A dichotomy in the quenching of satellite galaxies

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Overview

The quenching of satellite galaxies involves the intersection of interesting physics

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Look for trends in quenching around L* hosts with properties of hosts and satellites

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Explore possible interpretations of this result

SDSS Sample

Host stellar mass > $10^{10.5}$ M_{solar}

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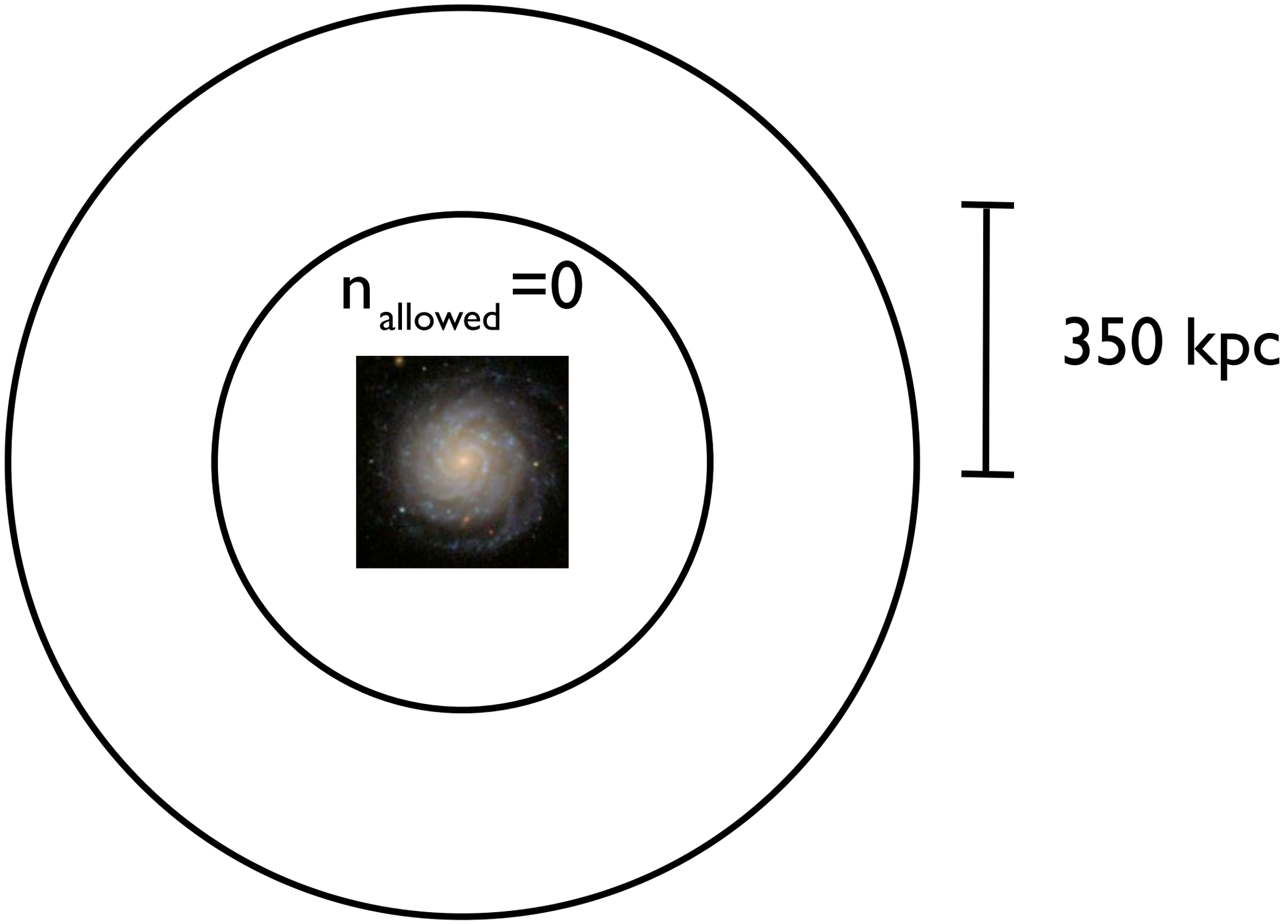
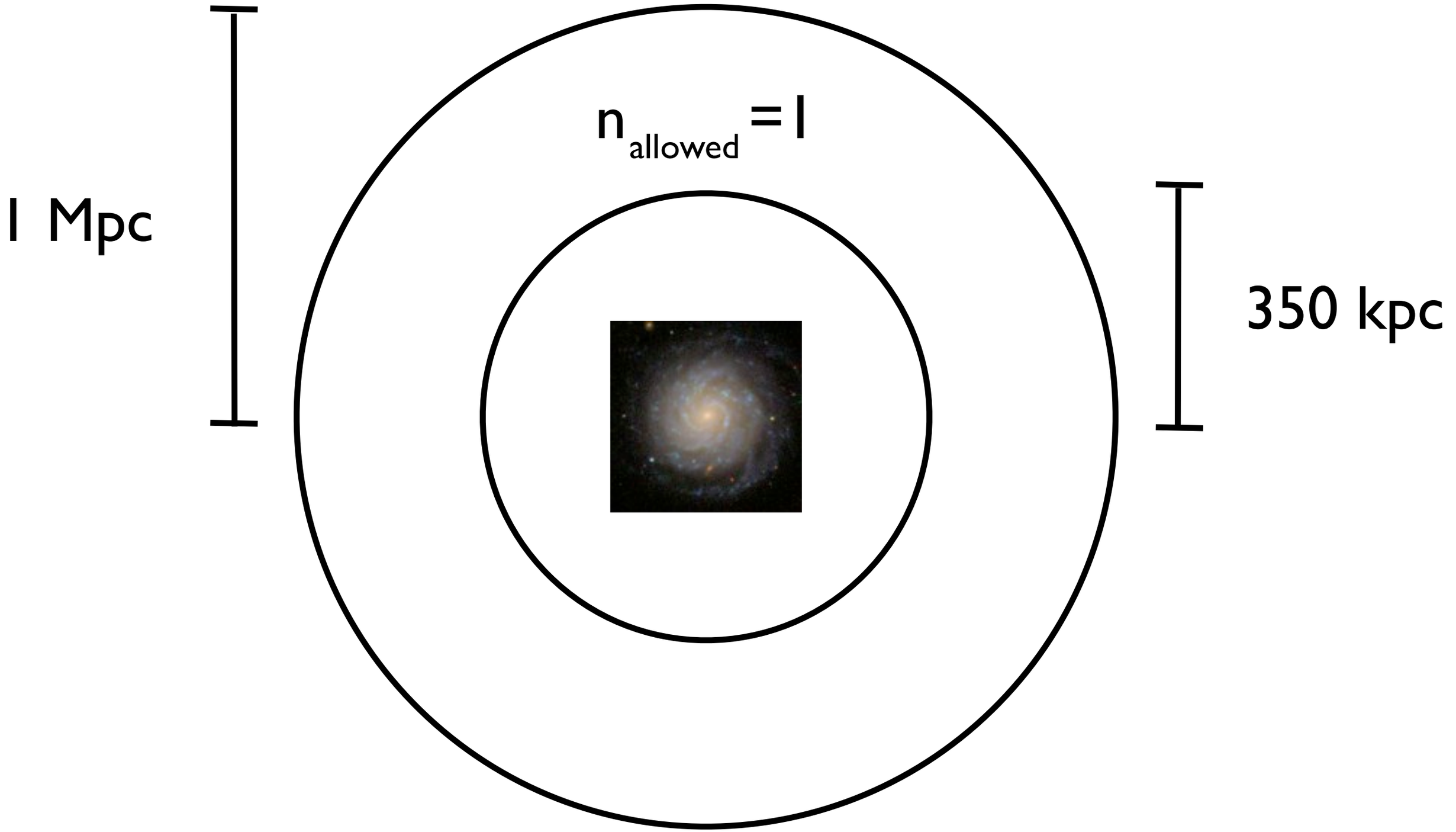
Host is isolated

