RAMSES projects at Yonsei 2016

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RAMSES projects at Yonsei

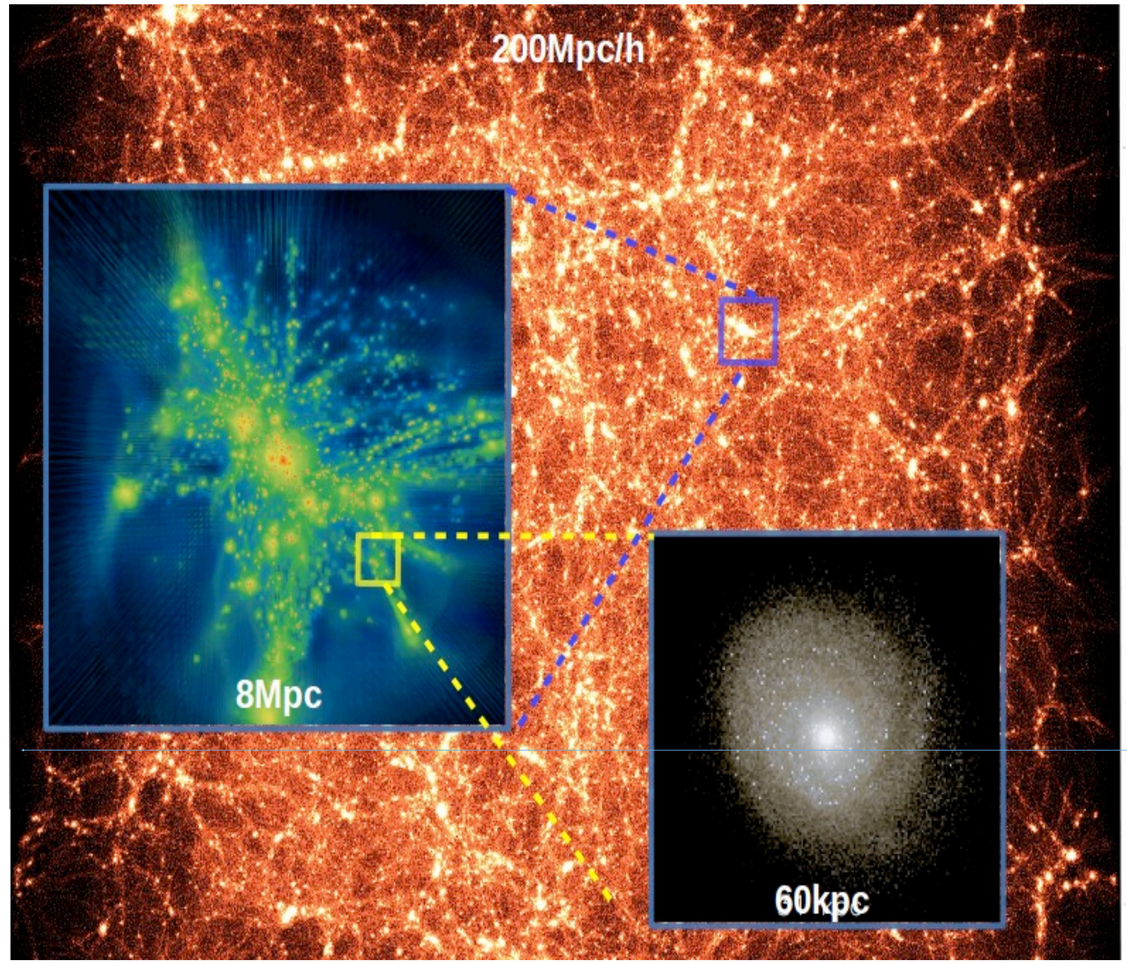
Present
- galaxy spin evolution (Hoseung Choi)
- disc galaxy merger (Jongwon Park)

Absent
- star formation quenching (Seoyoung Jung)
- cosmic evolution of dark halo concentration (Jinwoo Park)

My talk
- stripping in/outside clusters (Rory Smith)
- pure discs (Minjung Park)
- dark subhalo mass evolution: phase space analysis (Jinsu Rhee)
- New Horizon

Cosmological Hydrodynamic Zoom-in Simulation

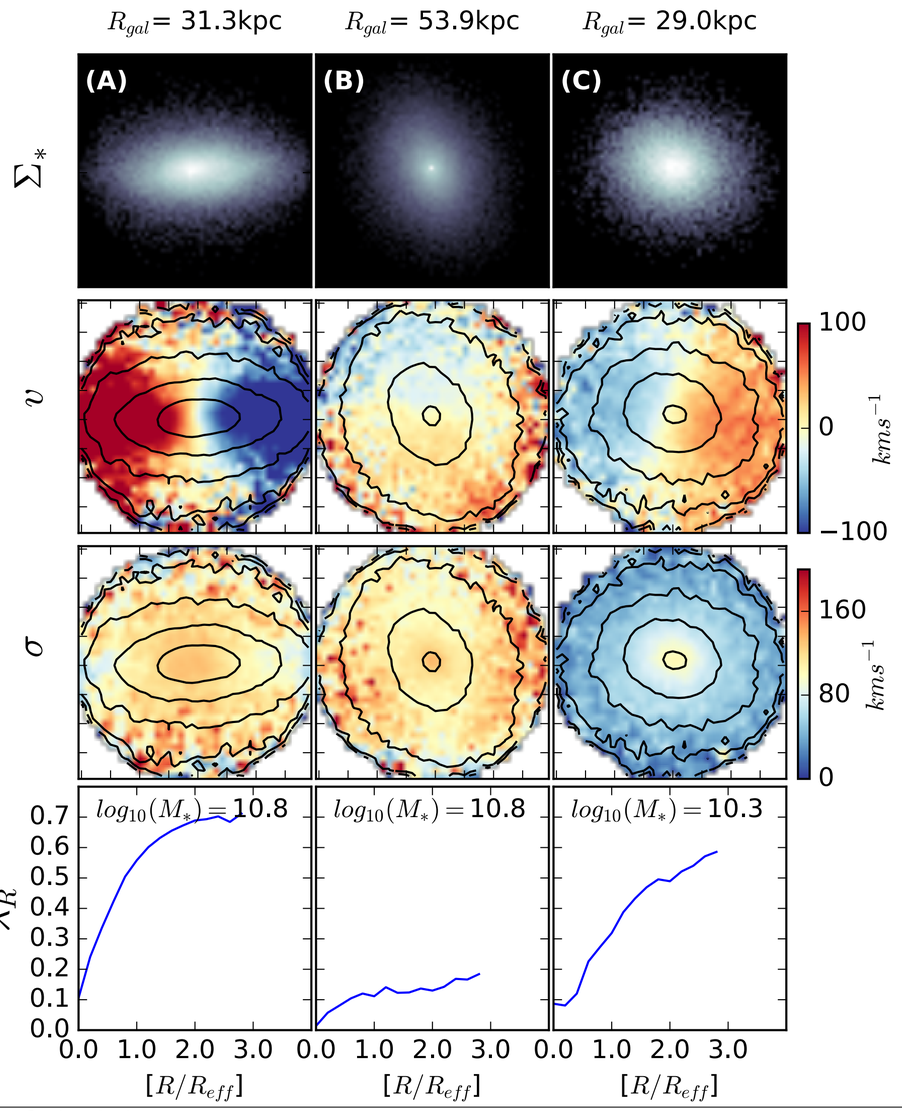
- RAMSES (AMR, Teyssier 2002)
- Baryon recipe: SF, SN, AGN FB (Dubois et al. 2012)
- **16 clusters** in 200Mpc/h of $13.5 < \log M/M_{\odot} < 15.0$
- dx = 0.76kpc/h
- 10M core hr

