

Predicting the tidal stripping of satellite galaxies

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Survival of substructure

Tidal evolution of

low mass ($<10^9 M_{\odot}$) dwarfs

Due to

tidal stripping around MW

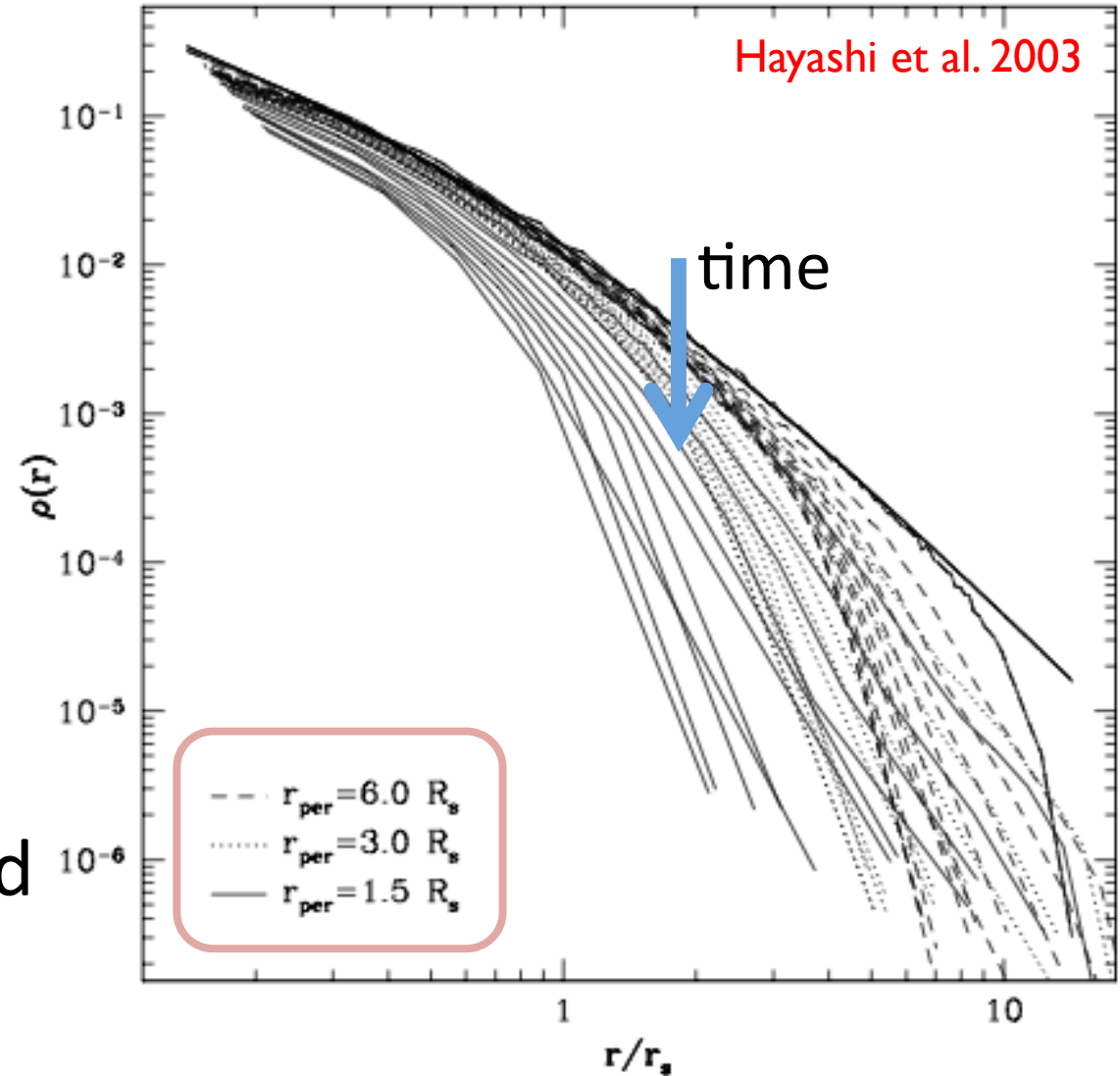
Using

controlled N -body simulations

Tidal stripping of satellites

density profiles

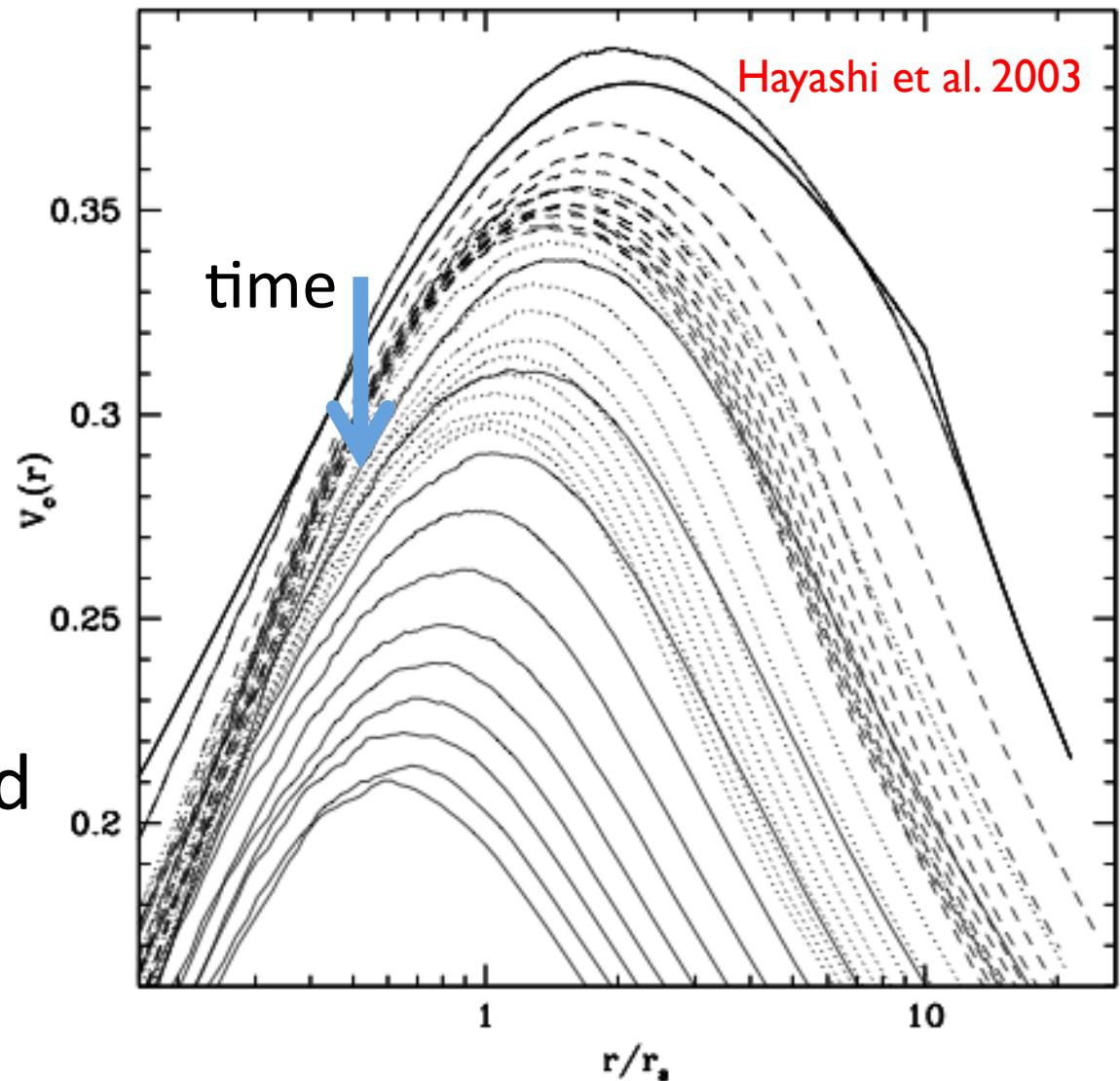
- tidal stripping impacts outer regions
- central slope unchanged
- satellite destroyed



Tidal stripping of satellites

circular velocity

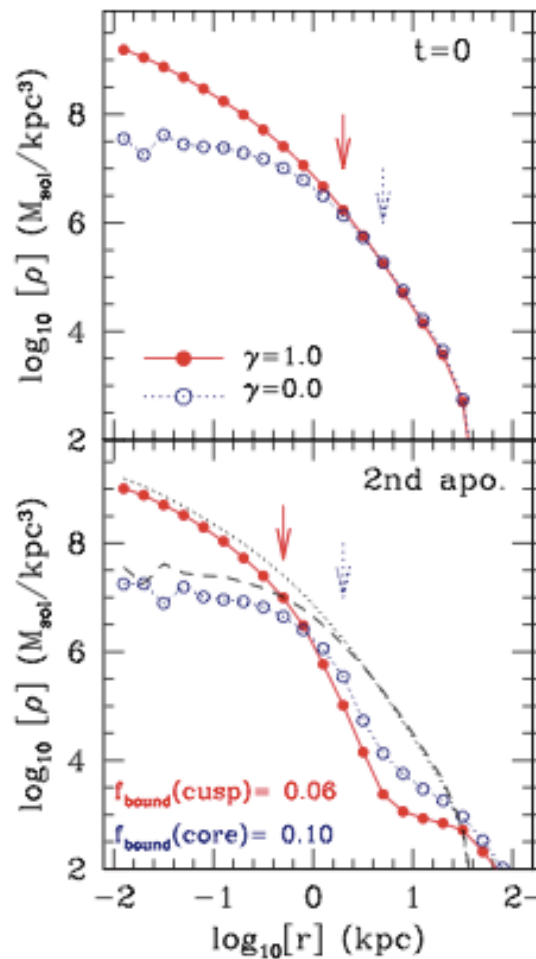
- v_{\max} decreases systematically
- profile retains shape
- satellite destroyed