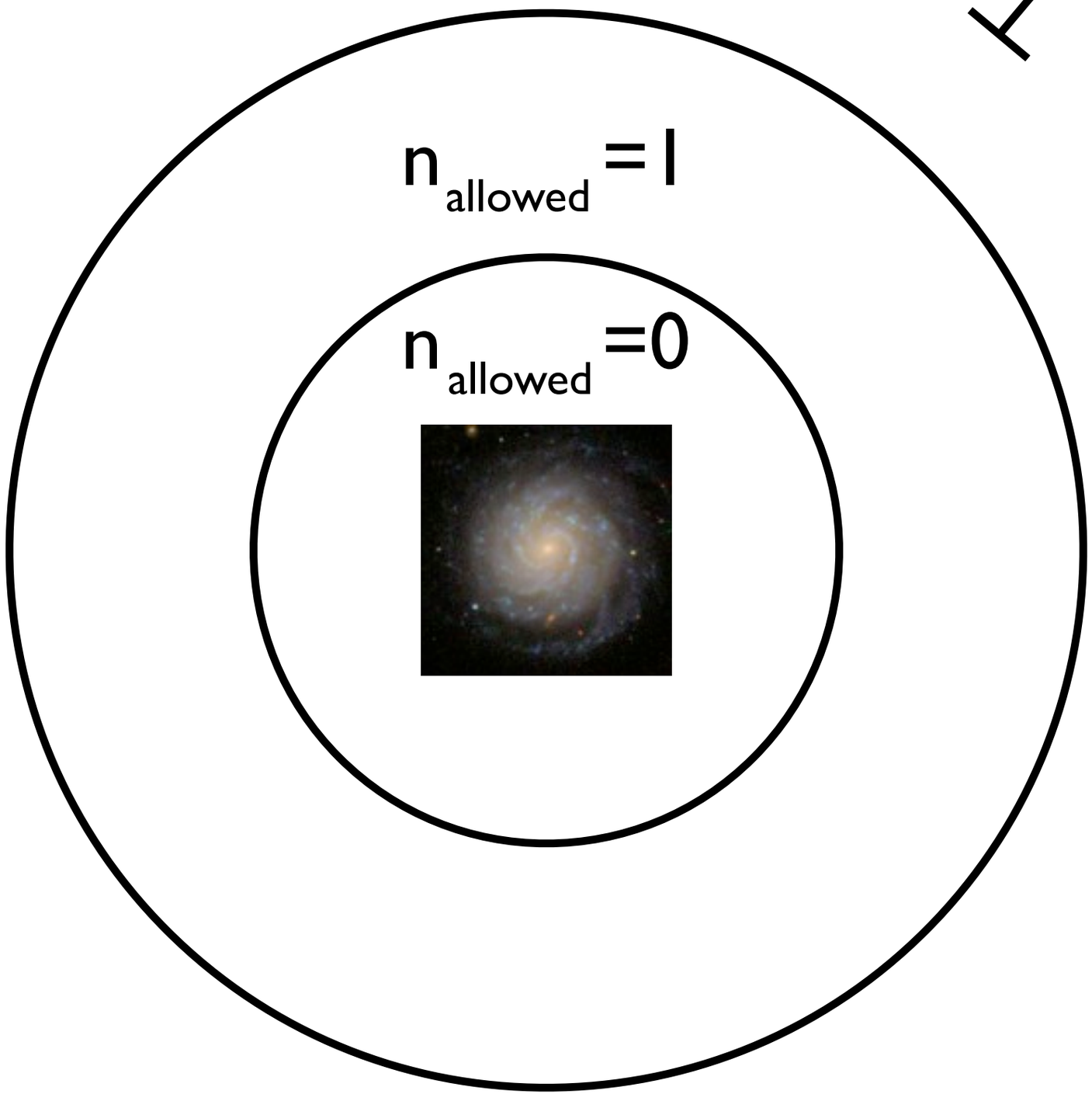
Isolation



Isolation



Isolation



SDSS Sample

Host stellar mass > $10^{10.5}$ M_{solar}

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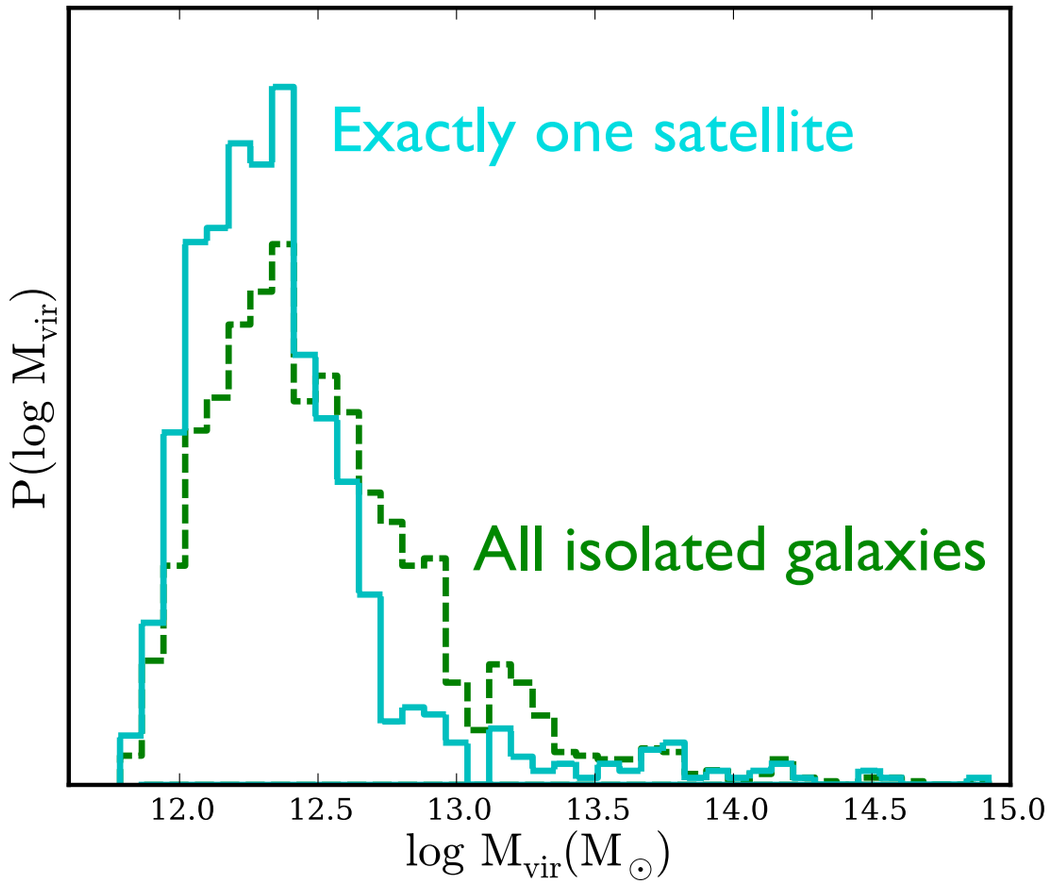
Host virial mass few x 10^{12} M_{solar}

Virial Mass Distributions



Requiring exactly one satellite selects lower mass halos (~ 2 x 10^{12} M_{solar})