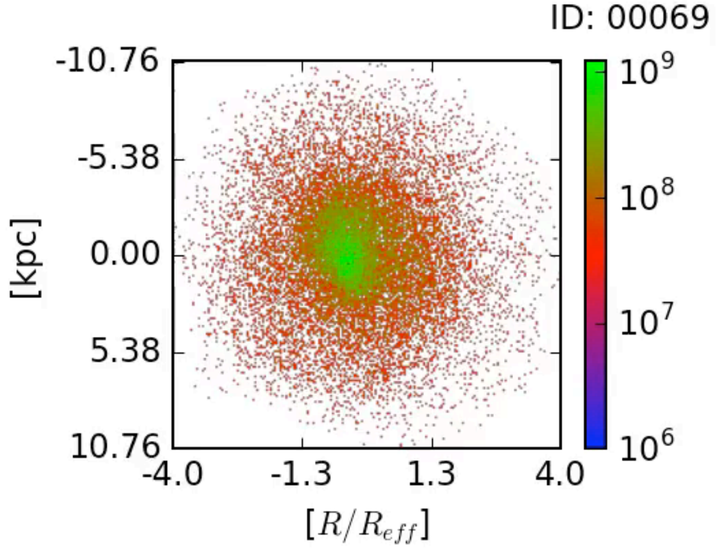


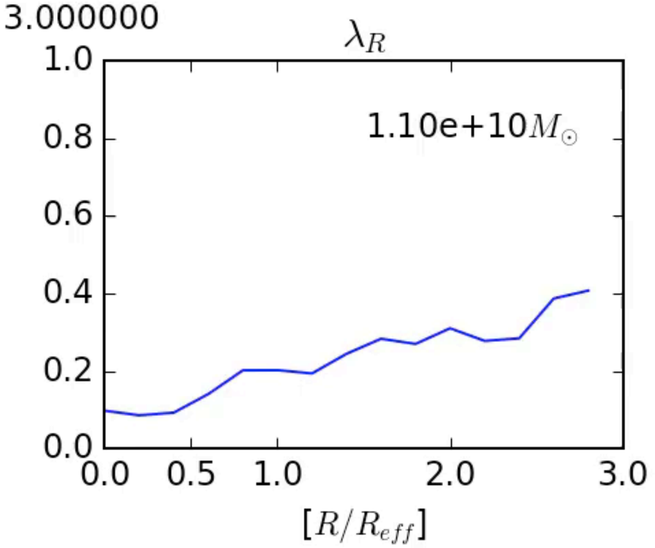
Hoseung Choi

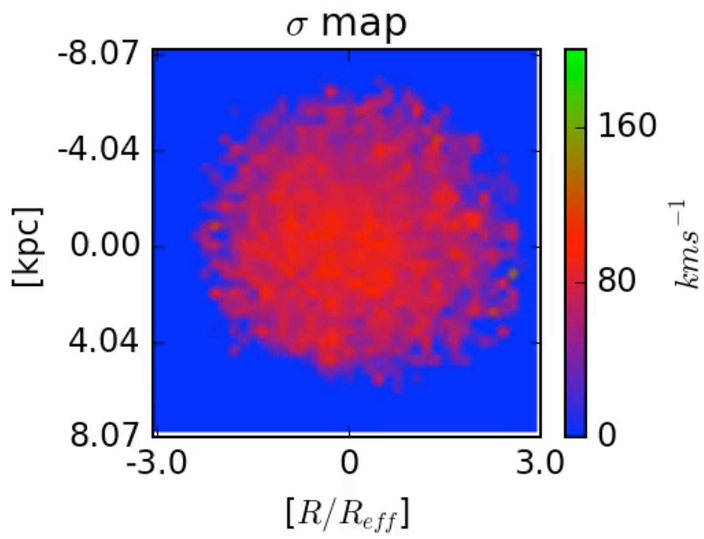
Choi & Yi 2016, submitted

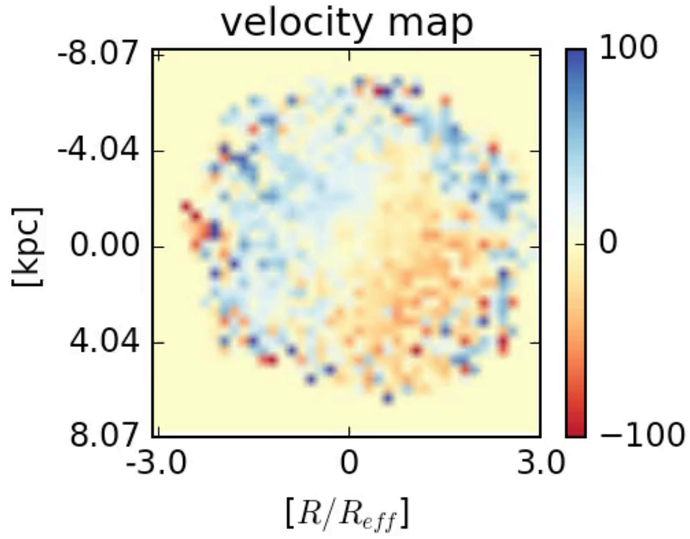
Galaxy spin evolution







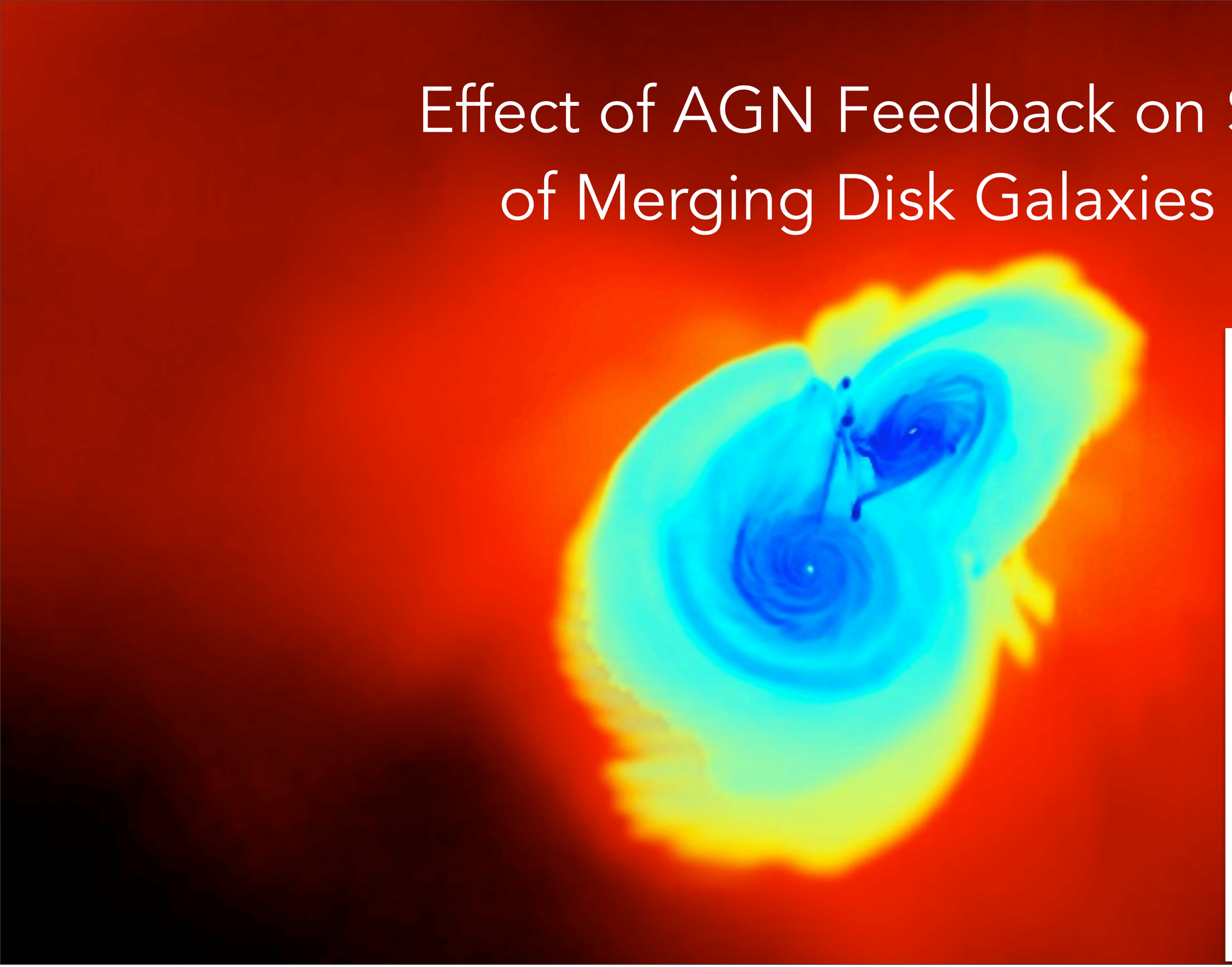


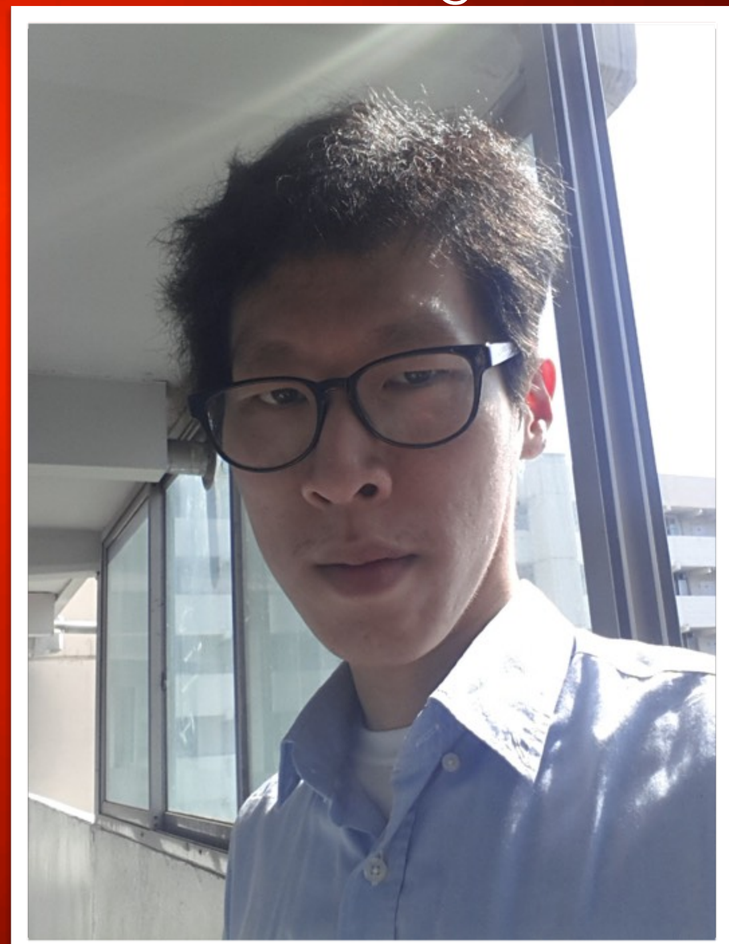


Park & Yi 2016, in prep

Effect of AGN Feedback on SF of Merging Disk Galaxies

