Tools for observers: Phase-space diagrams

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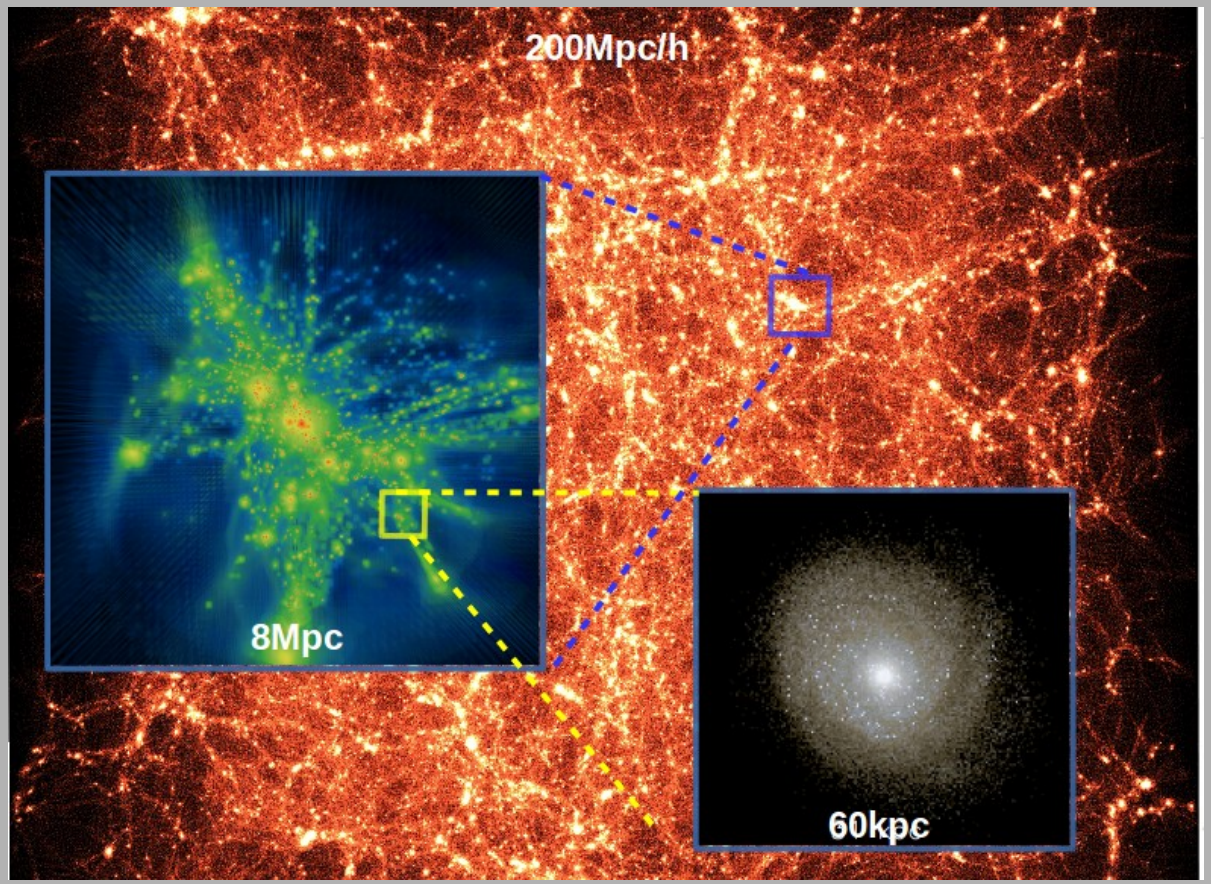

Simulation details:

- ~15 clusters in total
  (Mass range 5e13-1e15 M_{sol})
- Simulation resolution:
  → Resolved to 700 pc
  → Resolved to 1e9 M_{sol}
  → 70 Myr time resolution
- Baryonic physics:
  Hydrodynamical gas, star formation, stellar feedback, AGN formation, AGN feedback, etc