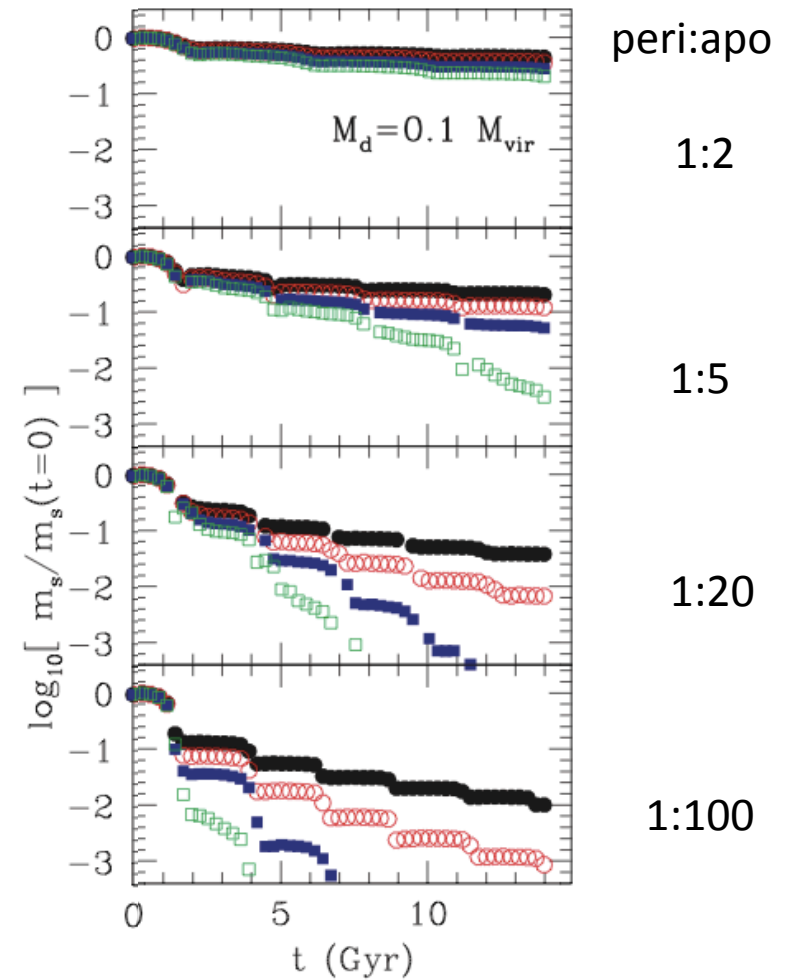
Tidal stripping of satellites

Peñarrubia et al. 2010

Core vs cusp density evolution



mass loss with time including MW disk



Colors for different inner densities

N-body simulations

Initial conditions by spherIC

Two dwarfs

M_{vir} with 10^8 and $10^9 M_{\odot}$

$N_{\text{p}_{\text{eff}}} = 54 \text{ Million}$

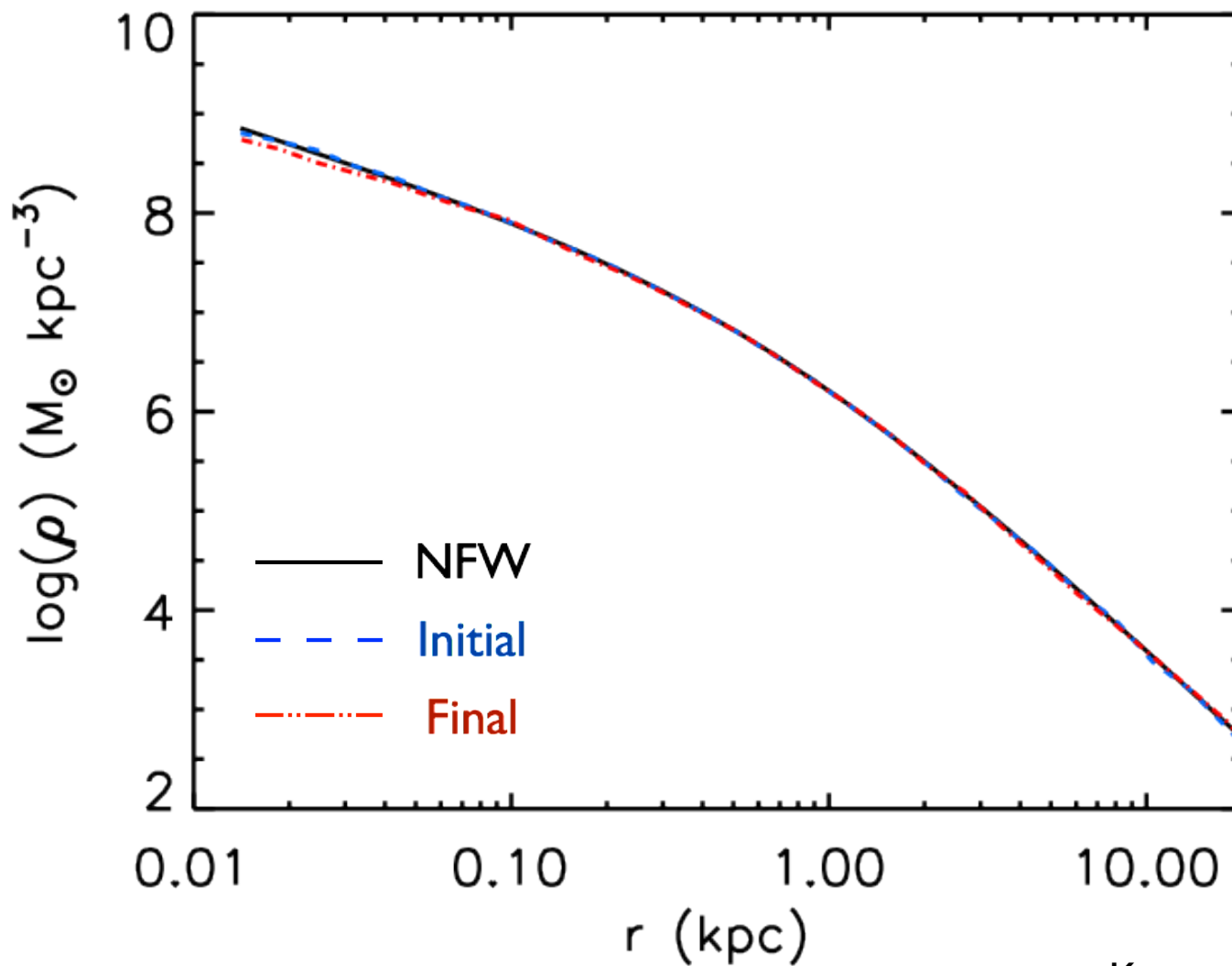
$\epsilon = 12 \text{ pc}$

$M_{\text{min}} = 13 M_{\odot}$

$t_{\text{orbit}} = 6 \text{ Gyrs}$

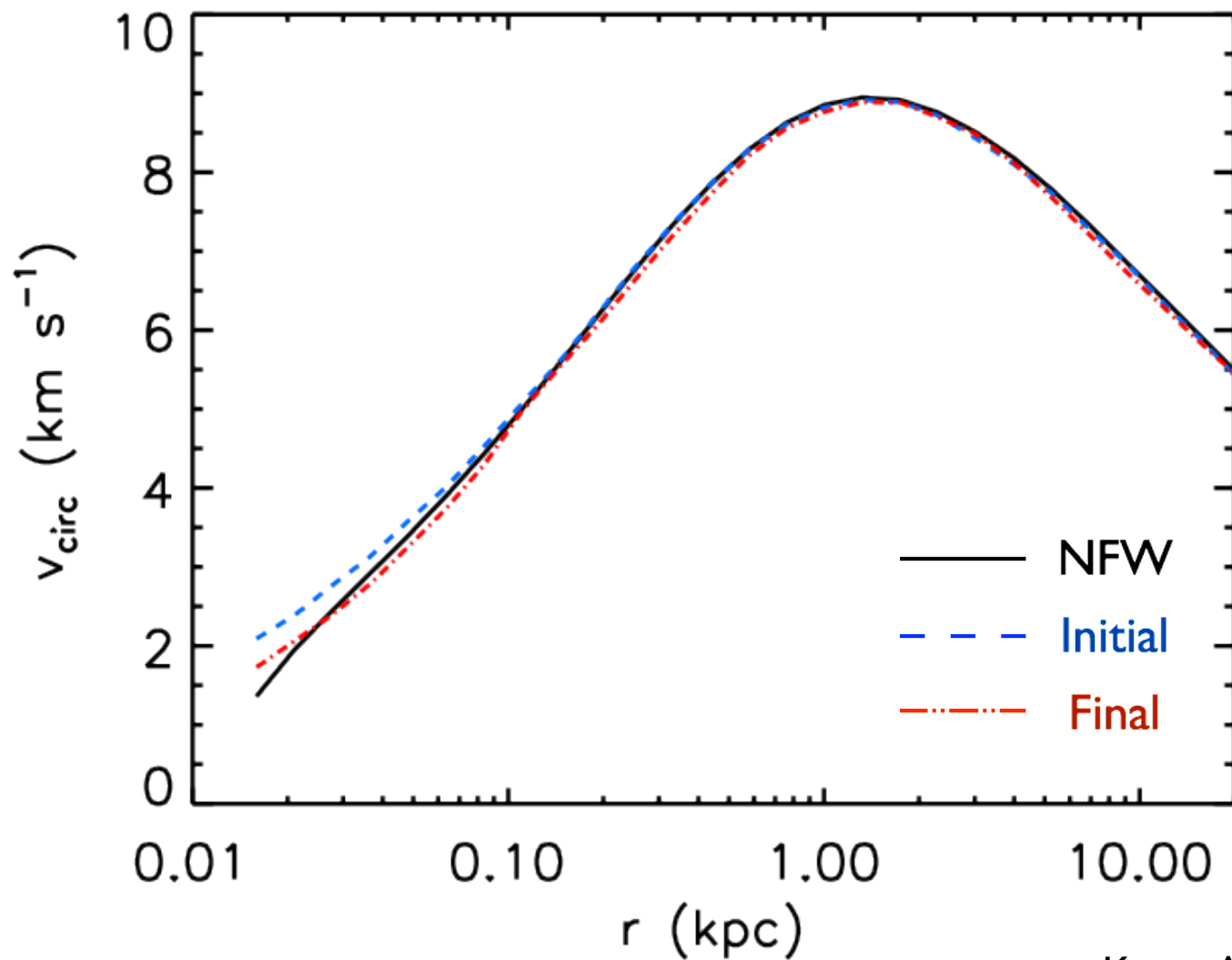
Isolated dwarf

$M=10^8 M_{\odot}$



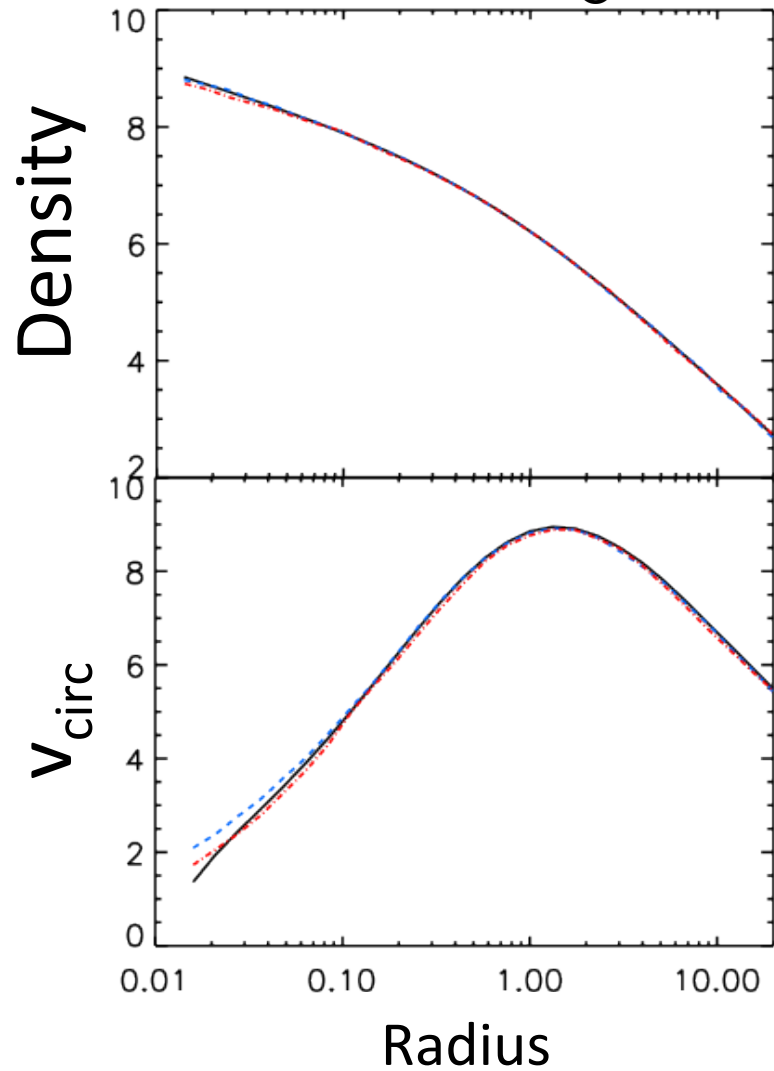
Isolated dwarf

$M=10^8 M_{\odot}$

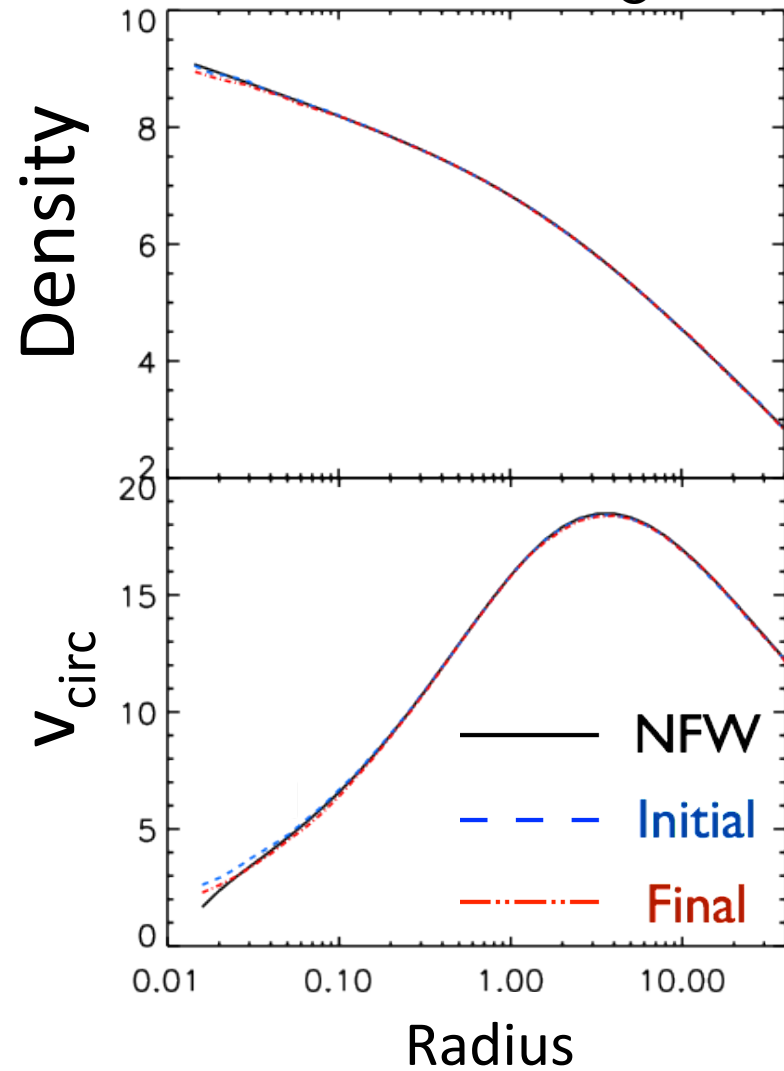


Isolated dwarfs

$M=10^8 M_{\odot}$



$M=10^9 M_{\odot}$



previous work

Arraki et al. 2012

<http://arxiv.org/abs/1212.6651>