Jongwon Park



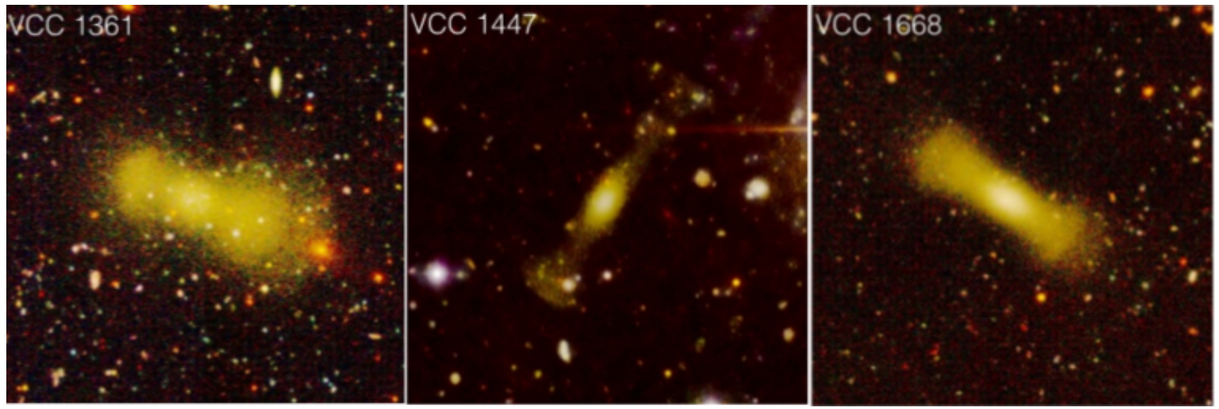


Rory Smith

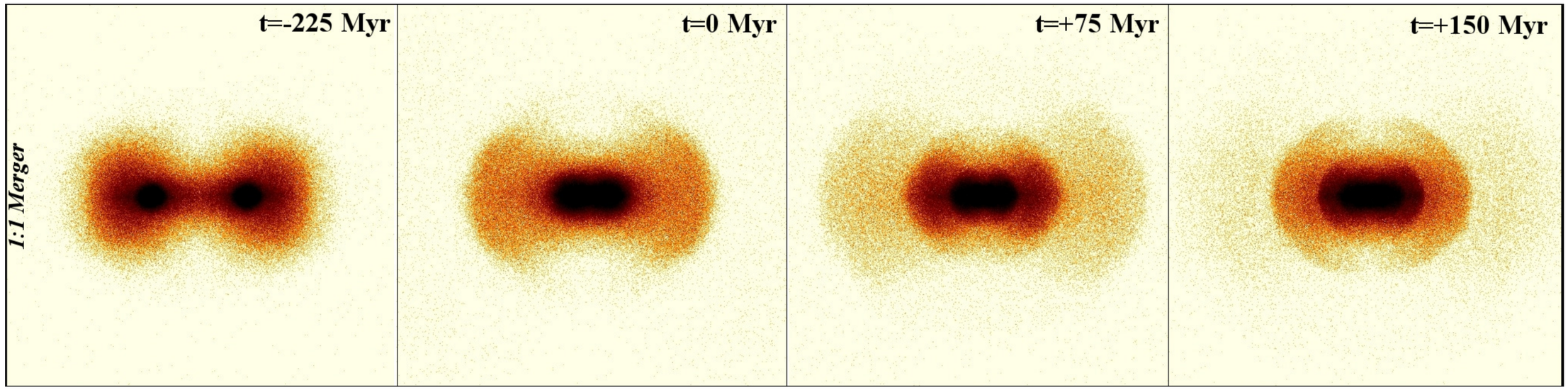
axy mergers and shell formation

th, with Sanjaya Paudel & Pierre-Alan Duc

observed dwarfs

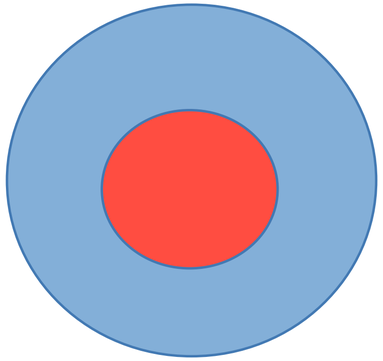


ter Survey
al. 2016)



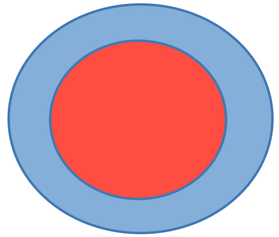
2.Tidal mass loss in groups and clusters: DM vs stars