JinSu Rhee

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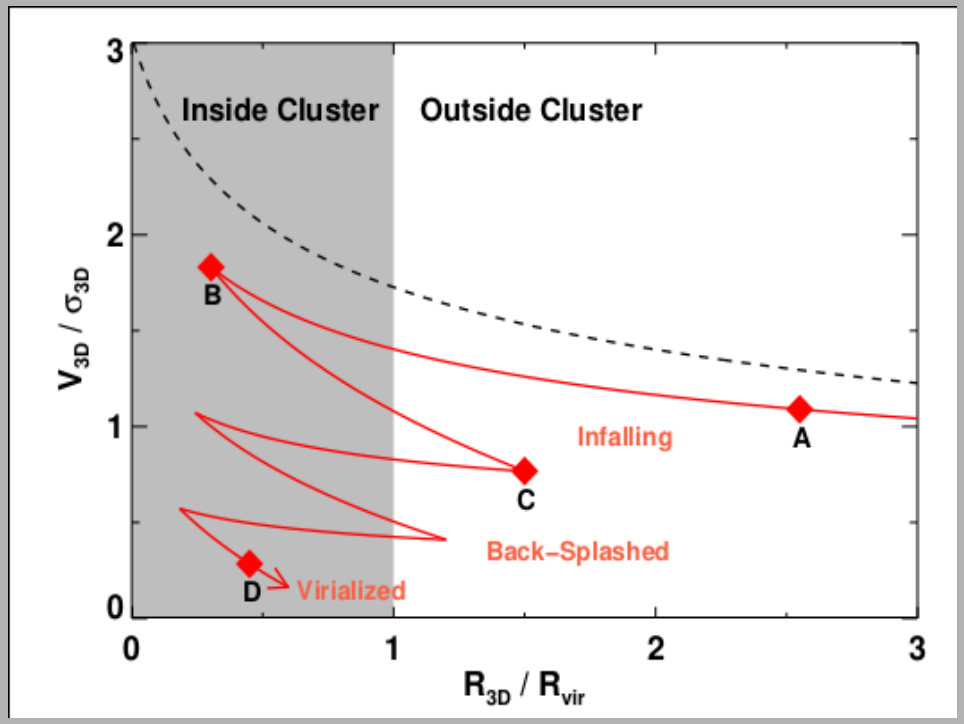
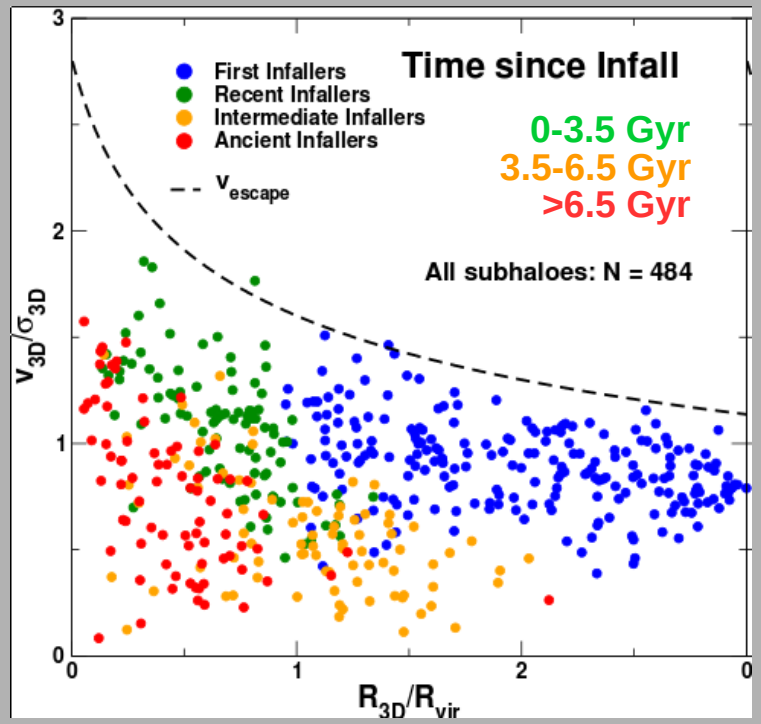