arXiv.org > astro-ph > arXiv:1212.6651

Astrophysics > Cosmology and Extragalactic Astrophysics

Effects of baryon removal on the structure of dwarf spheroidal galaxies

Kenza S. Arraki, Anatoly Klypin, Surhud More, Sebastian Trujillo-Gomez

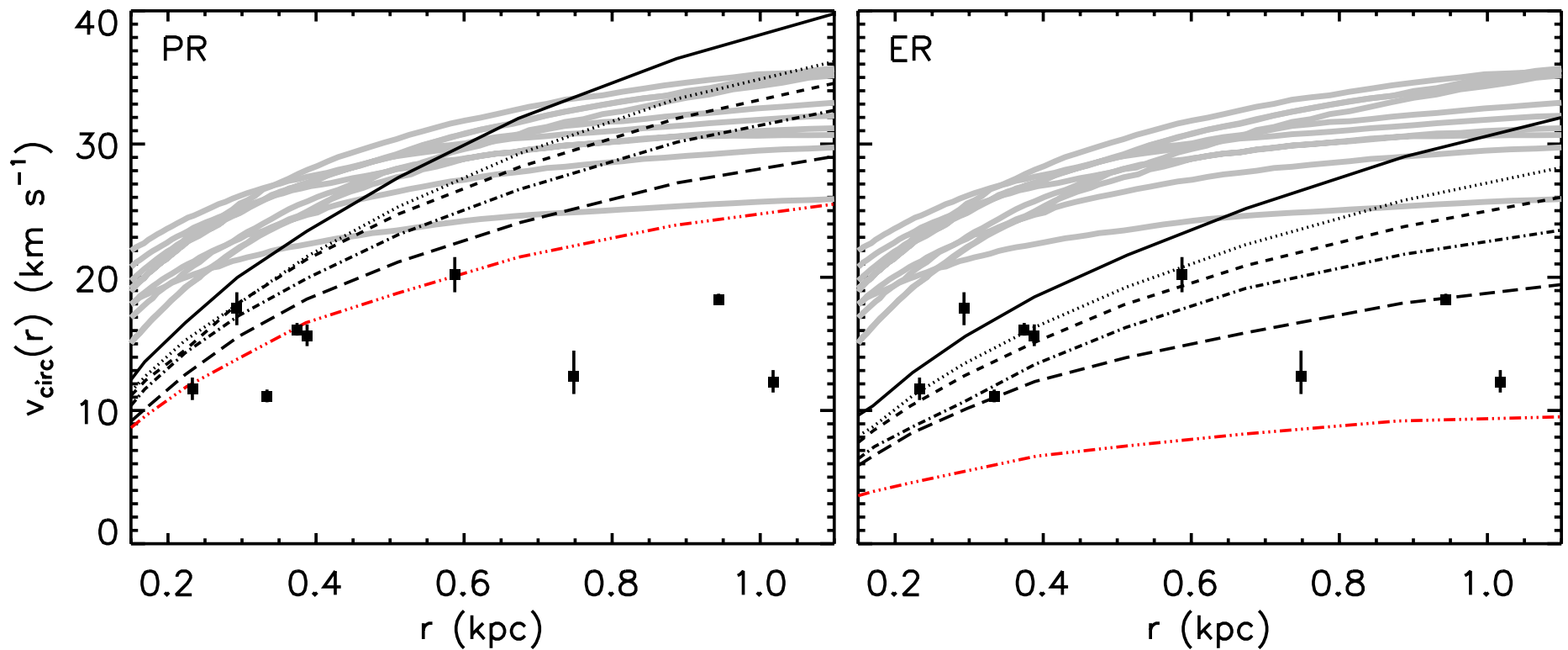
previous work

Arraki et al. 2012

<http://arxiv.org/abs/1212.6651>

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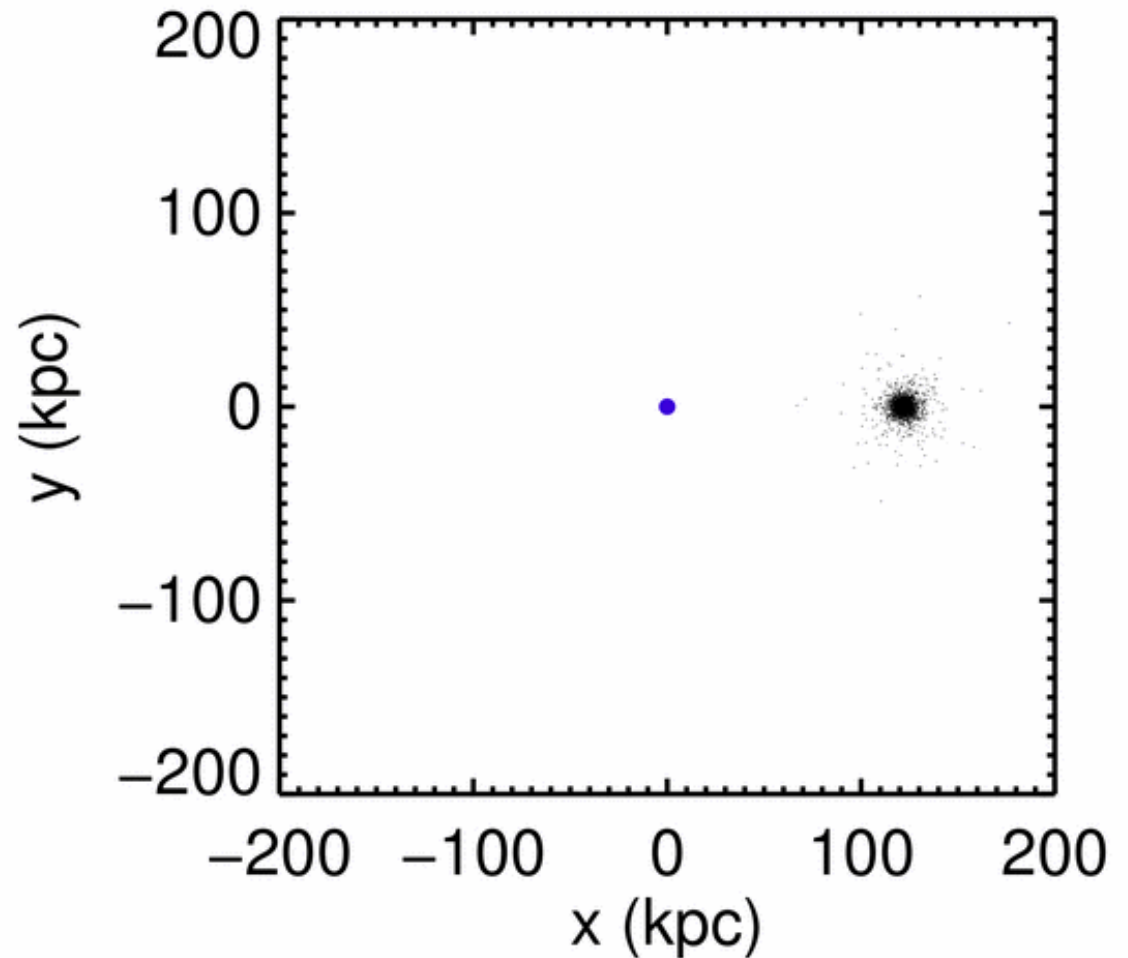
Kenza S. Arraki, Anatoly Klypin, Surhud More, Sebastian Trujillo-Gomez



Kenza Arraki - NMSU

Orbiting the MW

- Orbit MW with NFW halo and disk
- Range of pericenters
- All orbits have 1:6 ellipticity
- Orbit for 6 Gyrs



Orbiting the MW

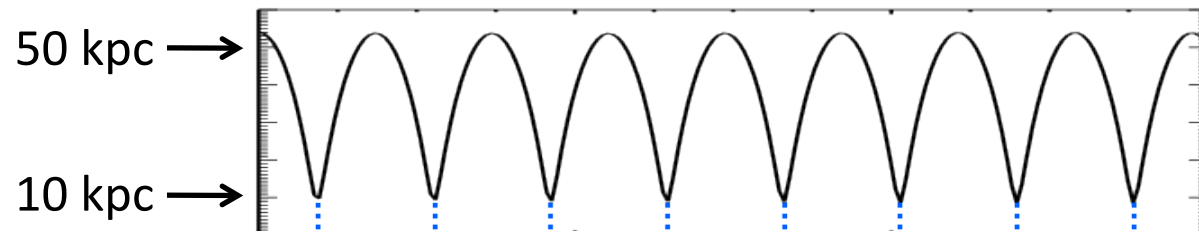
How do the satellite profiles evolve with time?

Can dwarfs be destroyed?

What are the implications for DM annihilation boost factors?