A) Before mass loss



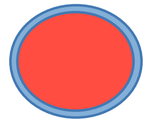
$f_{dm}=1$, $f_{str}=1$

B) Dark matter stripped
Stars not affected

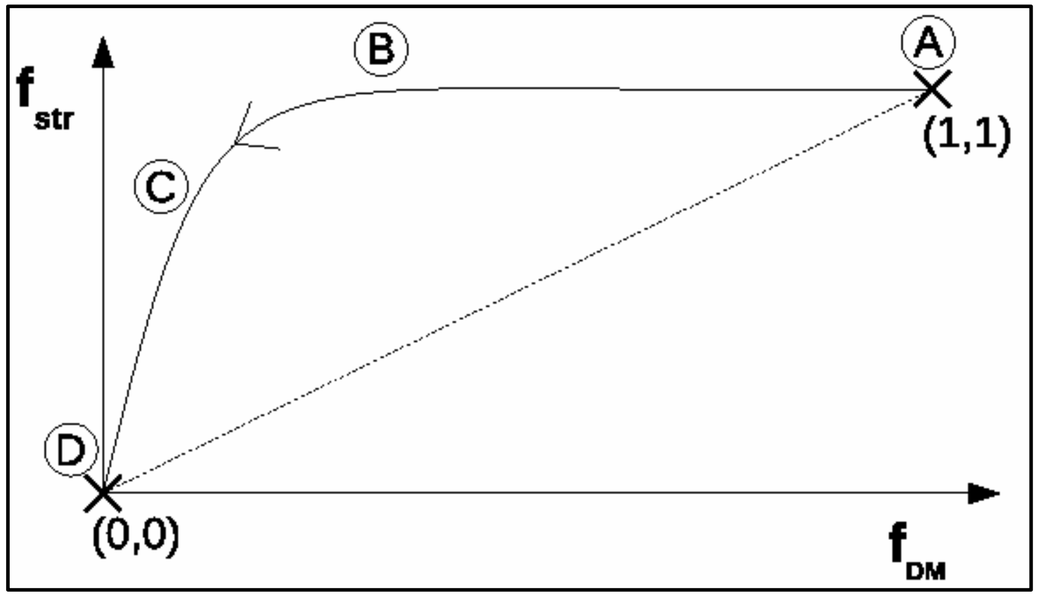


$f_{str}=0.3$, $f_{str}=1$

C) Dark matter heavily stripped
Stars start to be affected

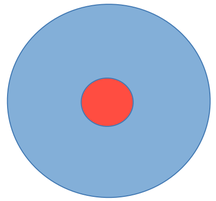


$f_{dm}=0.1$, $f_{str}=0.7$

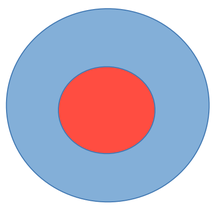


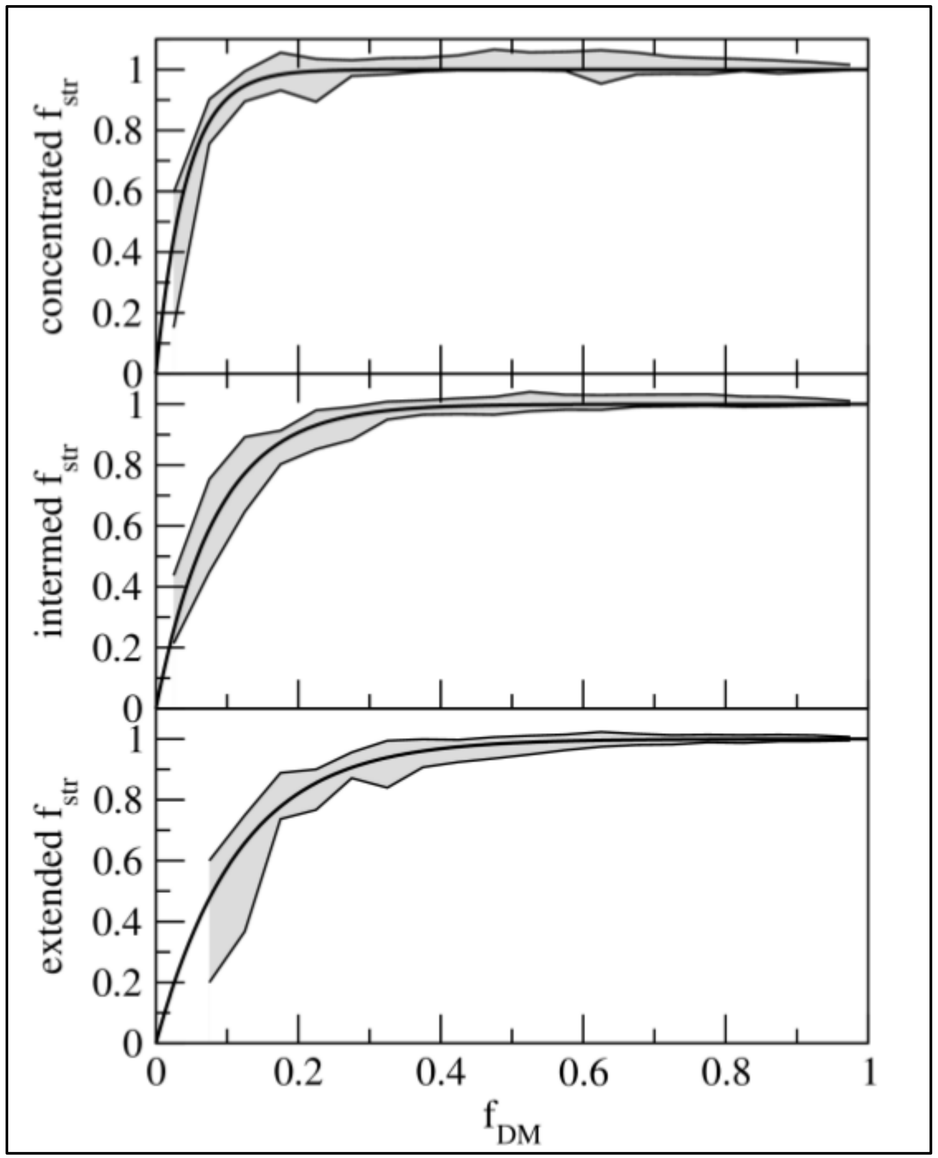
Smith et al. 2016, ApJ, in press

2.Tidal mass loss in groups and clusters: DM vs stars



- Useful recipe for improving modelling of stellar stripping in SAMs





concentrated

$r_e/r_{vir} < 0.025$

$0.025 < r_e/r_{vir} < 0.04$

extended

$r_e/r_{vir} > 0.04$

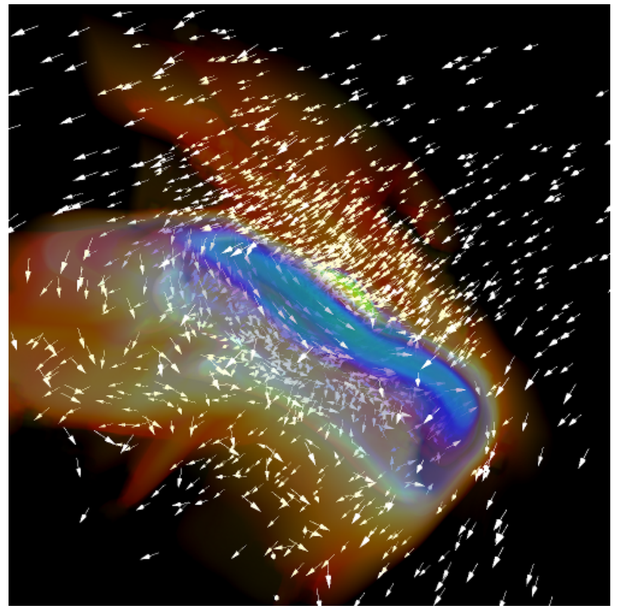
Smith et al. 2016, ApJ, in press

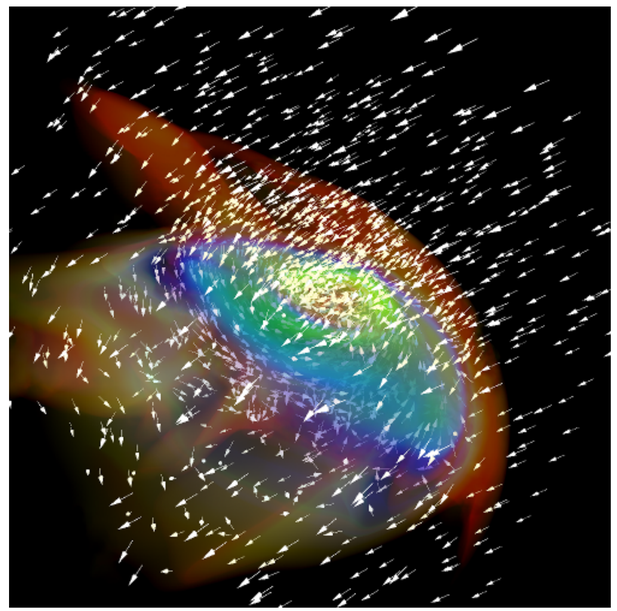
3.Ram pressure stripping zoom in simulation

- initially from 200Mpc
- large scale dx=5kpc to capture gravitational encounters with cluster potential
- zoom in scale dx=50pc to capture internal dynamics, interaction with environment, etc