Cartoon track of infalling galaxy in phase-space

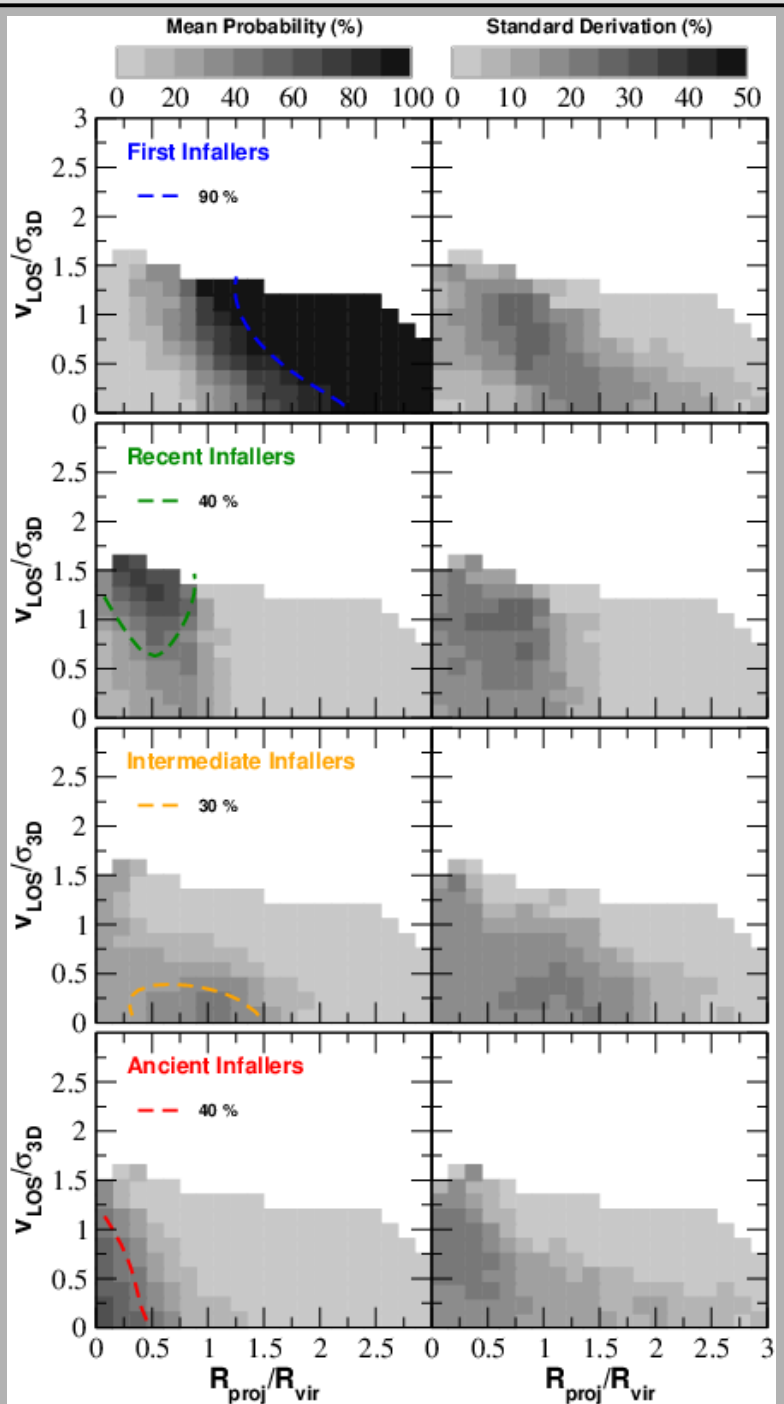


3D phase-space diagram of single cluster at z=0, with galaxies coloured by time since infall

All figures in talk from Rhee, Smith et al. 2017

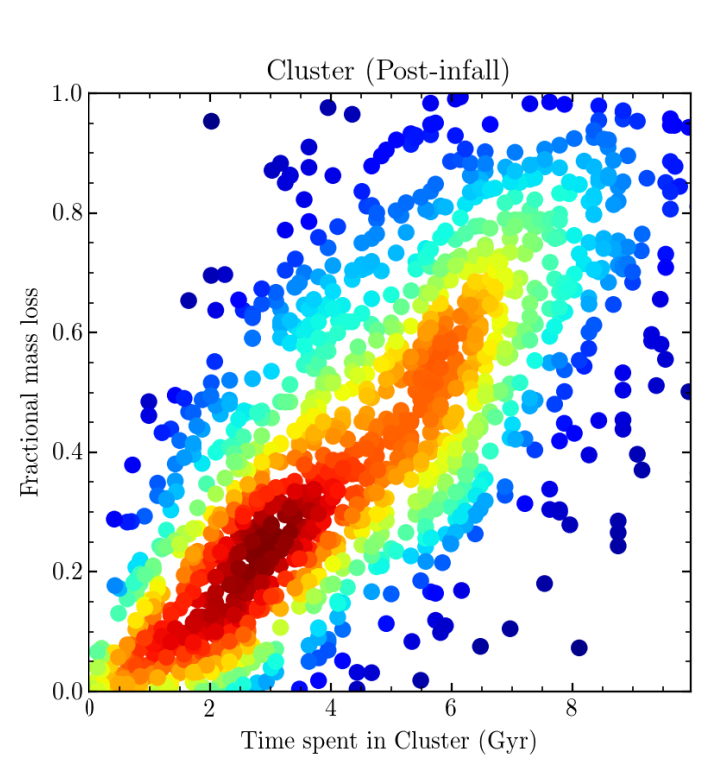
Projected phase-space diagrams: Infall time