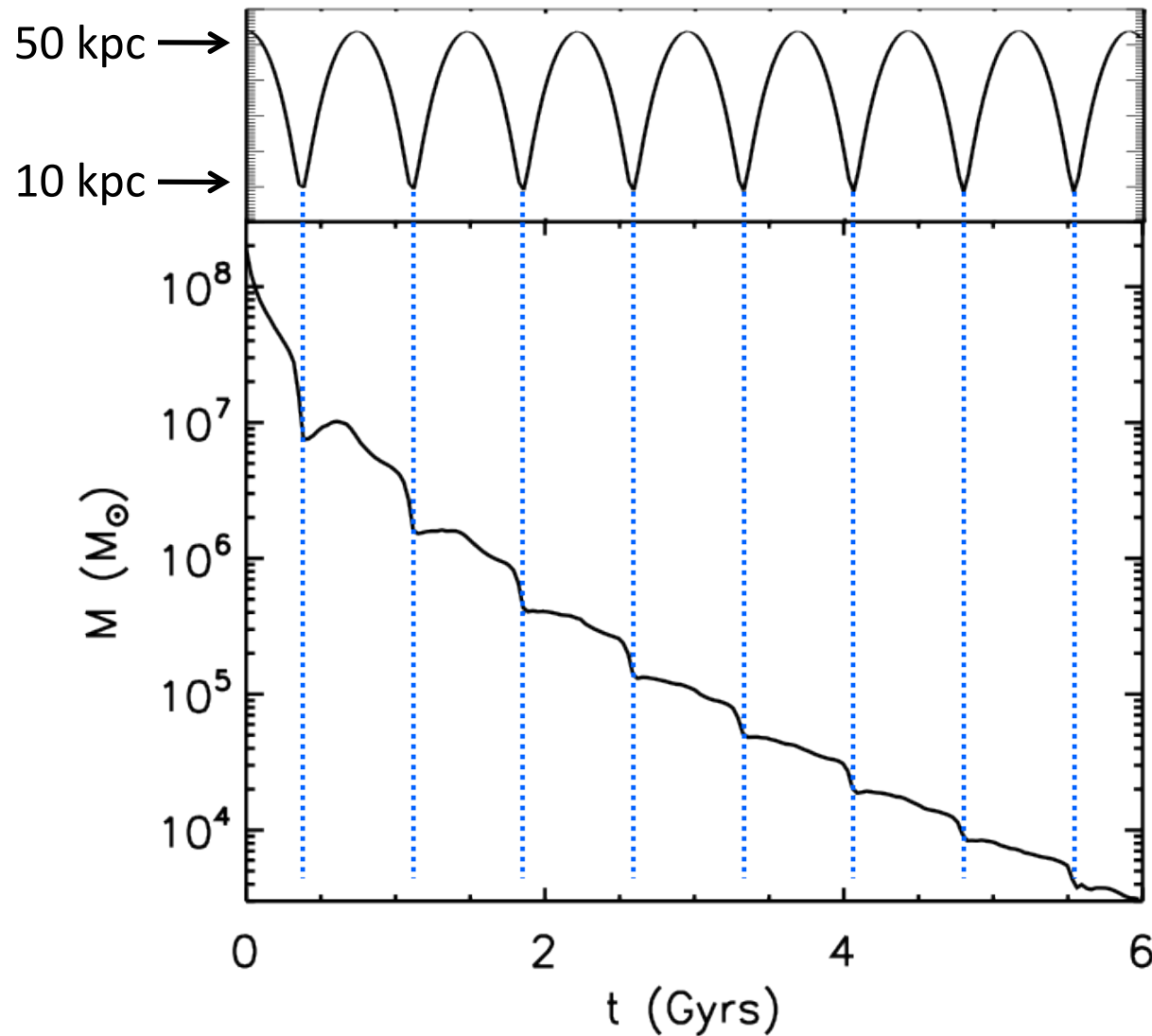
*Can we make predictions for dwarf galaxy futures?
If so based on some simple parameters?*