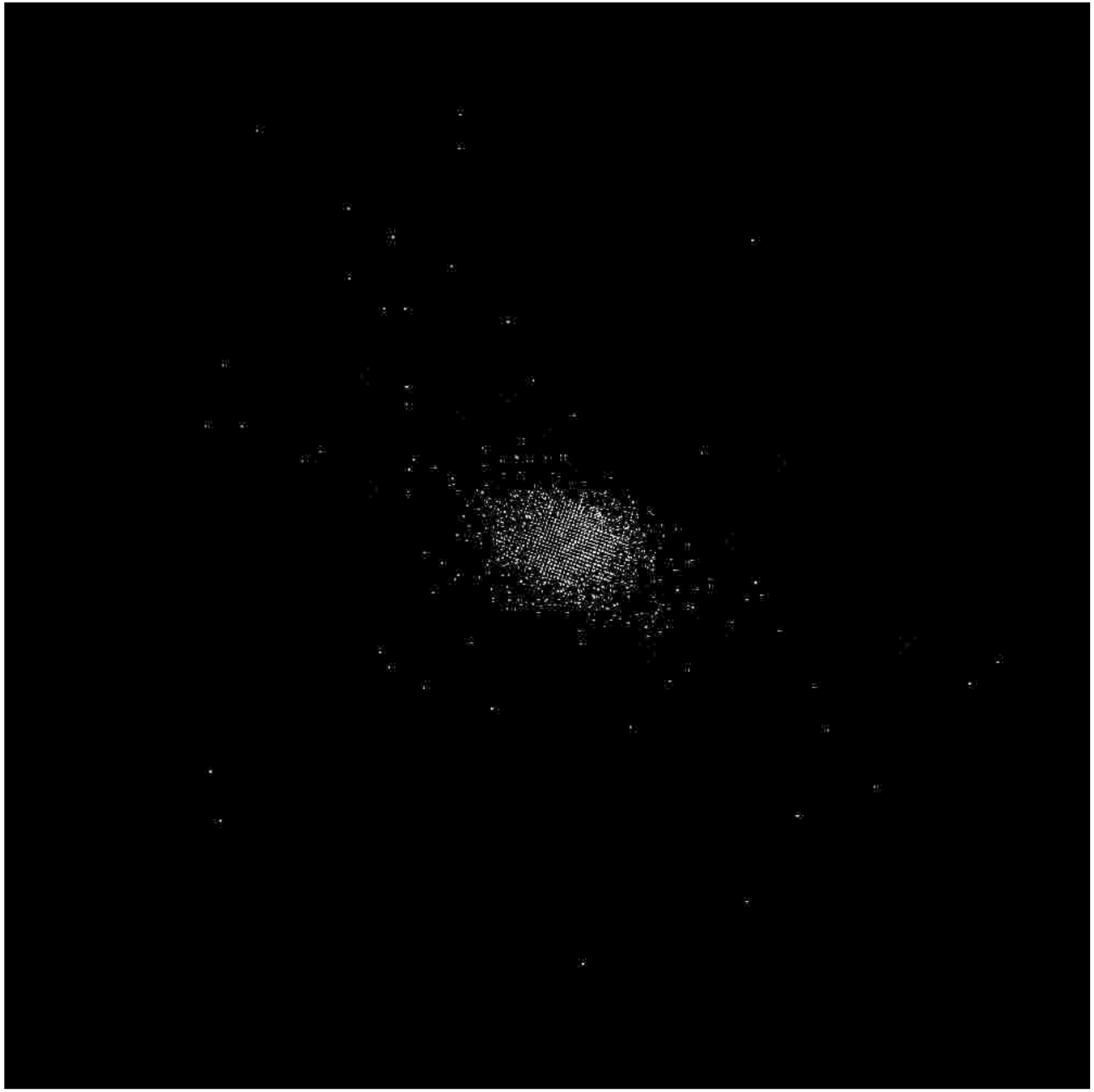
Vector: ICM flow
Rainbow: cold gas

Top: edge-on view of cold gas disc





Bottom: inclined view of cold gas disc



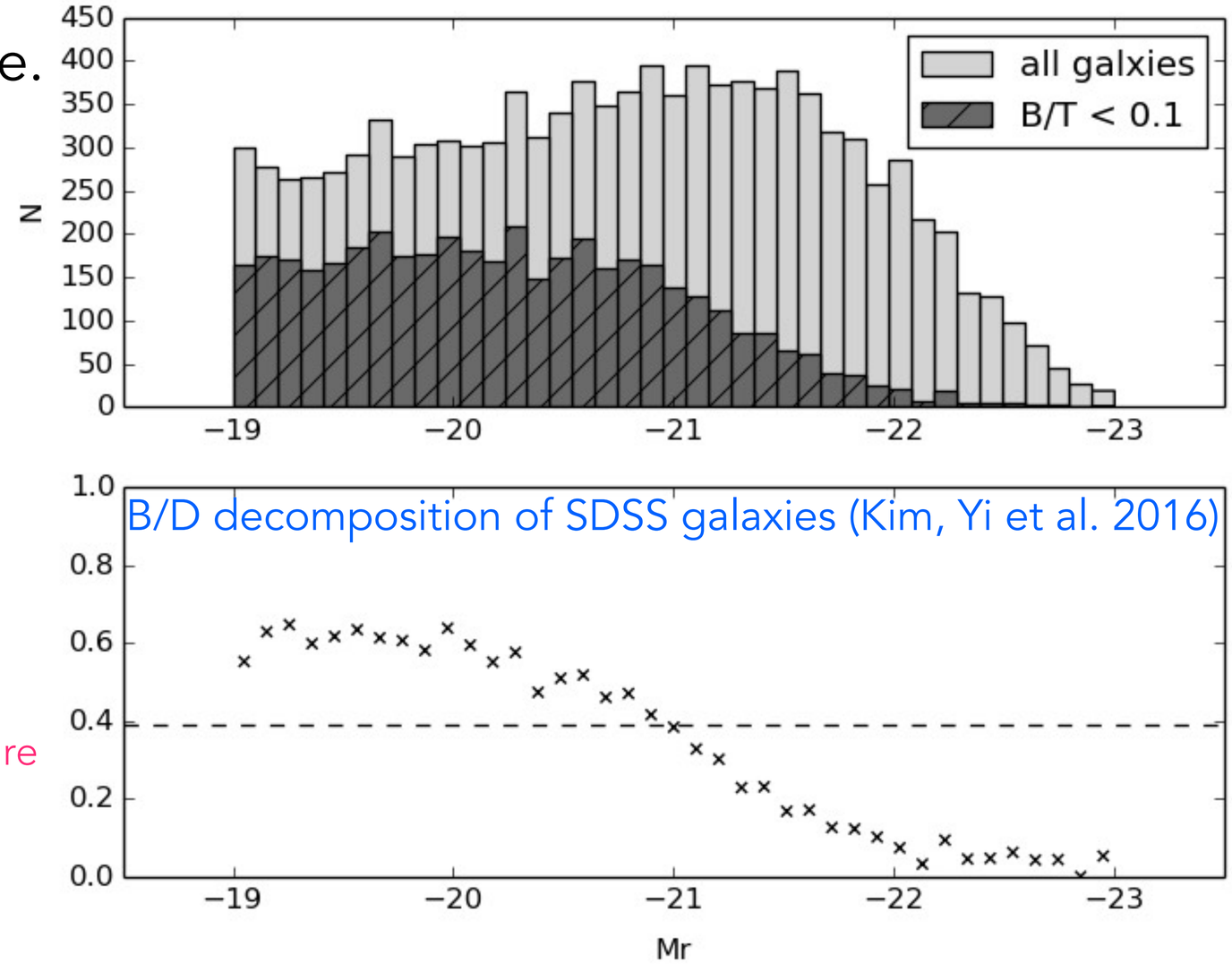
Vector: ICM flow
Rainbow: cold gas

stars: white
dense gas: rainbow
low density gas: orange

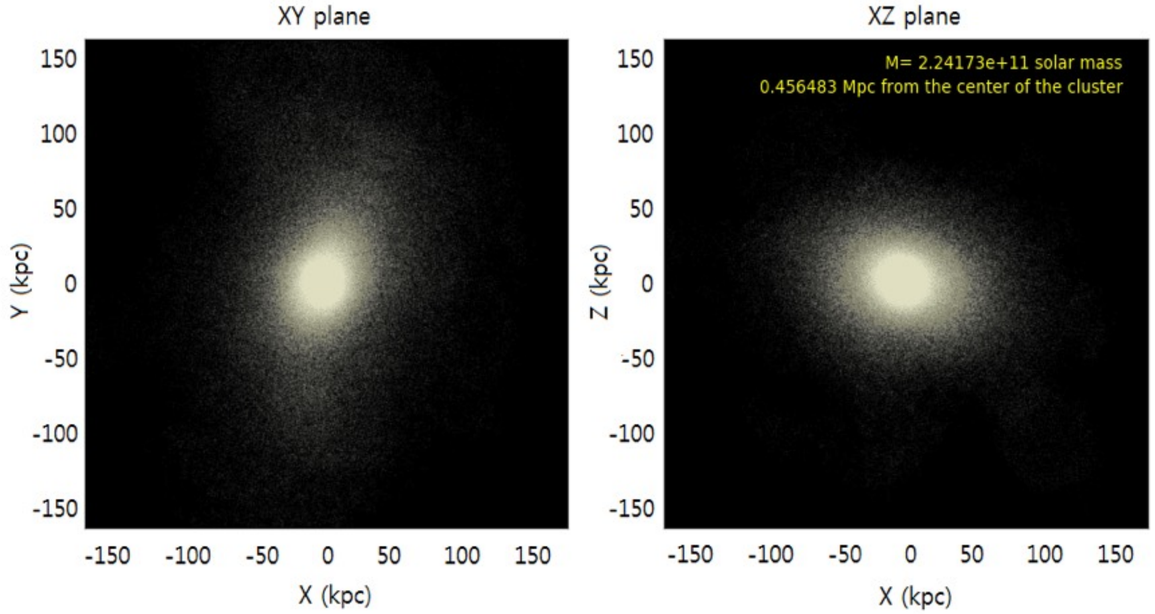
Pure disc fraction

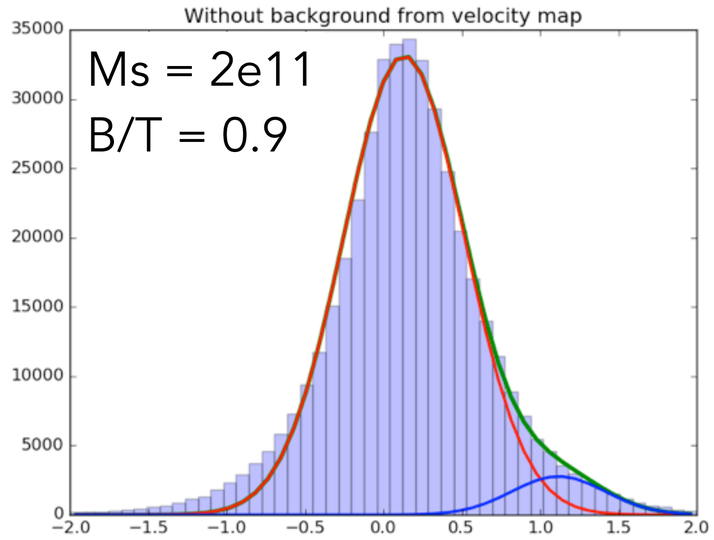
important prediction of LCDM universe.