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Satellite stellar mass [$10^{9.5}$,$10^{10.5}$] M_{solar}

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Satellite within 350 kpc projected, 500 km/s

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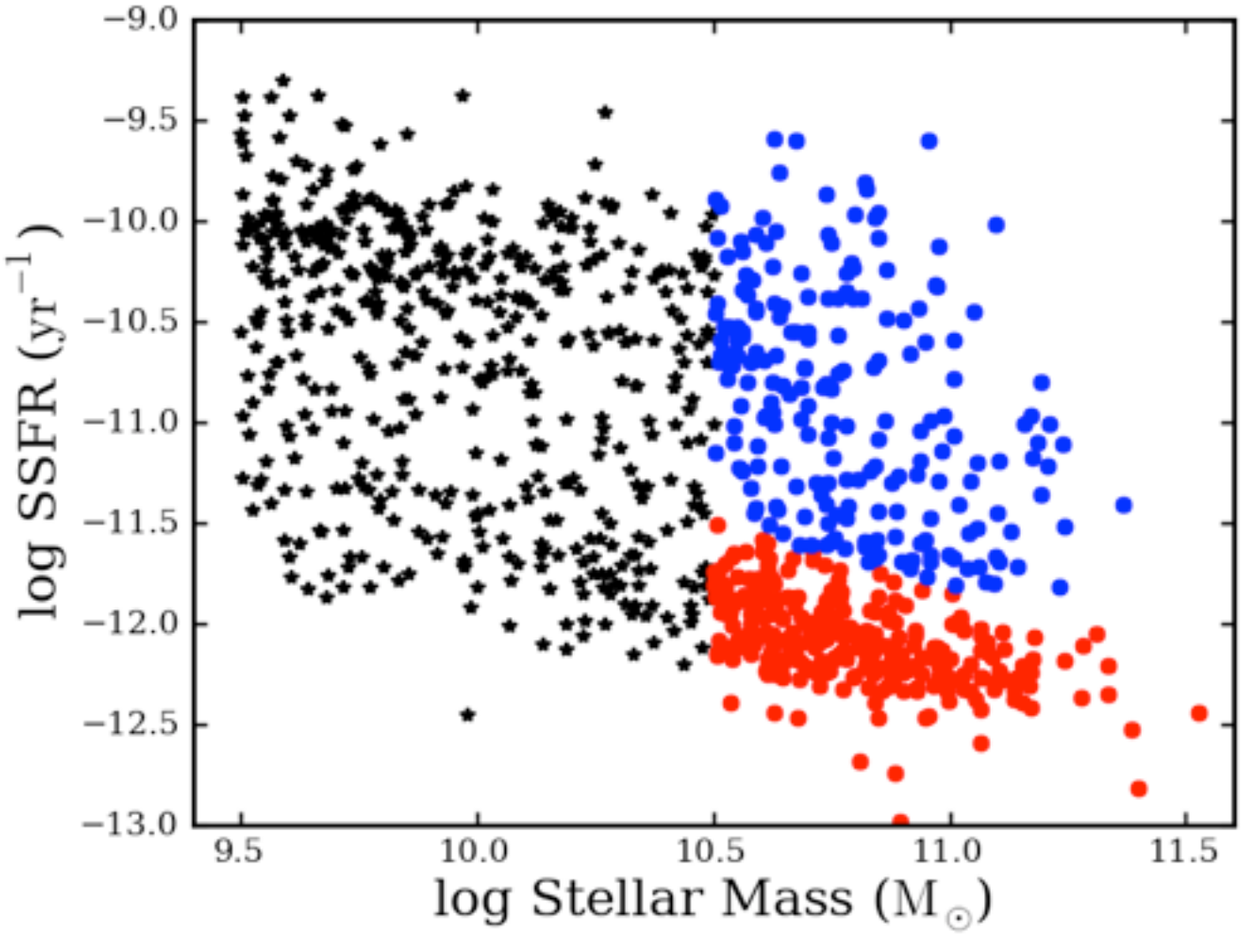
Satellite stellar mass [$10^{9.5}$,$10^{10.5}$] M_{solar}