(Left column) Mean probability of the given infall time



(Right column) Standard deviation (arising from cluster-cluster variations, line-of-sight, etc)

Mass loss in Phase space

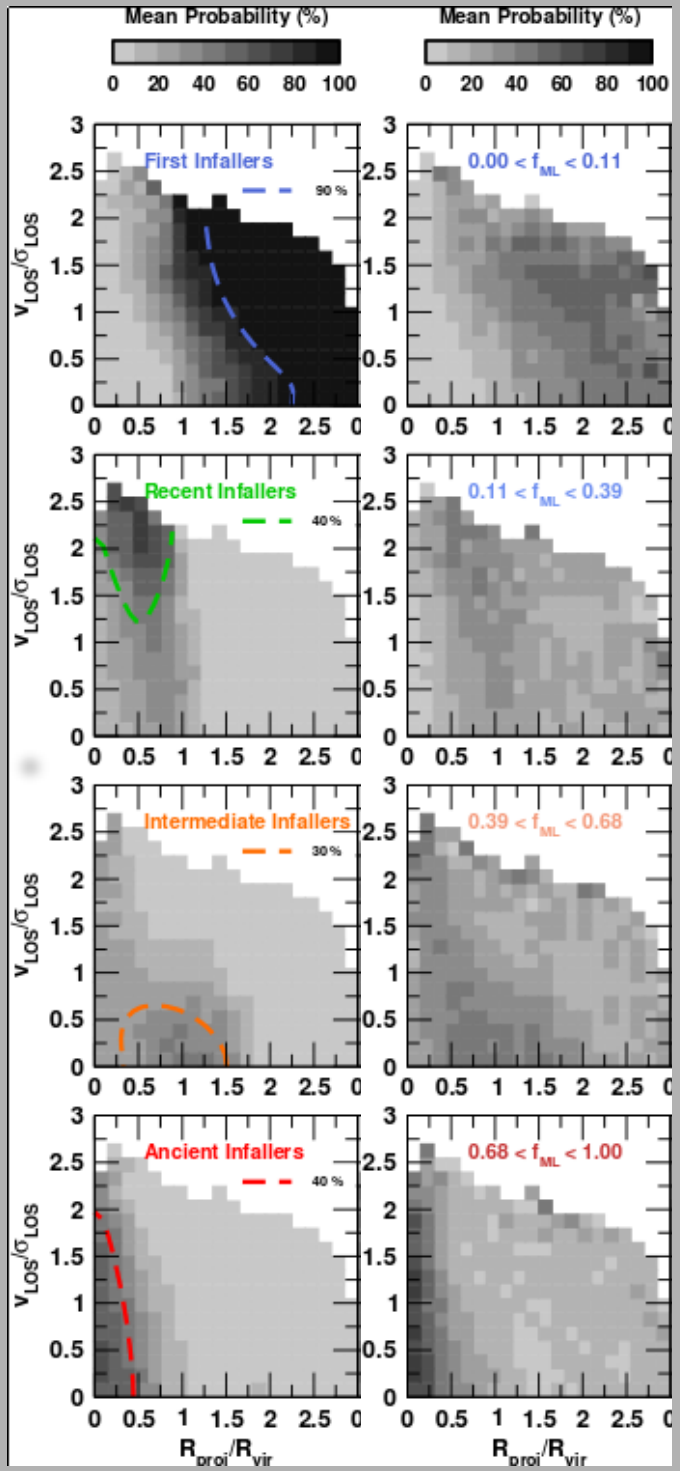


From Han, Smith et al. 2018 (in prep.)

