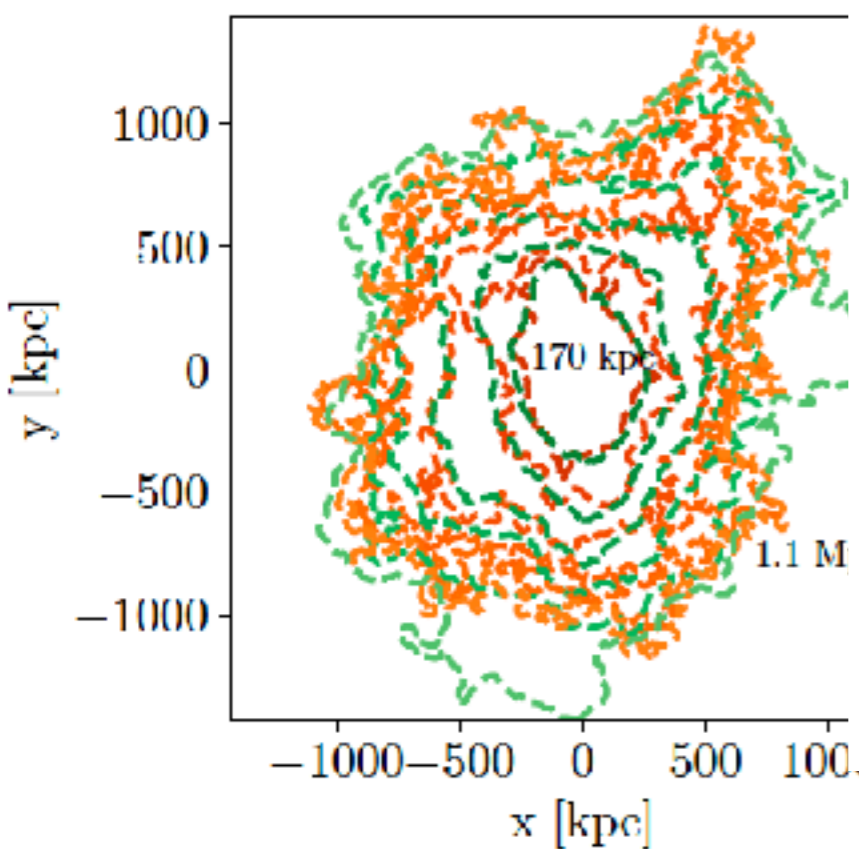
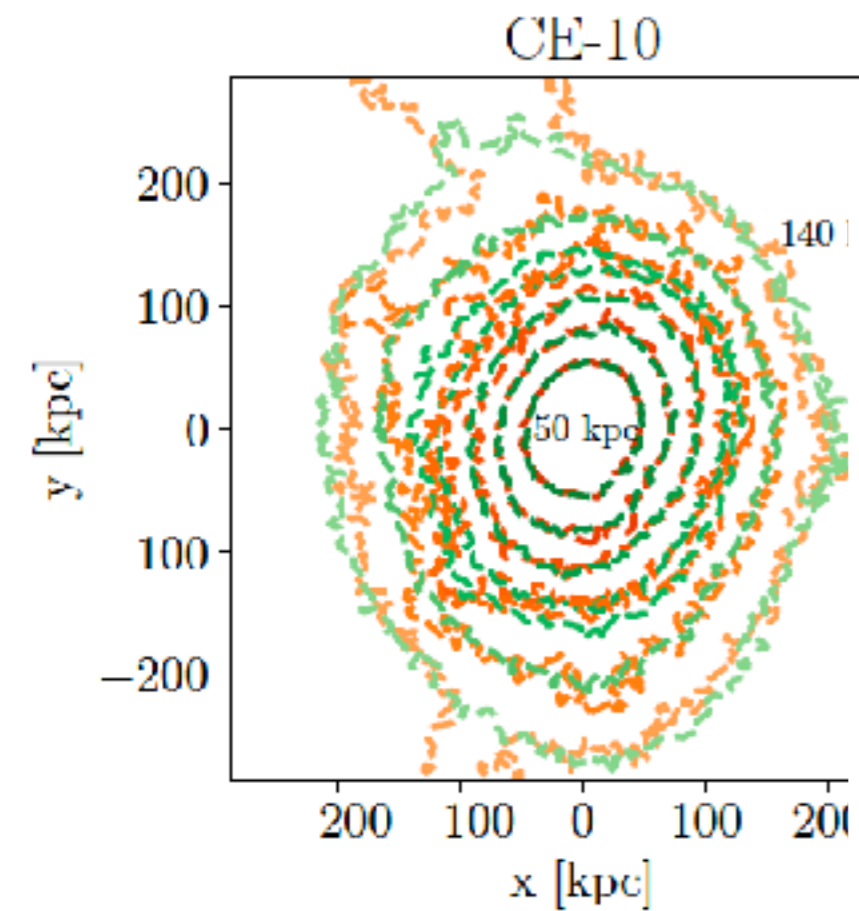
see also Jee 2007b