Satellite within 350 kpc projected, 500 km/s

Control sample is isolated by 3 Mpc, 400 km/s

SDSS Sample



483 host/satellite pairs

204 around star forming hosts

279 around passive hosts

Satellite Quenching

Define conversion fraction

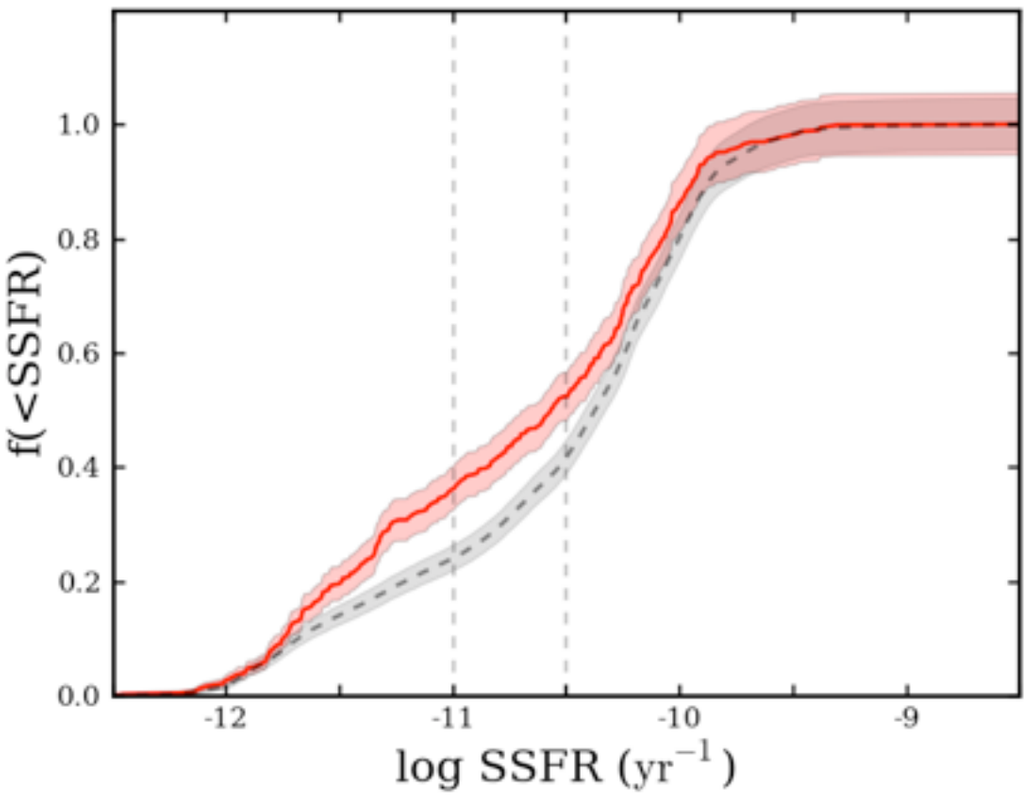
$$f_{convert} = \frac{f_{quenched,sat} - f_{quenched,control}}{f_{unquenched,control}}$$