Clear correlation between infall time and mass loss within the cluster

Infall time and Tidal Mass Loss linked in Projected Phase-space:

(Left column)
Time since infall



(Right column)
Fractional mass loss

- Similarity between infall time and tidal mass loss diagrams
- Location in phase-space gives information on tidal mass loss

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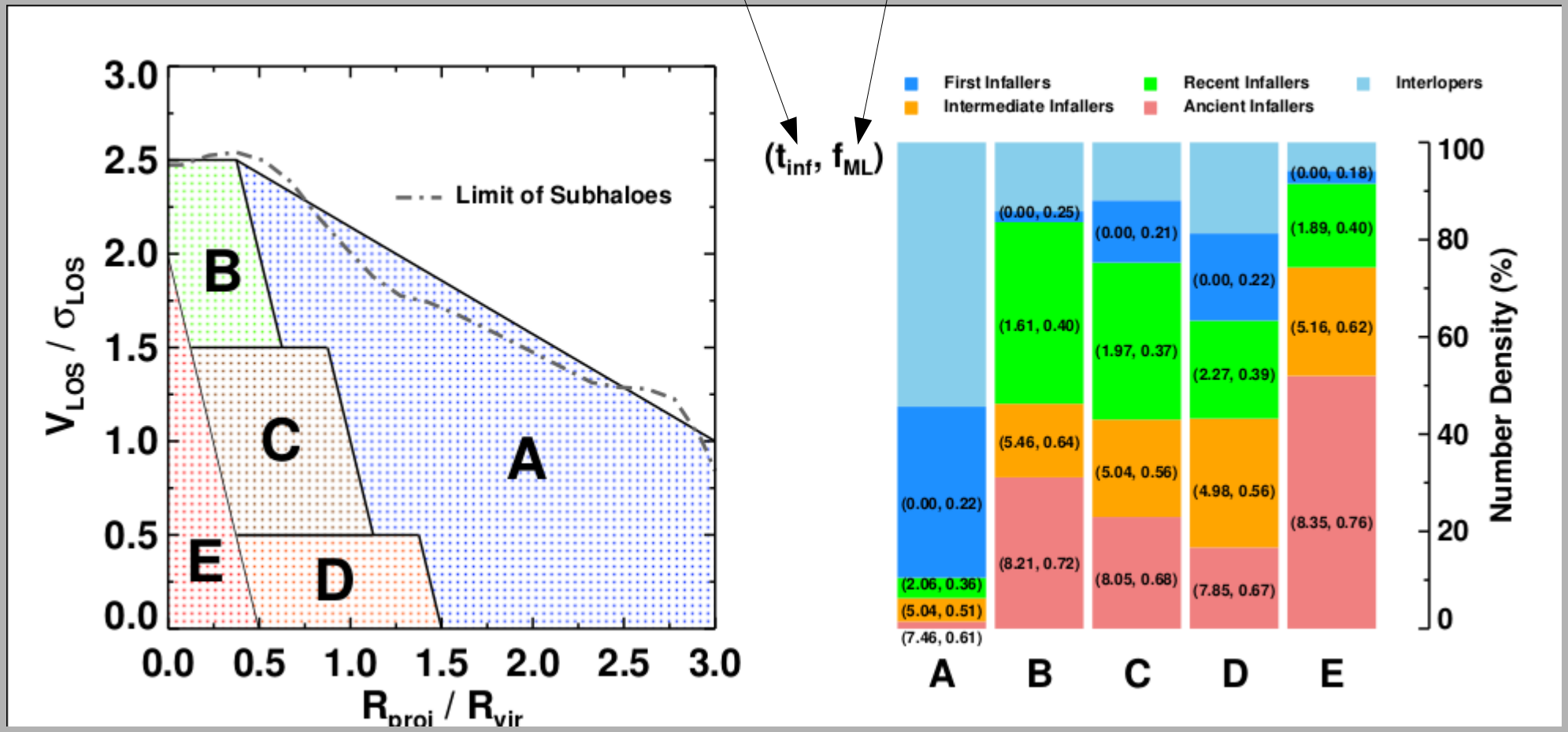
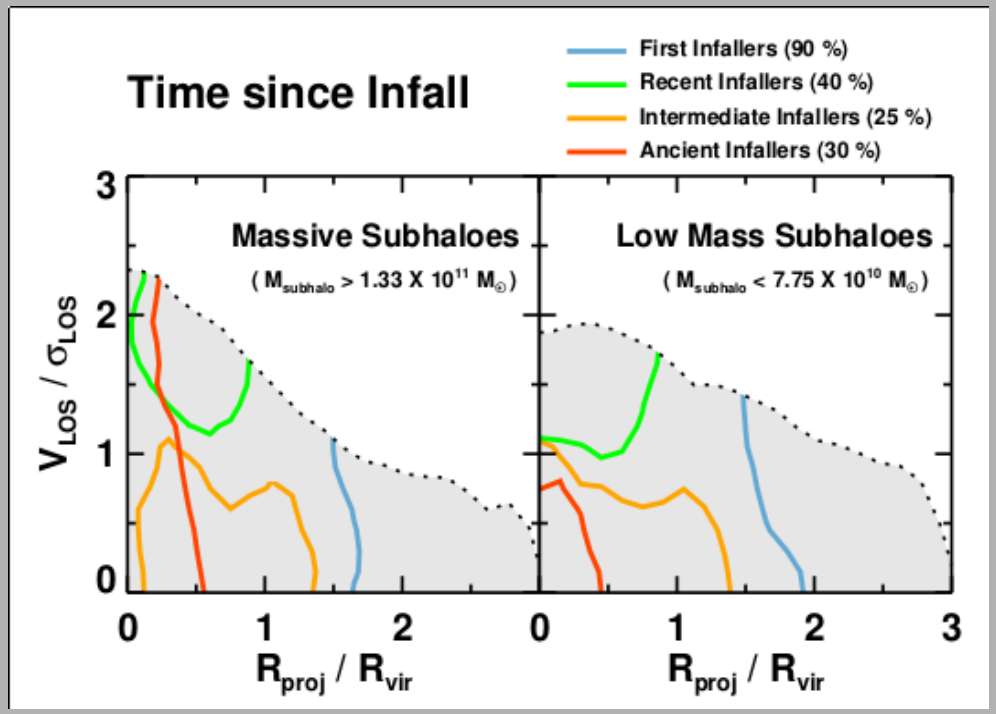
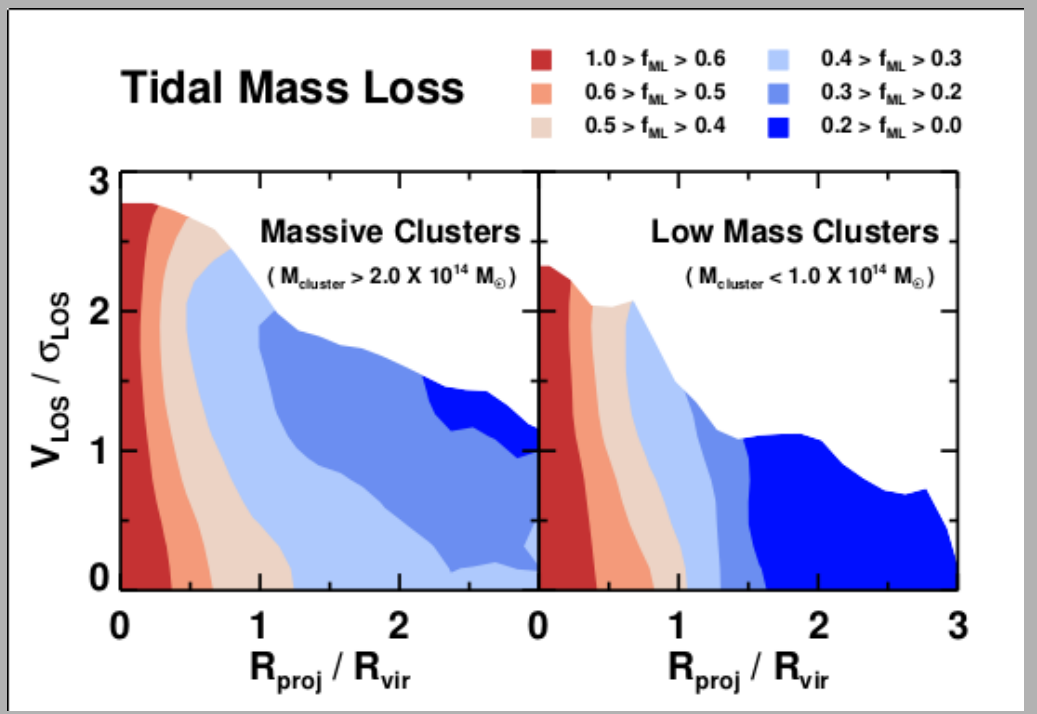