Orbiting the MW: one case



radial distance

Orbiting the MW: one case

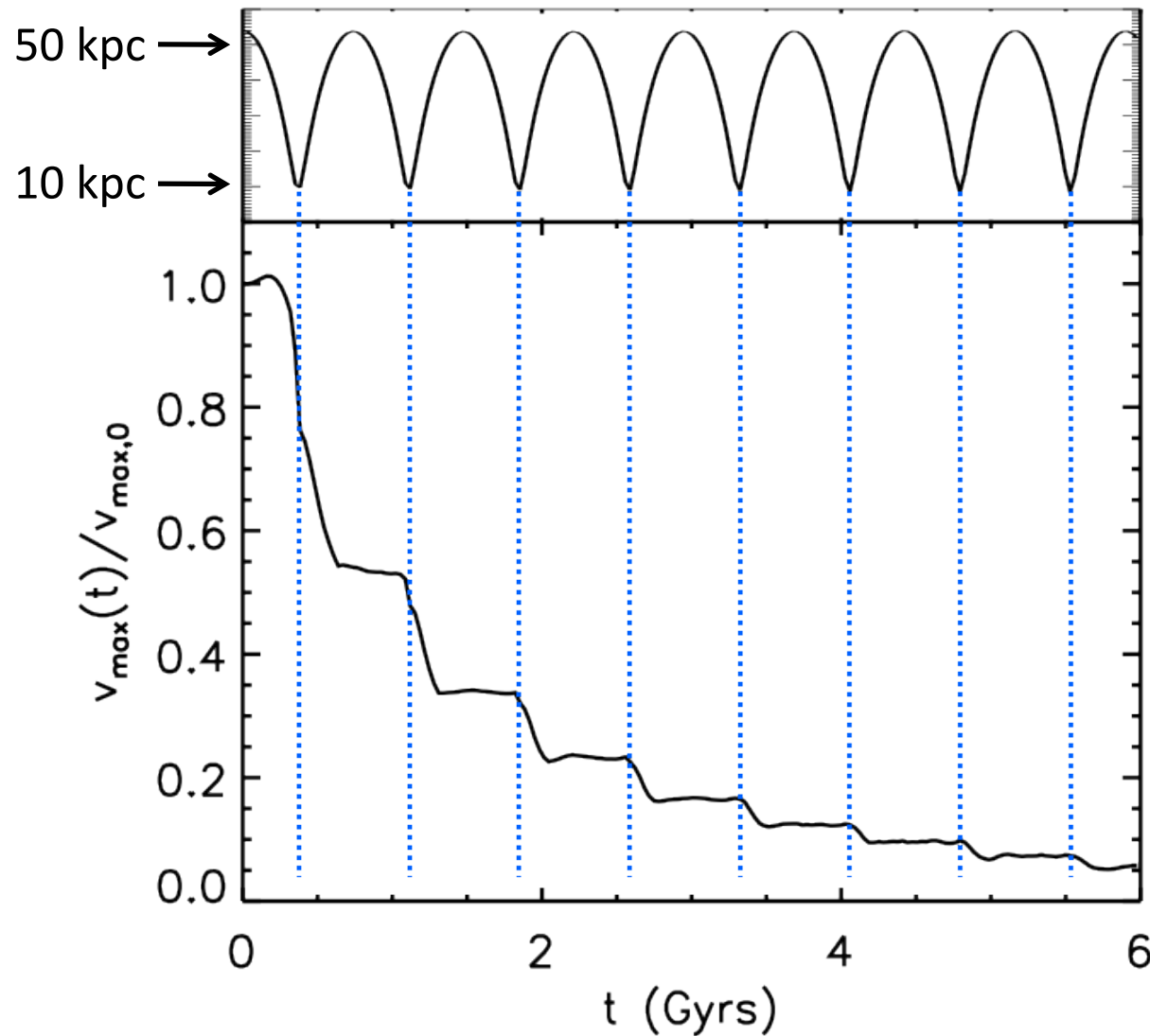


radial distance

mass loss



Orbiting the MW: one case

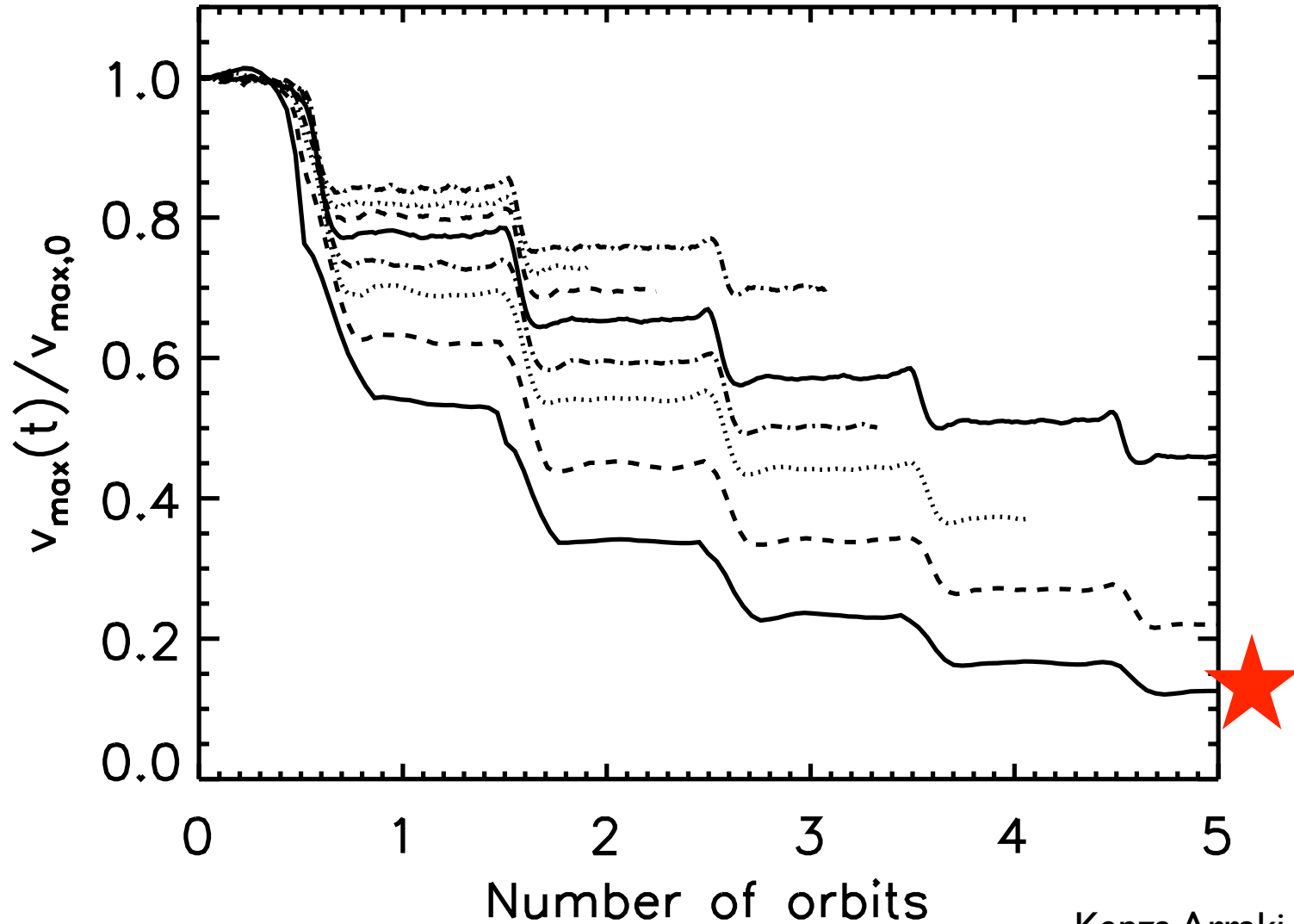


radial distance