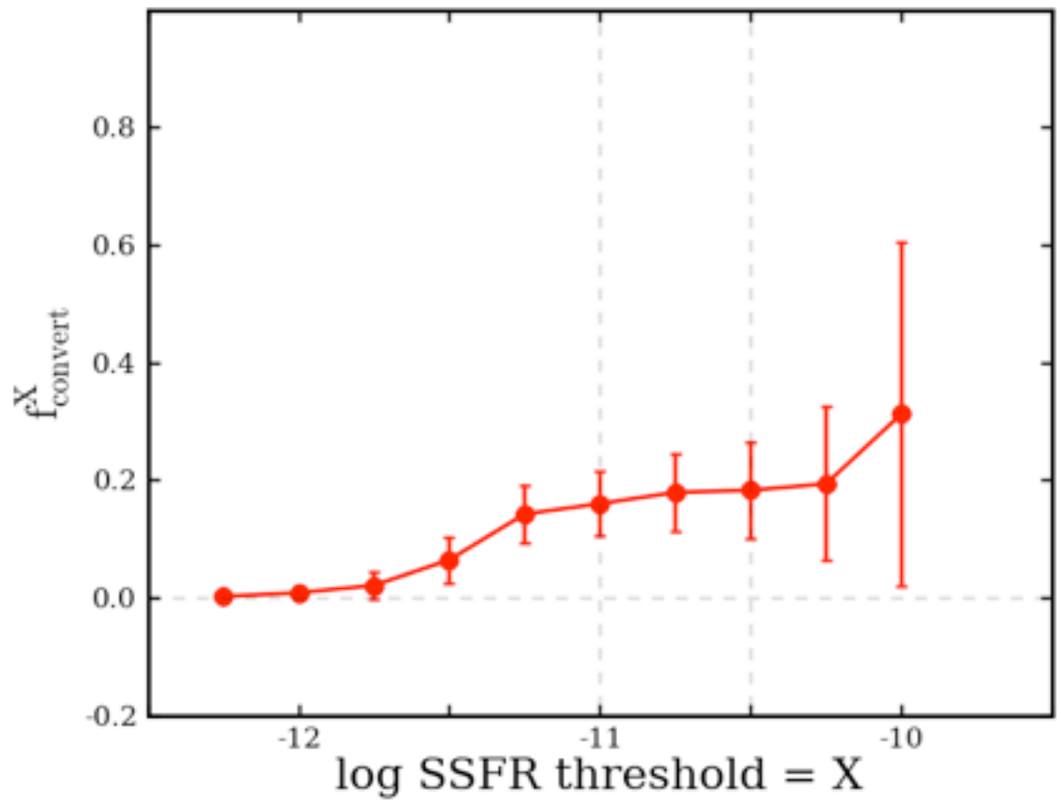
Fraction of satellites that become quenched after infall

Can play games with definition of “quenched”