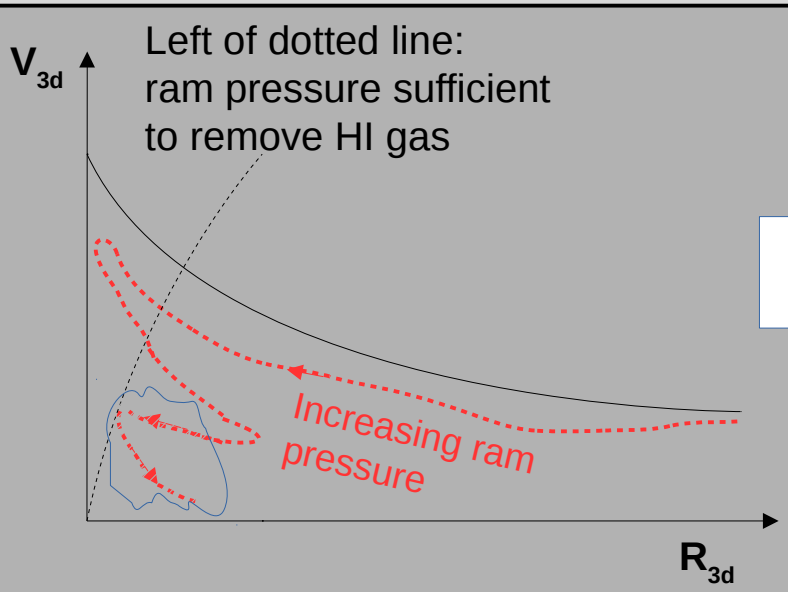
Breakdown of galaxy properties (infall time & halo mass-loss) in different regions in phase-space from Rhee, Smith et al. 2017