Minjung Park



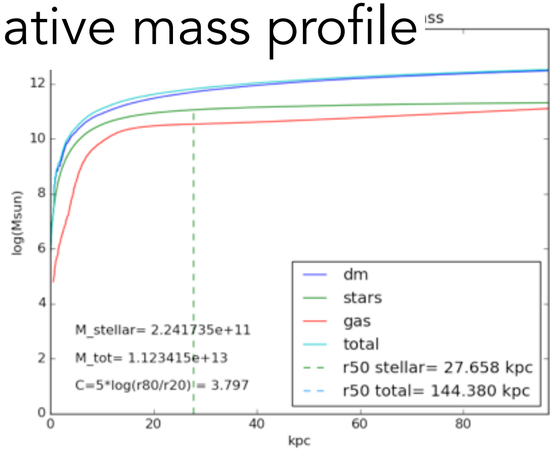
Pure discs: kinematic decoupling



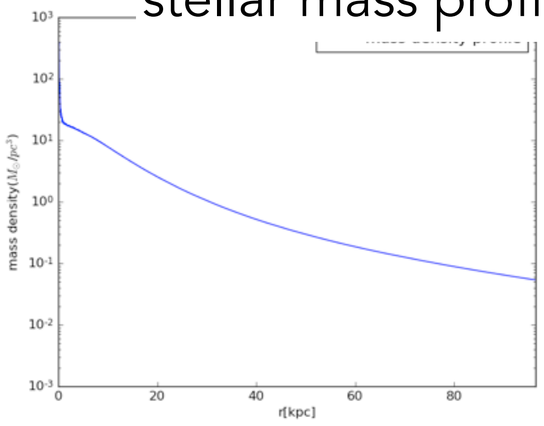


$\varepsilon \equiv j_z / j_{cir}$

cumulative mass profile



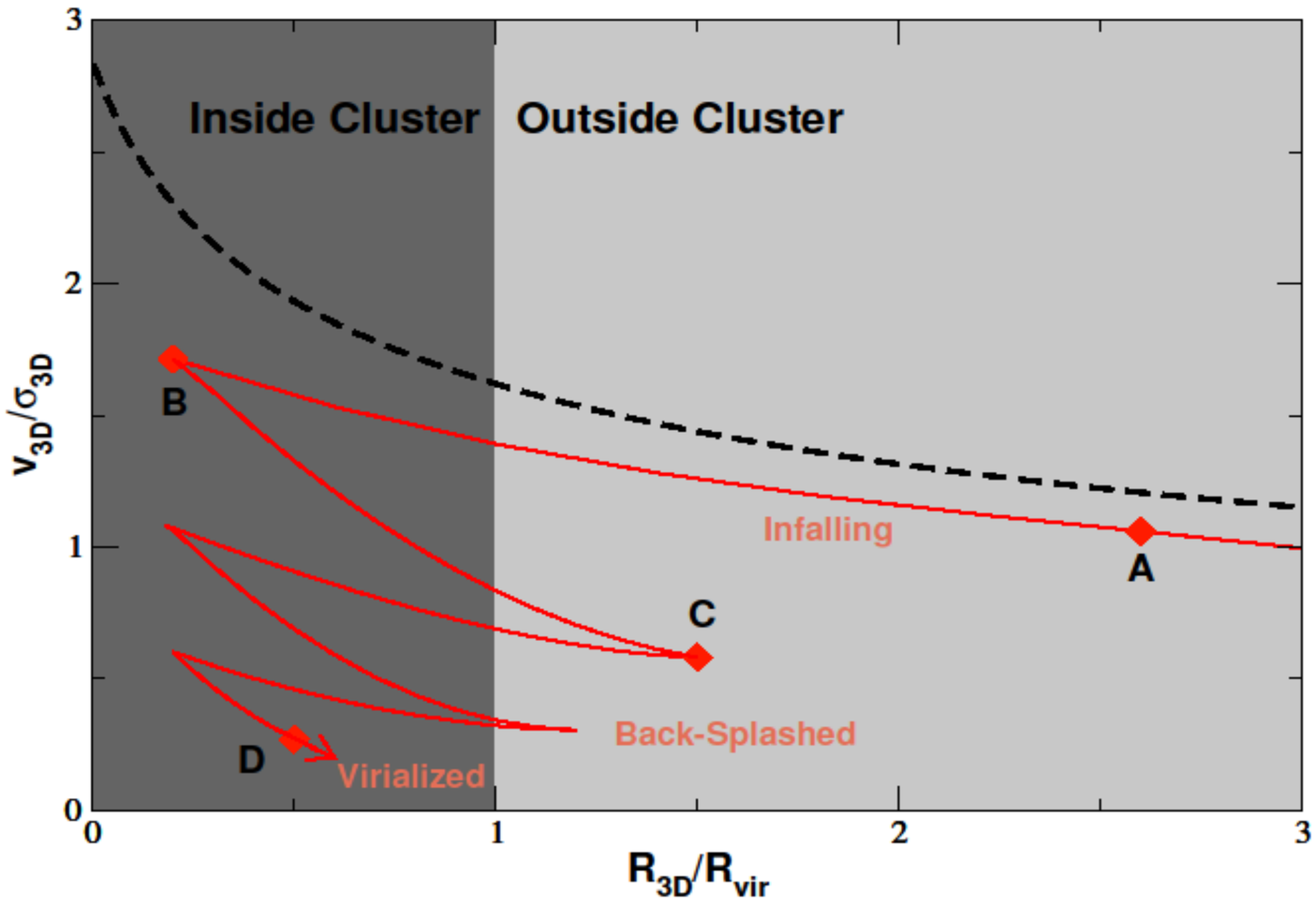
stellar mass profile



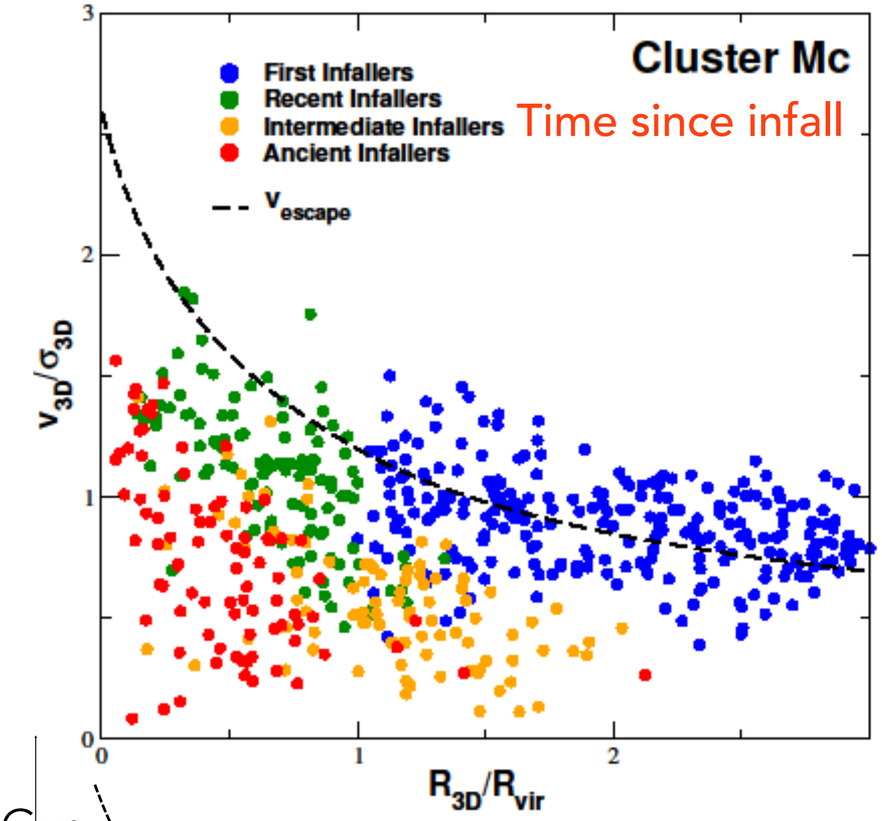
- Hoseung's clusters
- other large-volume simulations
- resolution issues