Satellite Quenching

All Satellites



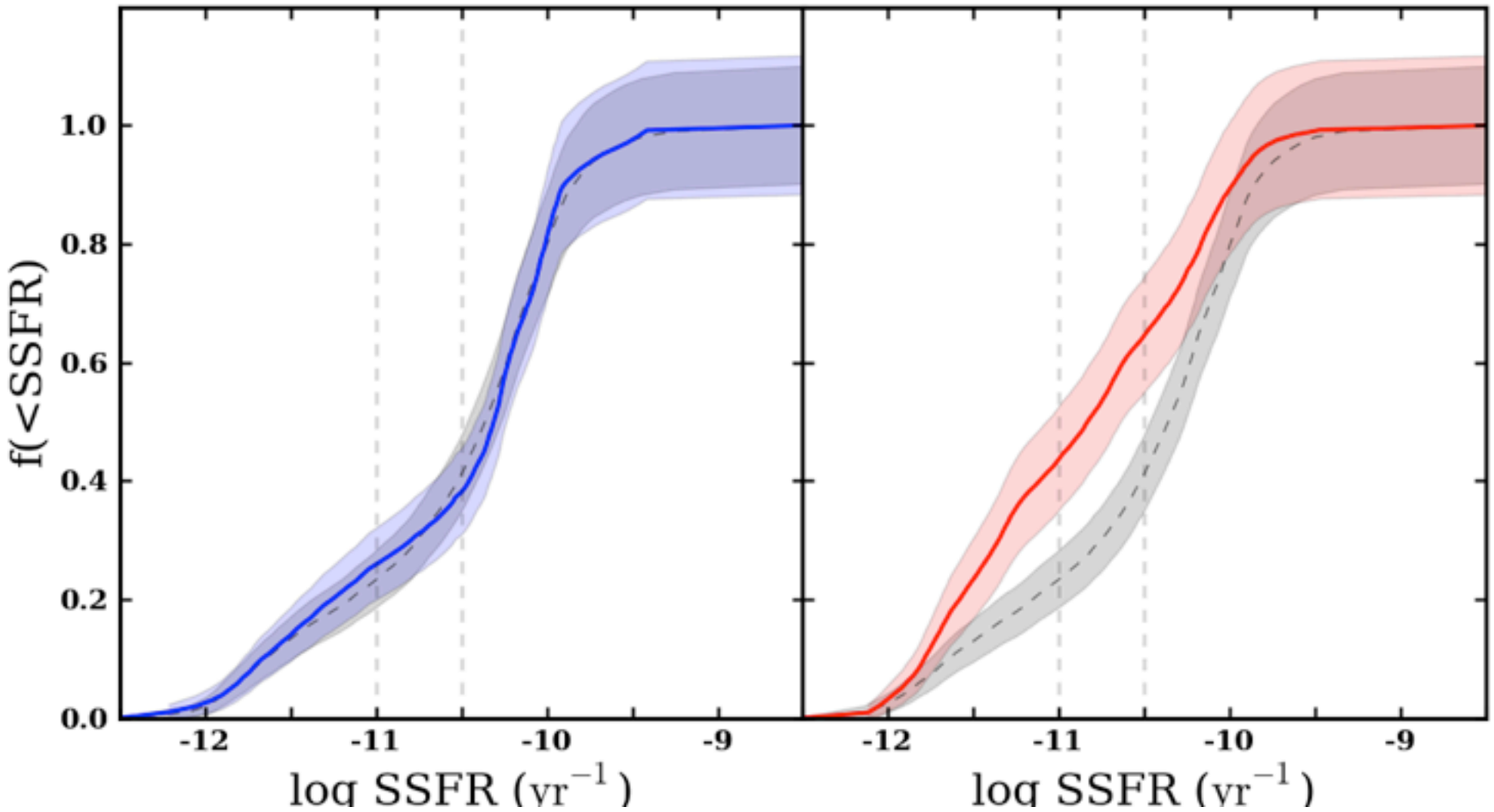


$$f^{-11}_{convert} = \sim 20\%$$

The Dichotomy

SF Hosts

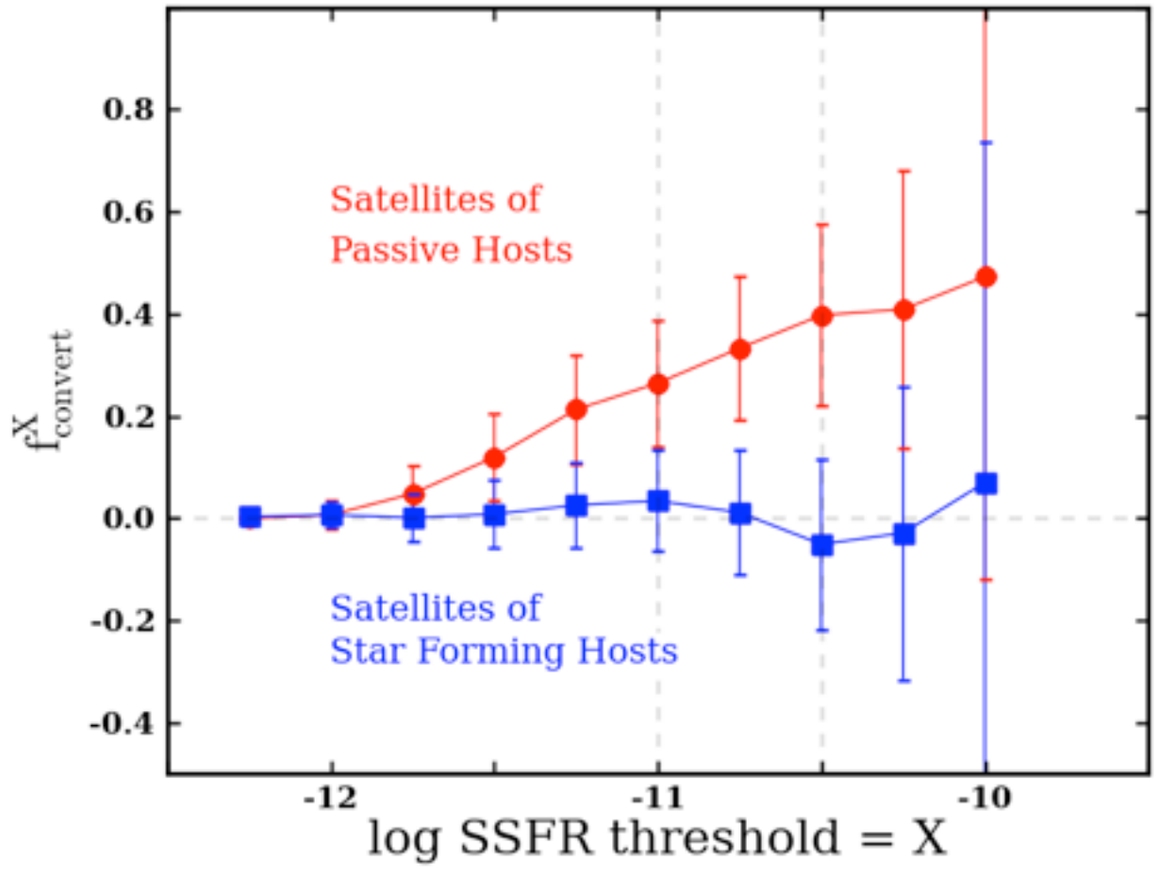
Passive Hosts



$f^{-11}_{convert}$ = ~0%

$f^{-11}_{convert}$ = ~30%

The Dichotomy