Dependency on Host & Galaxy mass

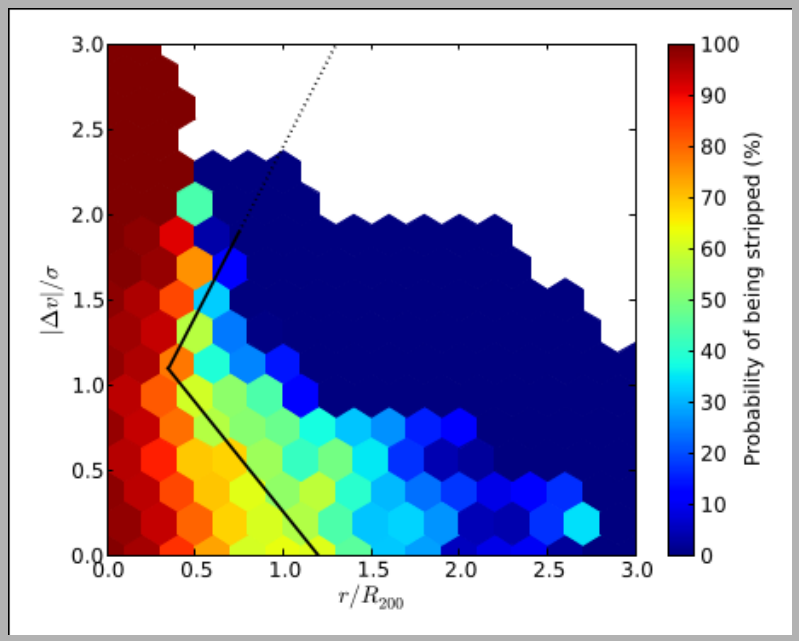




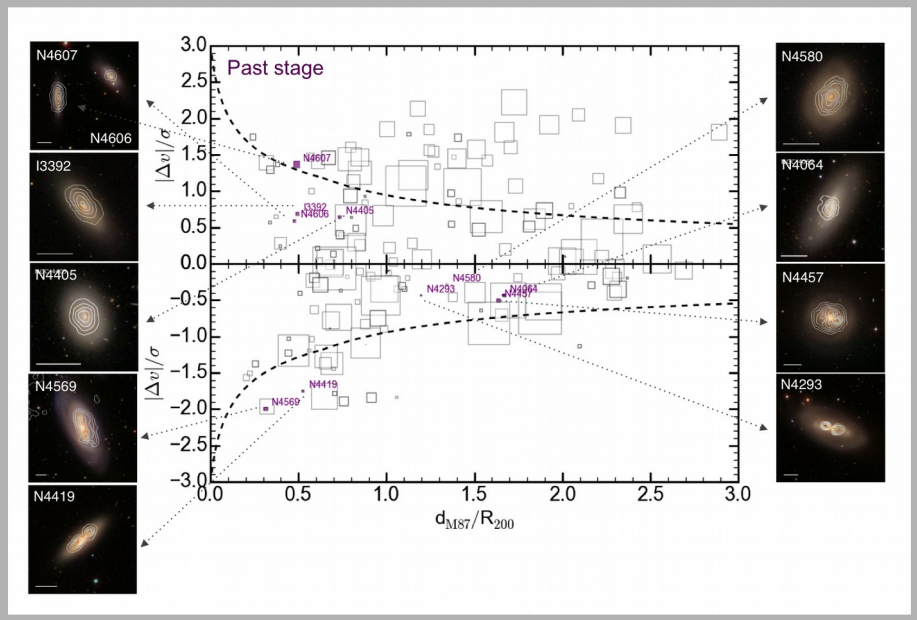
Ram pressure stripped galaxies in phase space