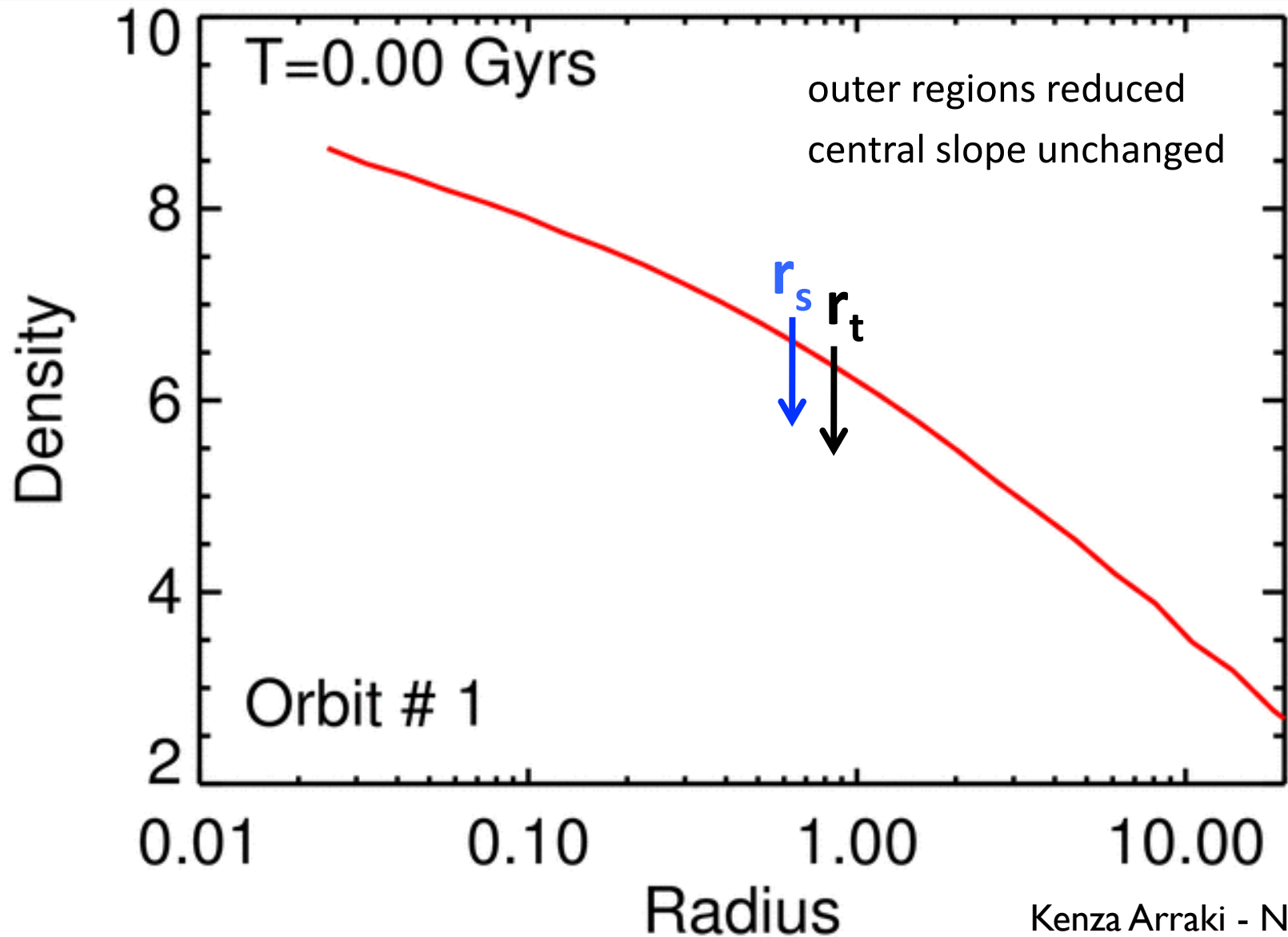
change in max
circular velocity



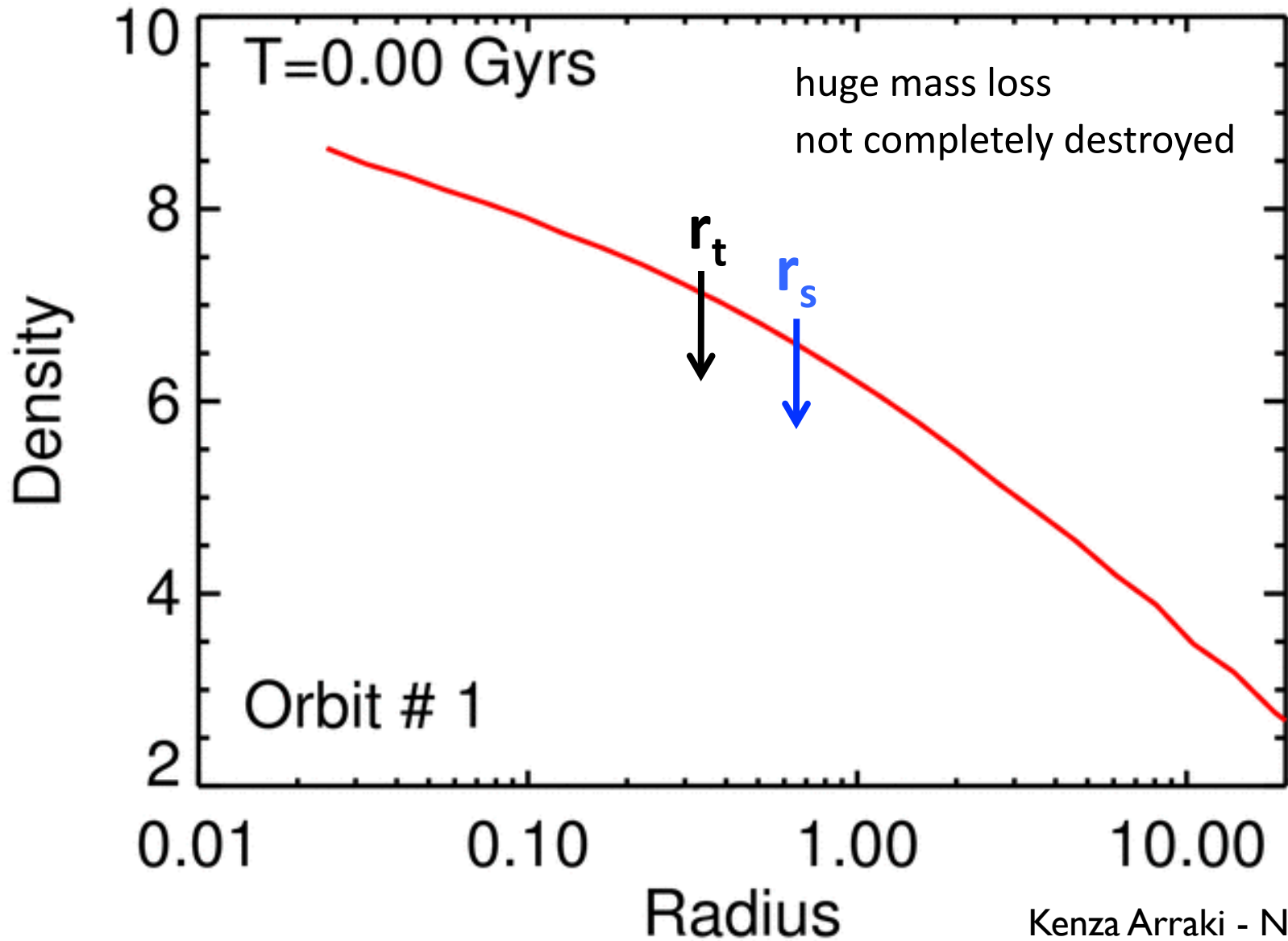
Orbiting the MW: many cases



Evolution of density



Evolution of density



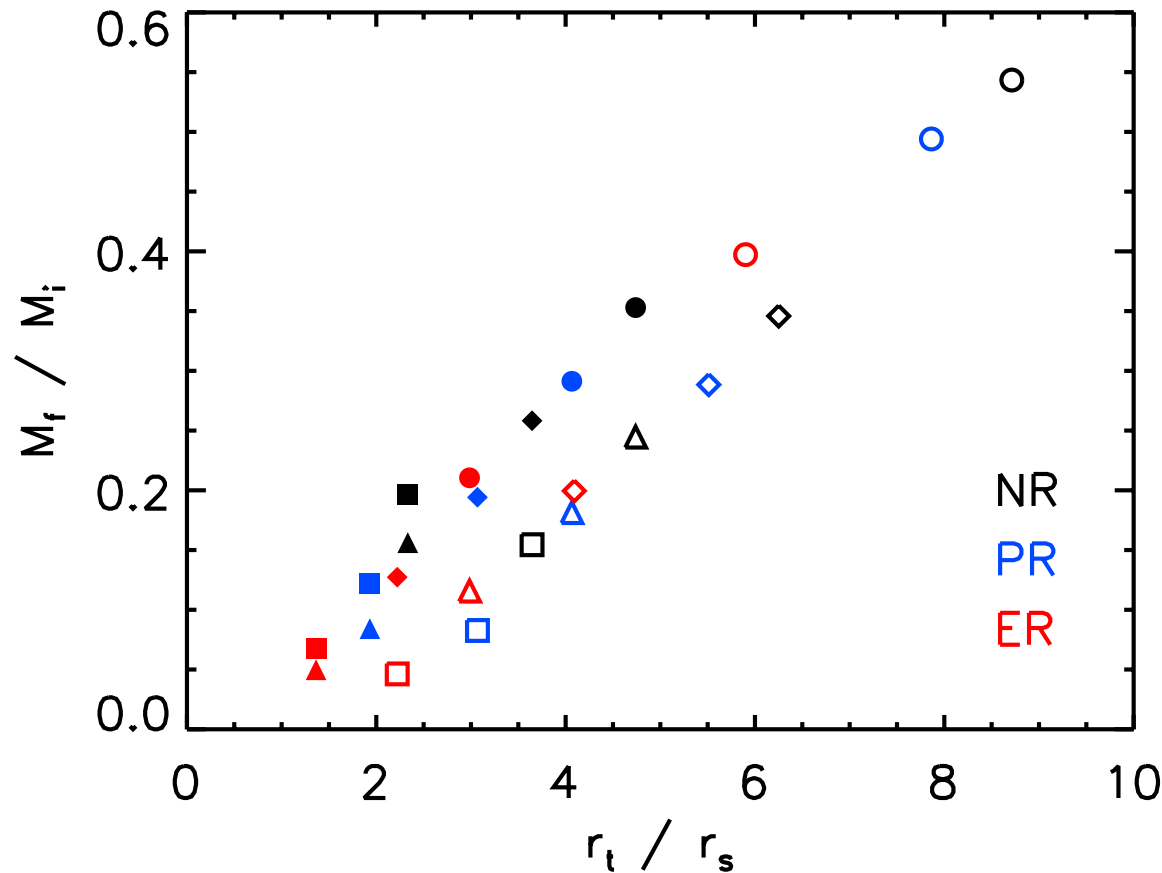