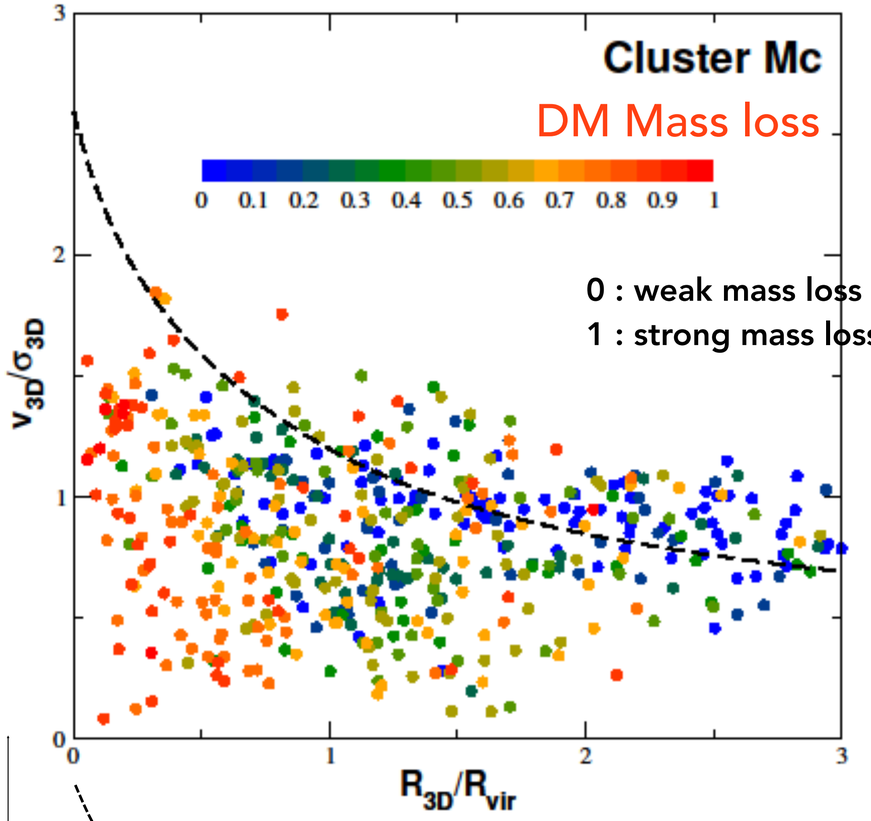
Phase space analysis and the stripping of dark haloes in clusters

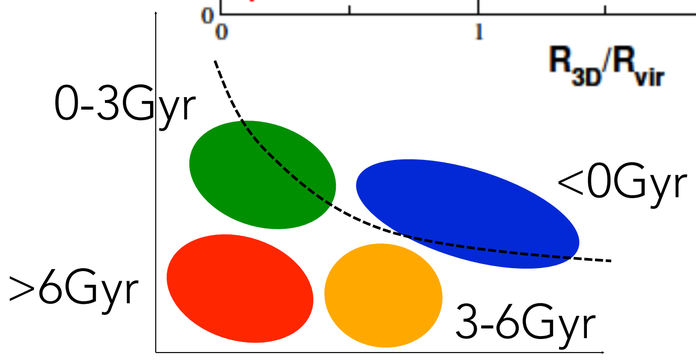
Jinsu Rhee

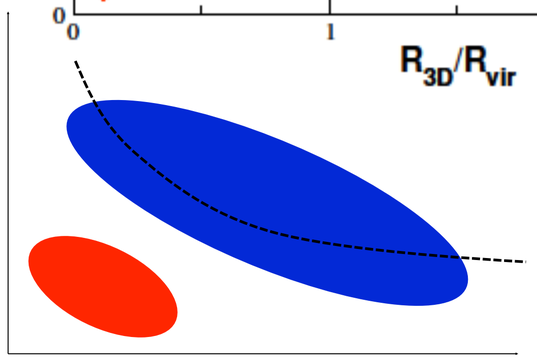


A cluster of M_{vir} = 2.3e14 (3D)



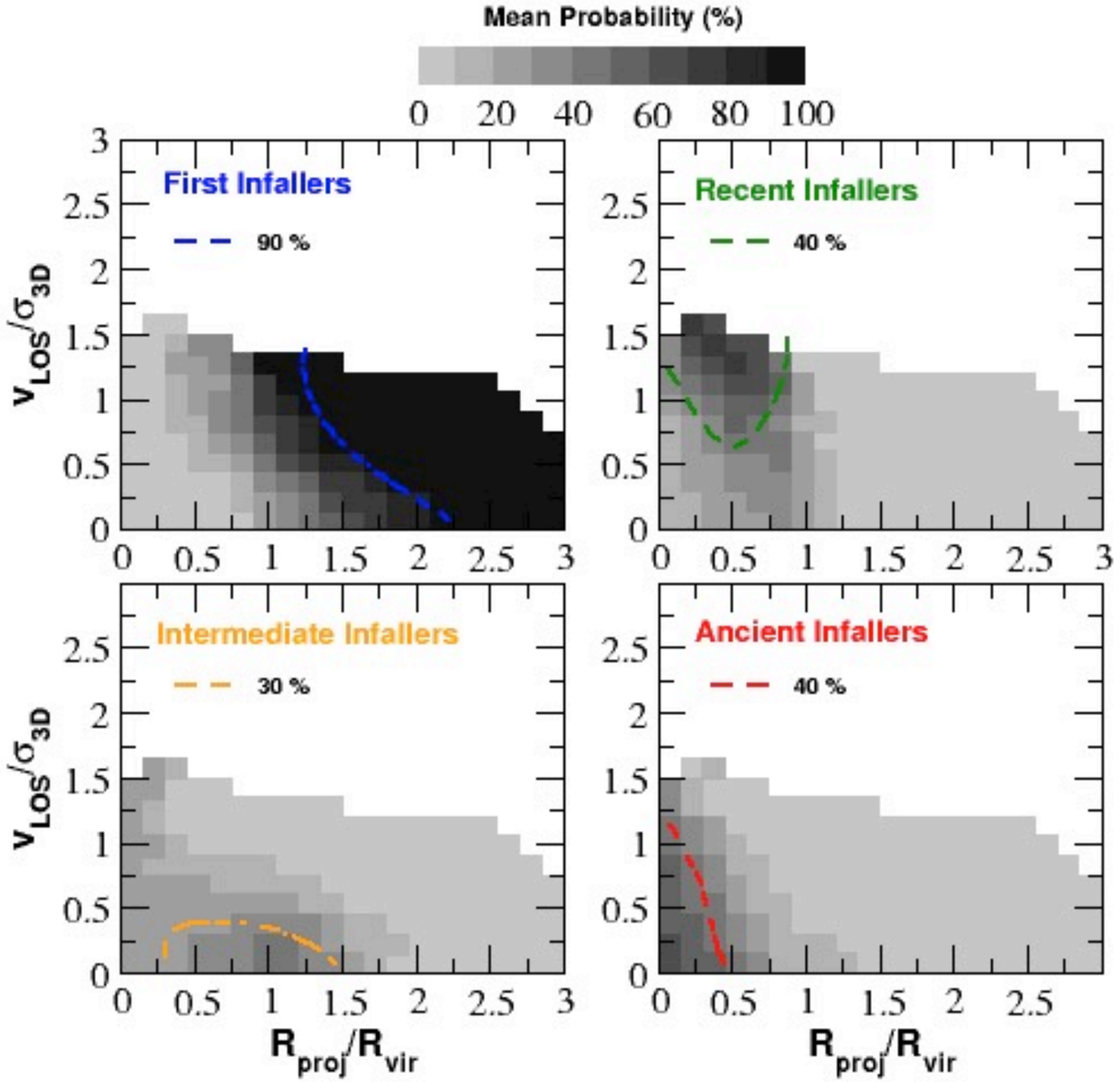






Rhee et al. 2016, in prep

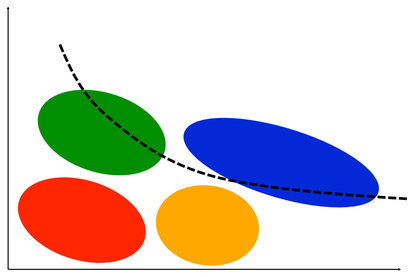
Time since Infall: 16 clusters (projected)



Behaviours still visible after projection!

Colour

the probability that a subhalo is expected to be in that category



Rhee et al. 2016, in prep

Mass loss: 16 clusters (projected)

- Observers can guess how long it has been since the galaxy joined the cluster and how much (DM) mass has been lost since the peak mass time.
- Gas and stellar properties of galaxies will be inspected.