$$RP = \rho_{ICM} \, v_{gal}^{2}$$

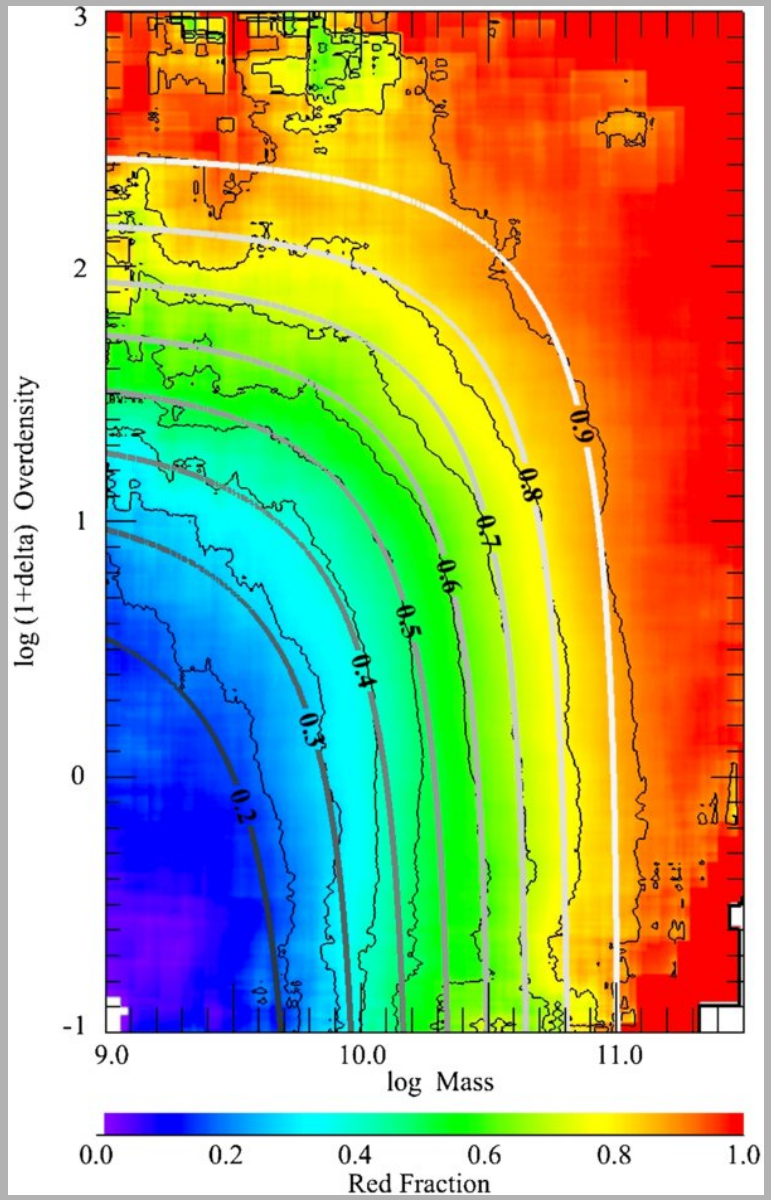


Probability of having been
ram pressure stripped in phase-space
(*Jaffe, Smith et al. 2015*)



Virgo cluster ram pressure stripping
in phase-space
(*Yoon, Chung, Smith et al. 2017*)

Galaxy properties function of mass and environment



To see effects of environment, need to first control for mass

Peng et al. 2010