previous work

Arraki et al. 2012

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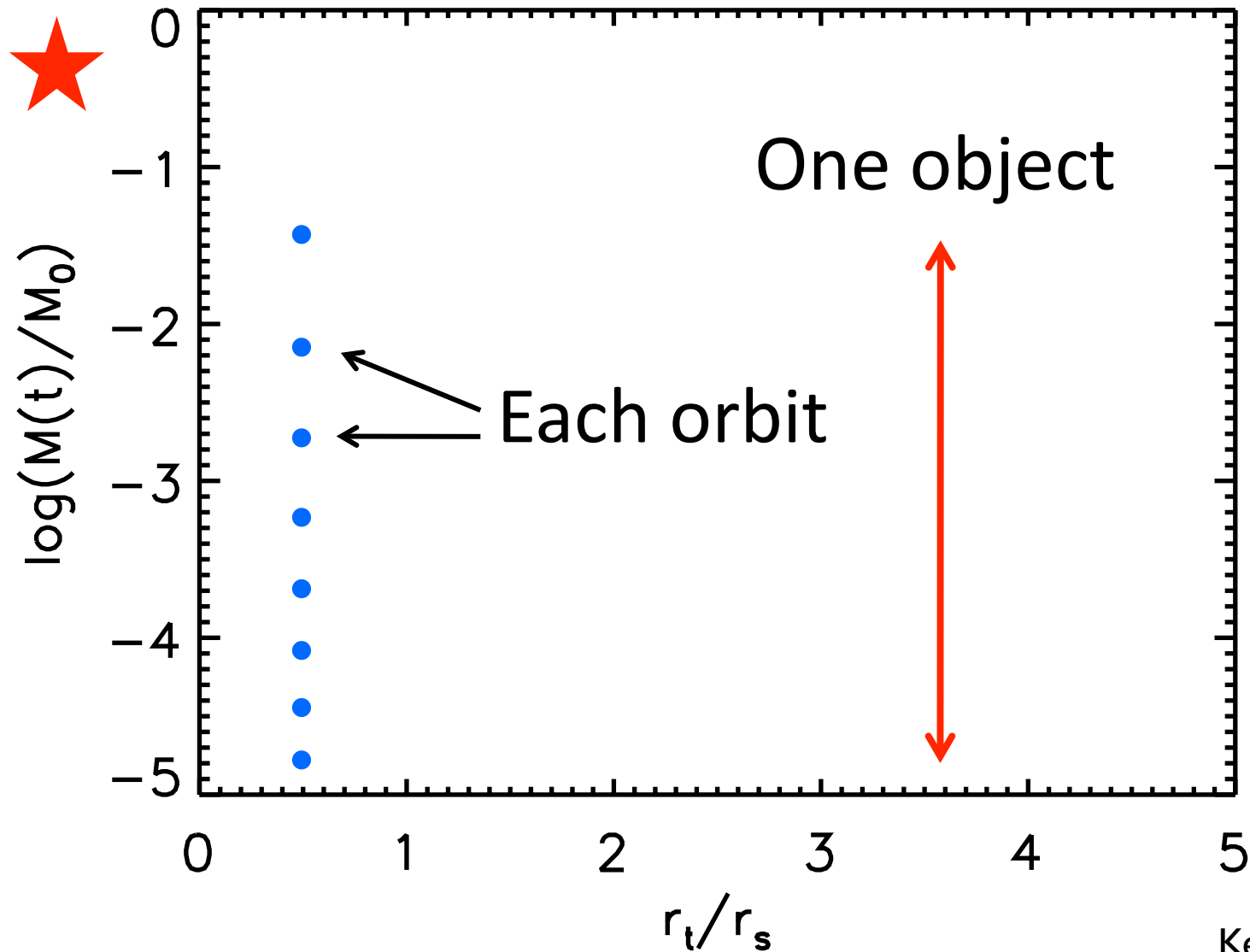
Mass

V_{\max}

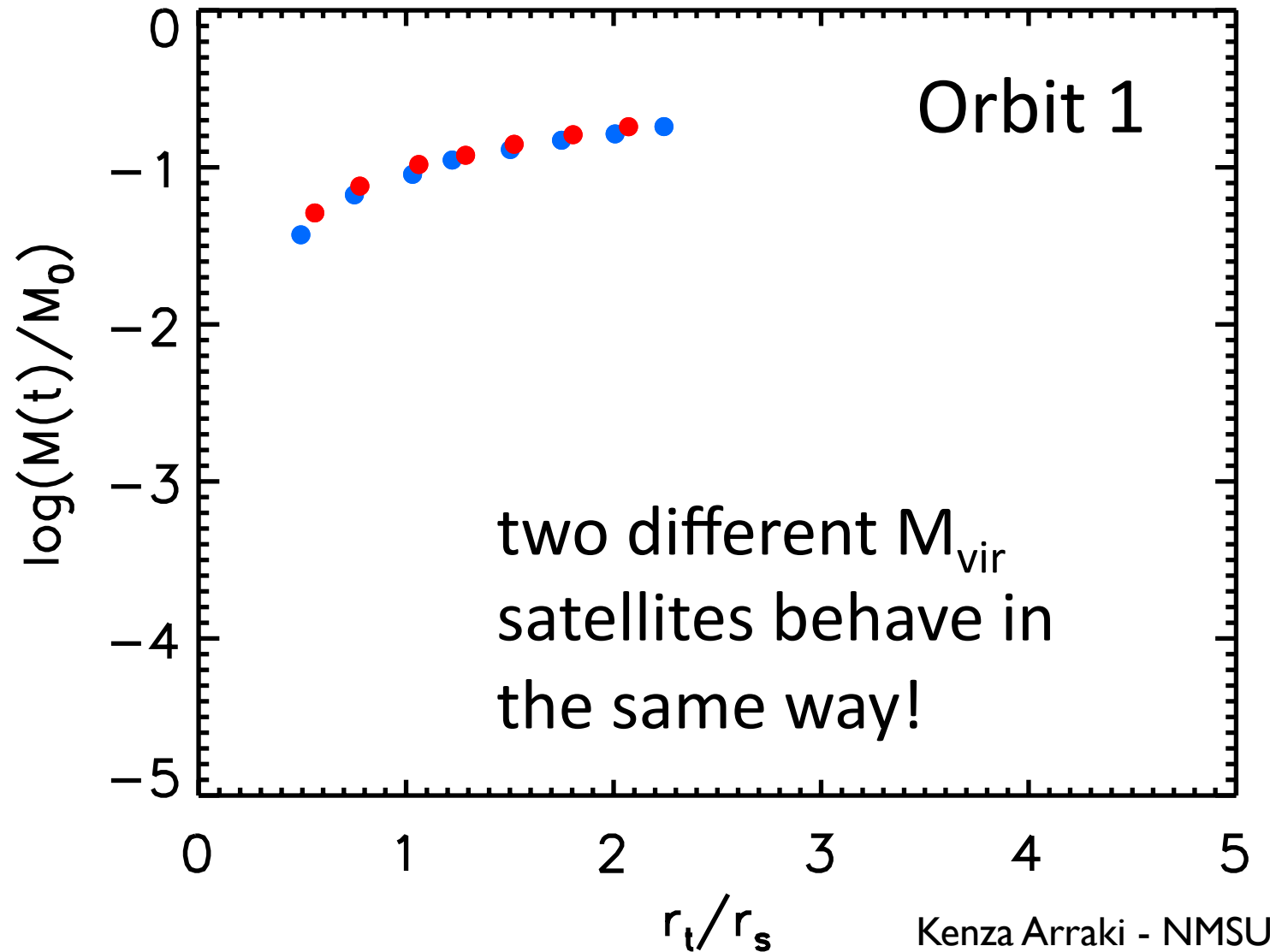
r_t / r_s

orbits?