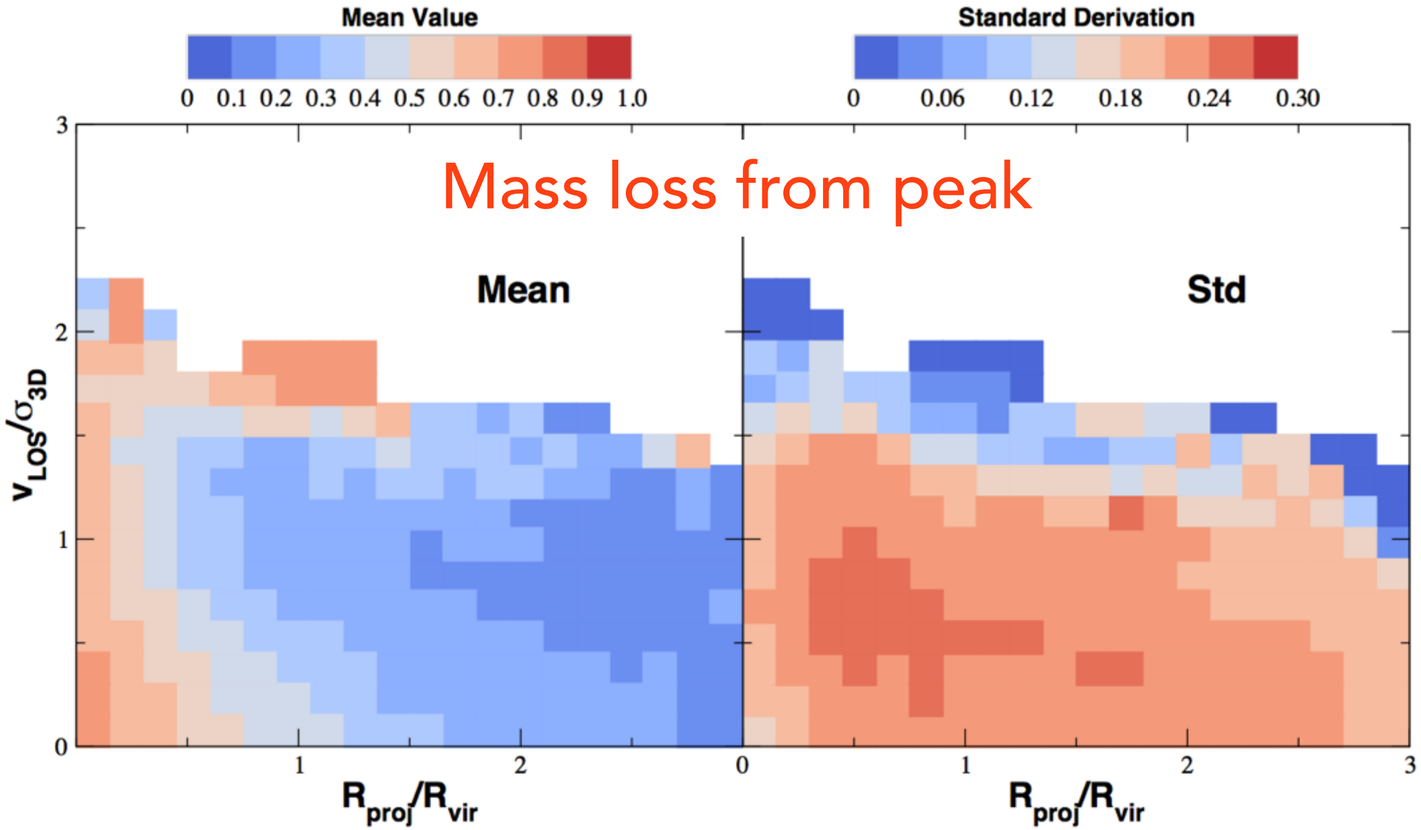
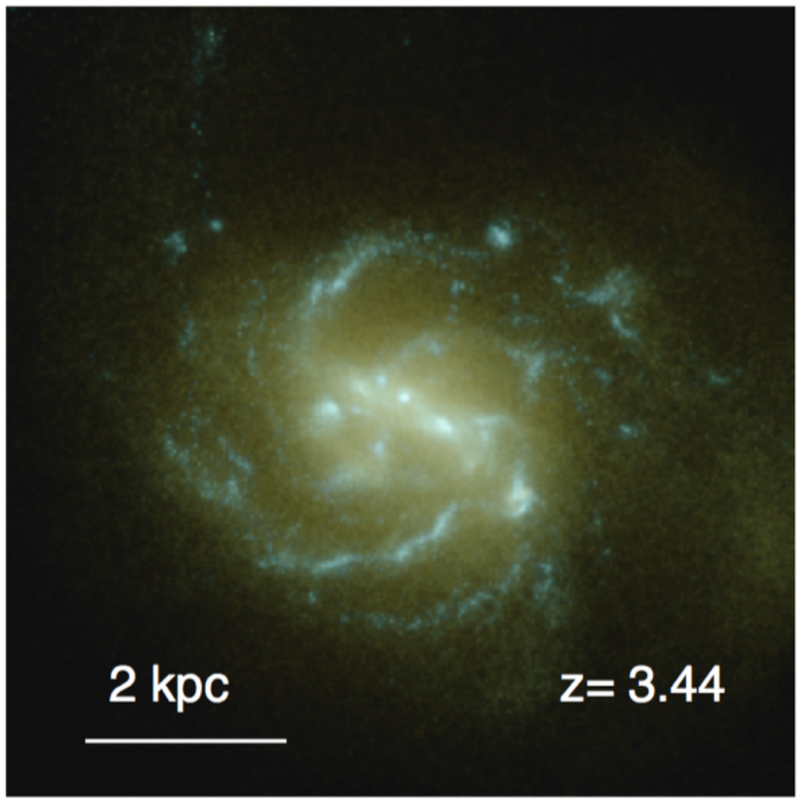


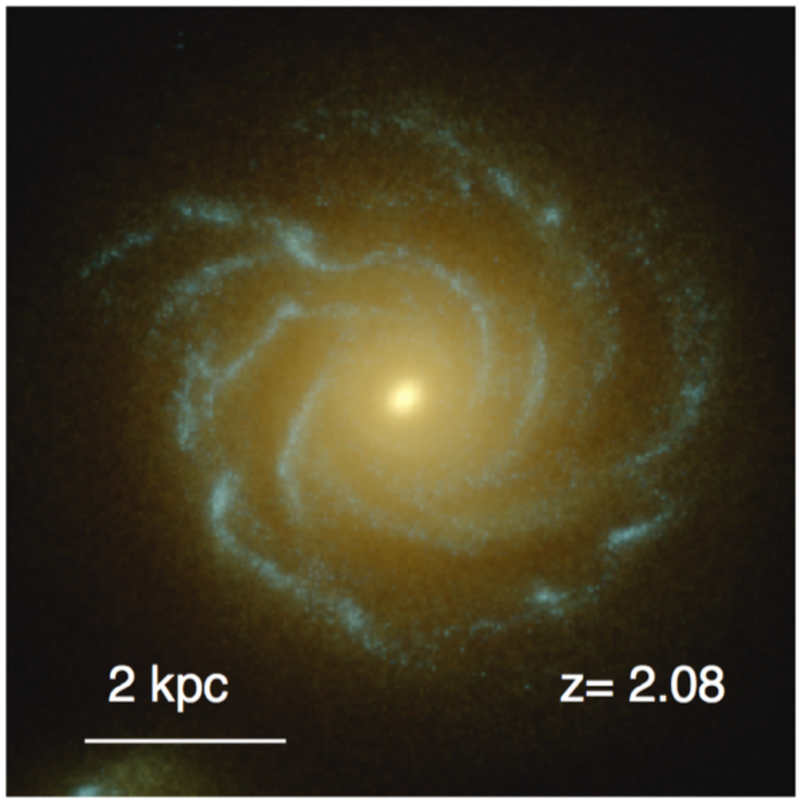
FIG. 8.— Master diagrams showing mean values and standard derivations of *peak mass loss* of all clusters.

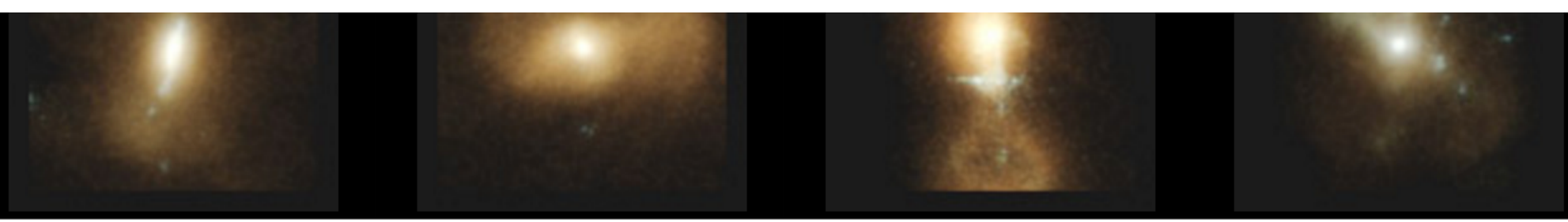
Rhee et al. 2016, in prep

The Horizon catalogue

Galaxies in the Horizon-AGN simulation







New Horizon

Dubois, Devriendt, Gavazzi, Hahn, Kaviraj, Kimm, Le Borgne, Peirani, Pichon, Silk, Slyz, Volonteri, Yi

- high resolution cosmological zoom-in simulation
- 10Mpc sphere
- Resolution: dx ~ 40pc, dm_s ~ 1e4, dm_{DM} ~ 1e6
- with turbulence SF (Devriendt), mechnical feedback (Kimm), etc.
- Mvir up to 4e12
- Computing: IAP: z>2 (2016-), Yonsei: z<2 (2017-)

z=9
Credit:Y. Dubois