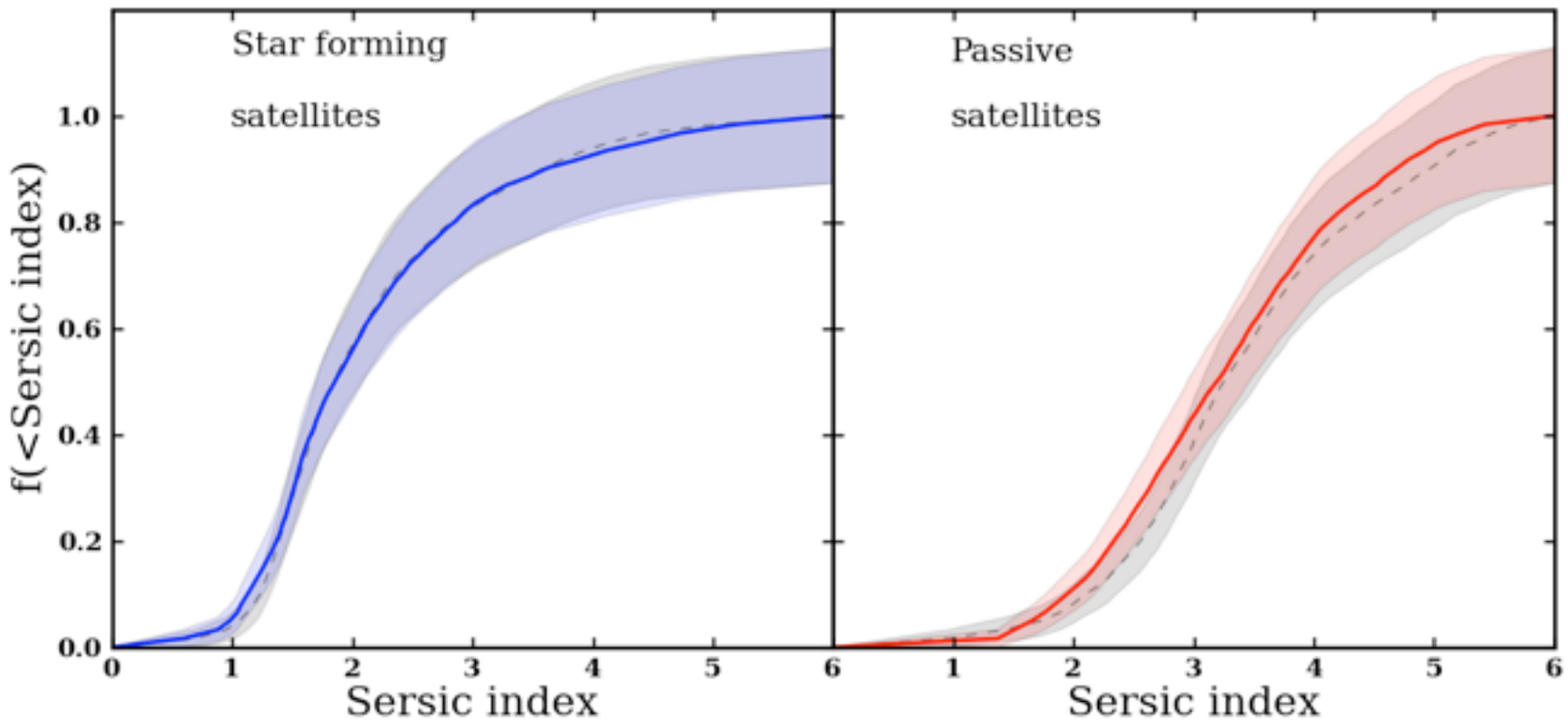
$f^{-11}_{convert}$ = 0%

$f^{-10.5}_{convert}$ = 0%

$f^{-11}_{convert}$ = 30%

$f^{-10.5}_{convert}$ = 40%

The Dichotomy

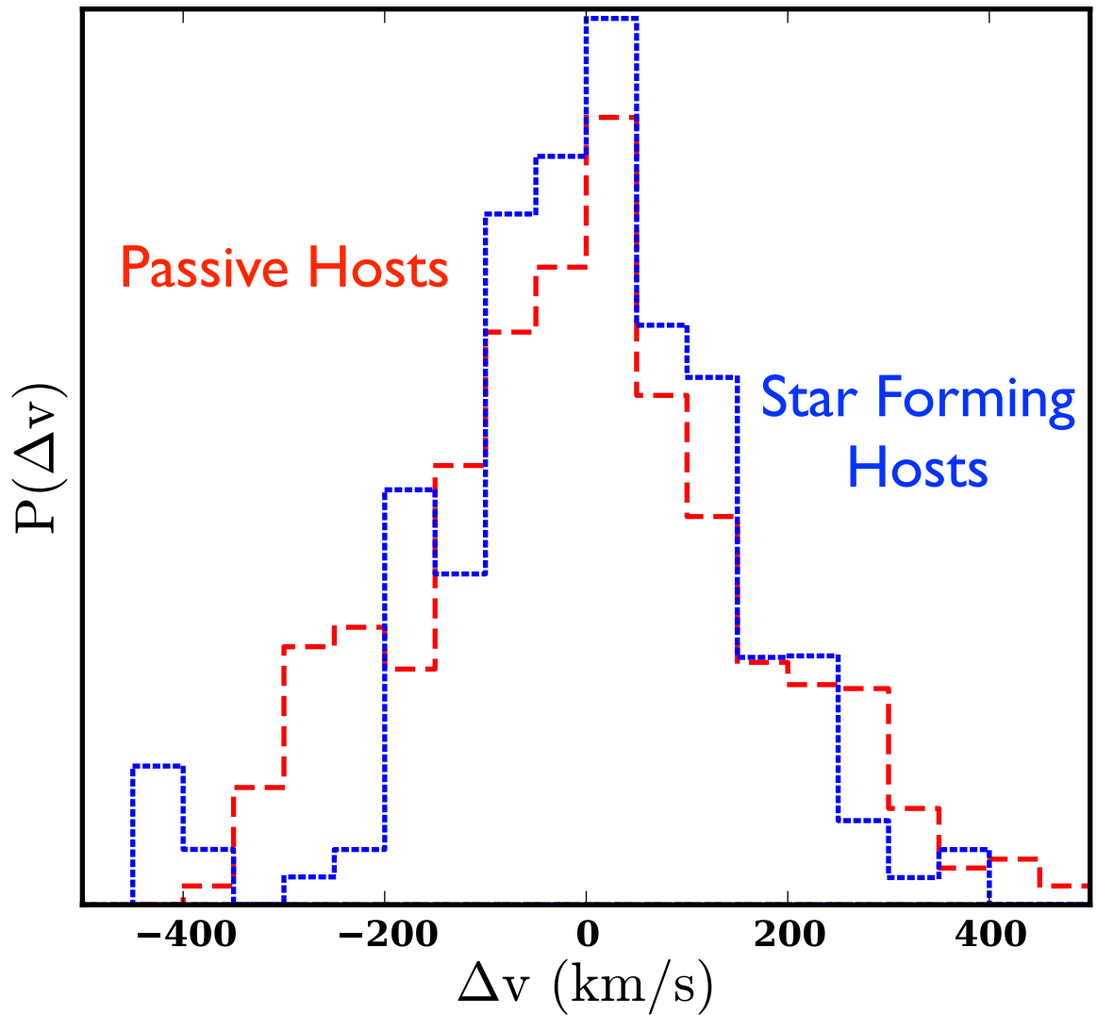


Satellite of passive hosts are morphologically indistinct from their field counterparts!