Predictive power

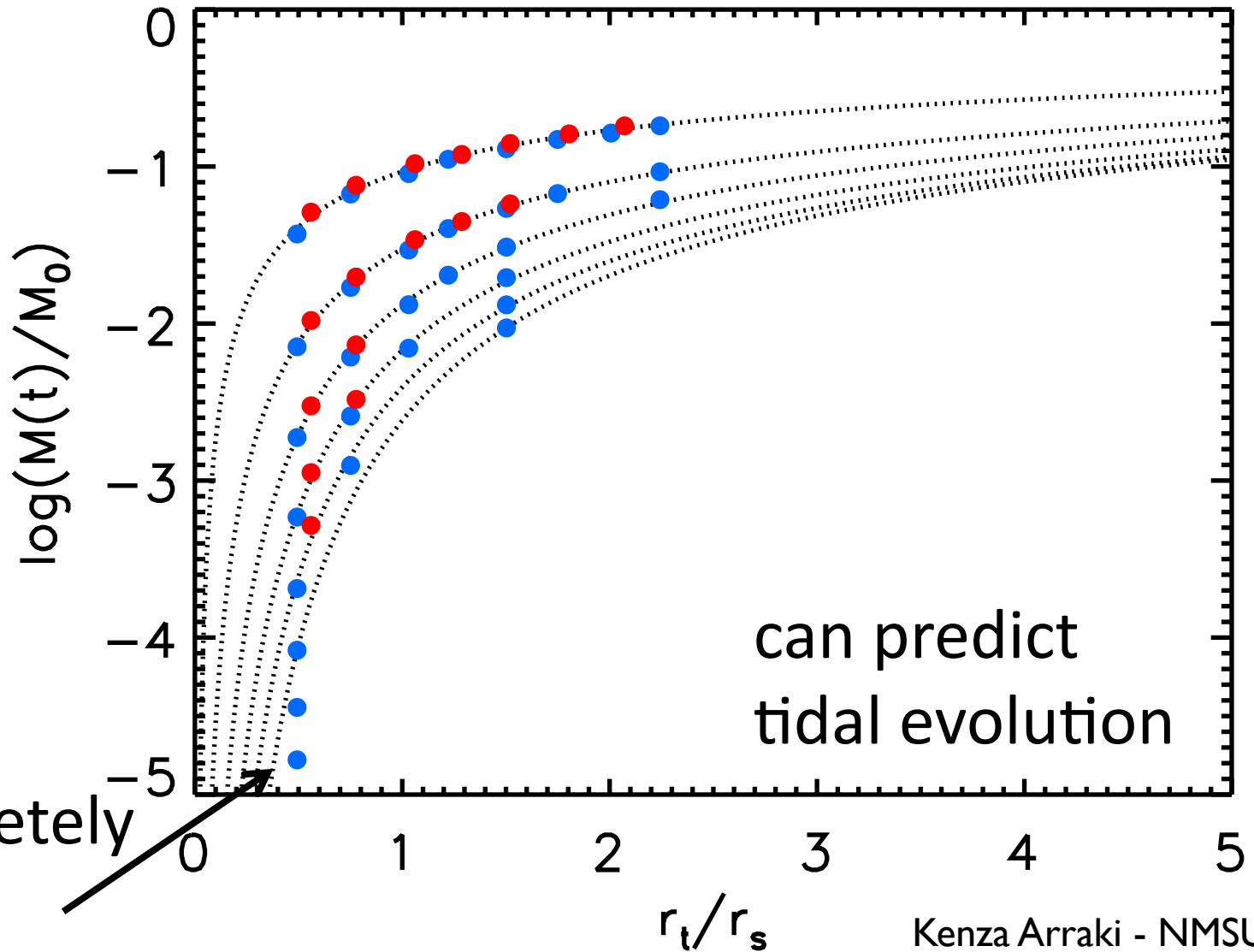


Predictive power

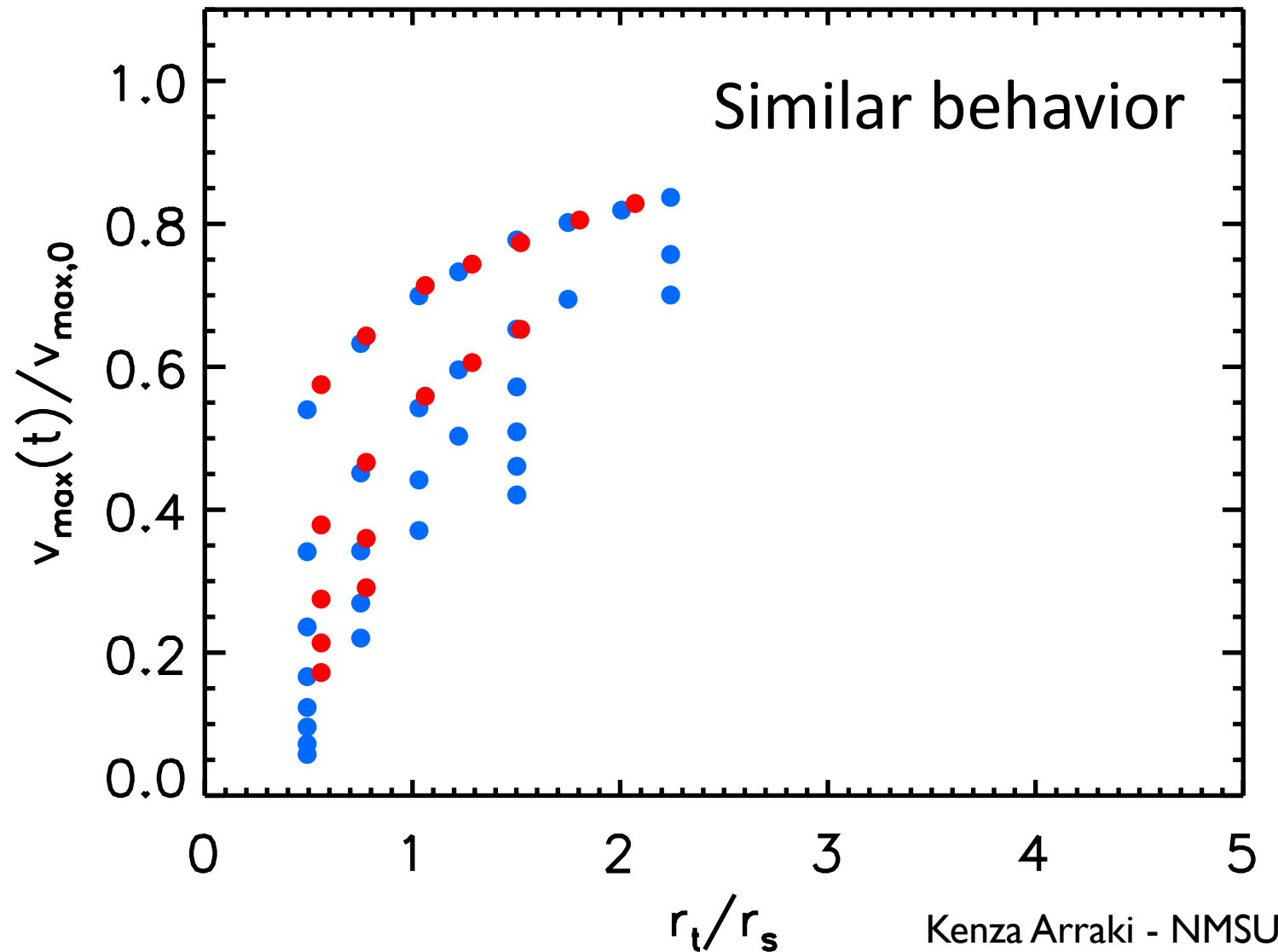


Predictive power

each line
indicates
a new
orbit



Predictive power - V_{\max}



Summary: survival of substructure

Examined tidal evolution of low mass satellites

1. Lots of mass loss and v_{\max} reduction
2. Dwarfs are not completely destroyed
3. Annihilation boost factor is not removed
4. Tidal stripping can be predicted based on r_t/r_s and number of orbits