Alonso-Asensio et al. 2020

STARS

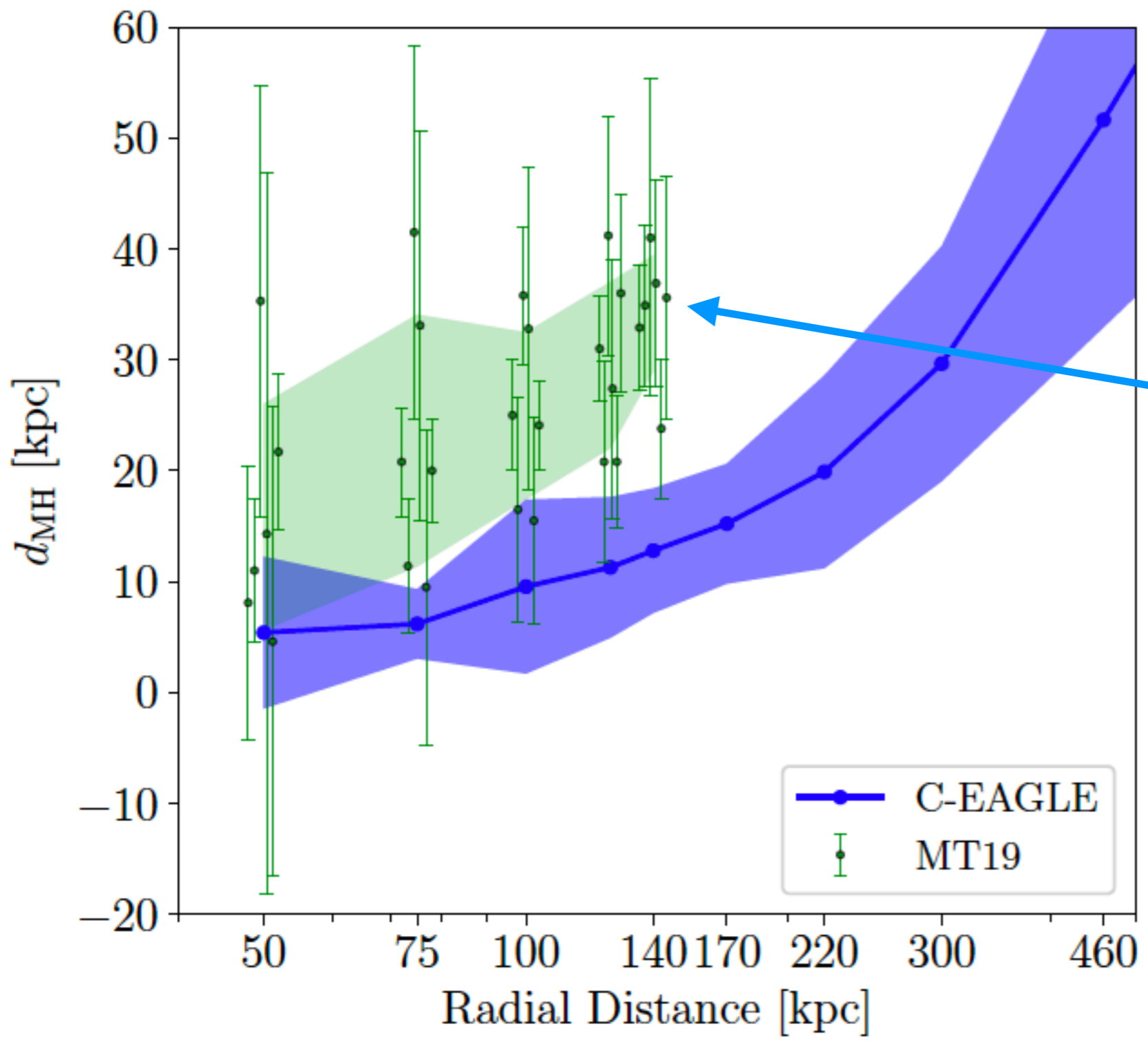
DM



Alonso-Asensio et al. 2020

STARS

DM



Beyond 140 kpc??



BUFFALO

OUR LITTLE BUFFALO



IS GROWING UP SOO FAST

memegenerator.net

Thanks!