Interpretations

σ = 165 km/s

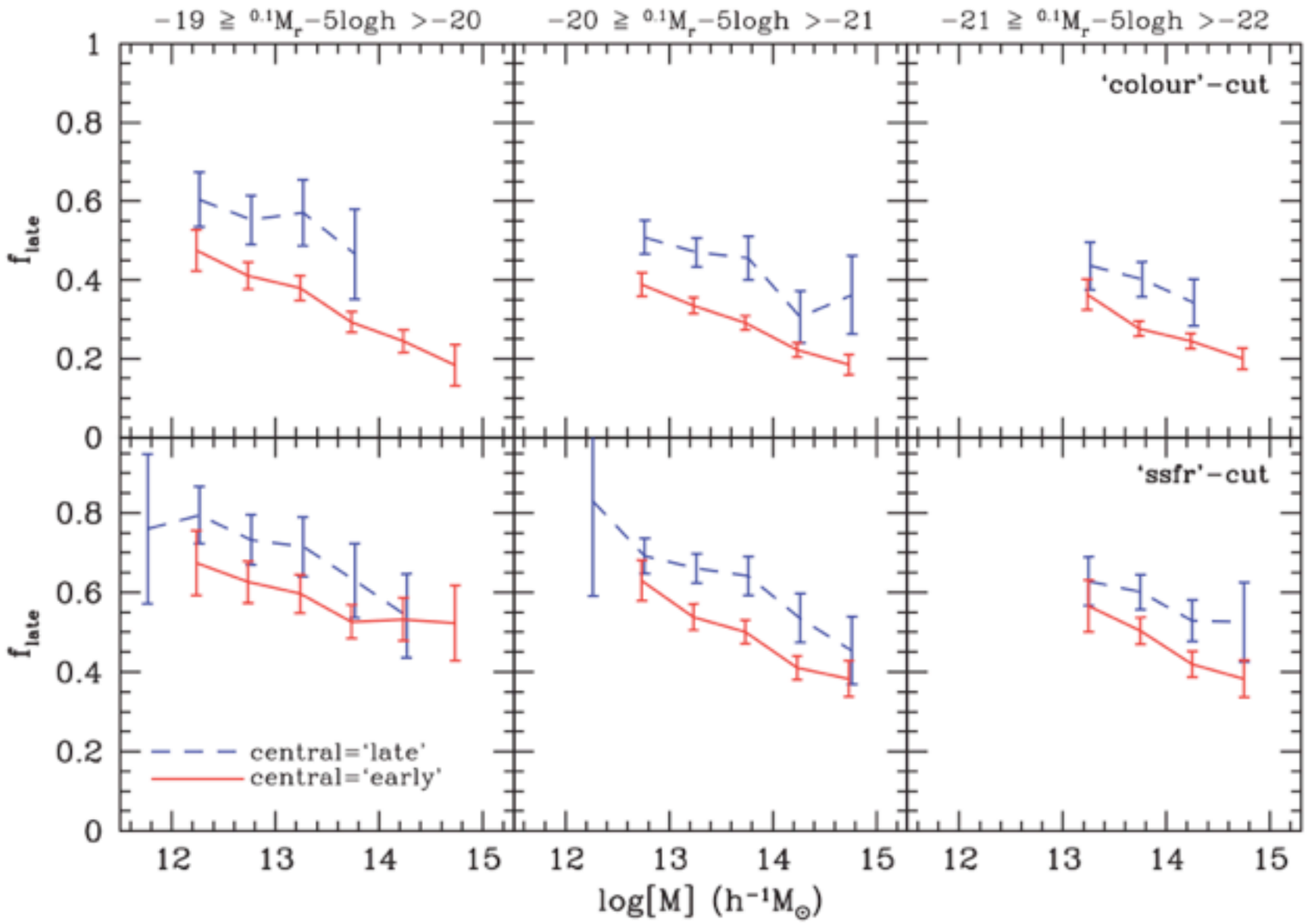
σ = 145 km/s



Stacked satellite velocity dispersions point to ~50% more massive halos for passive galaxies

Interpretations

Host halo mass effect?

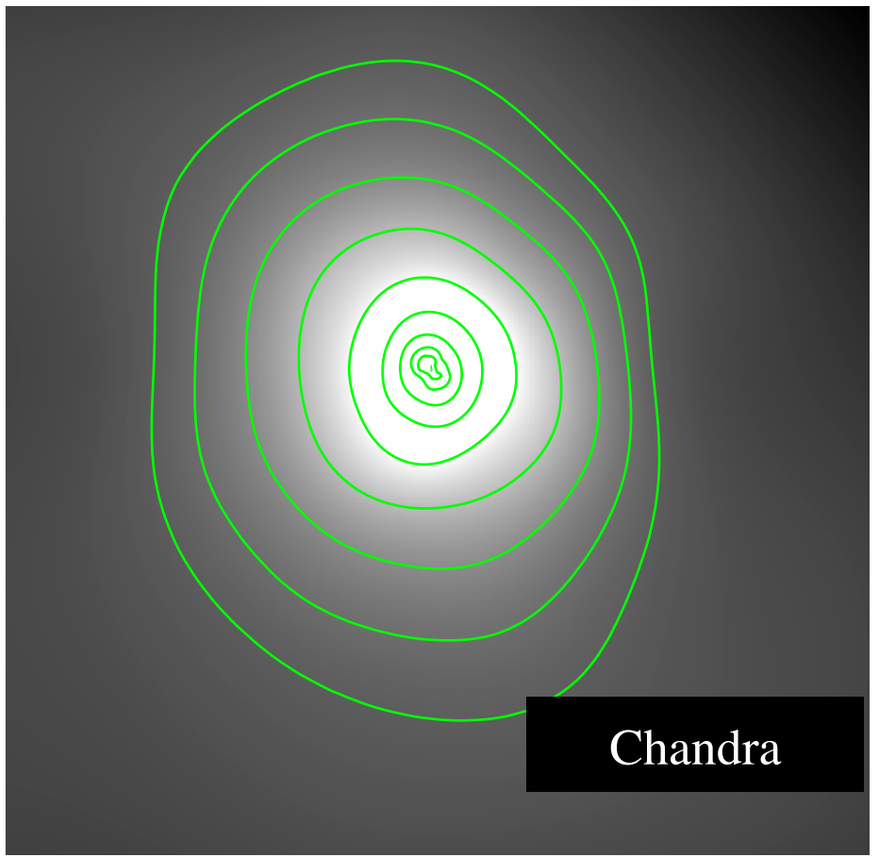


Weinmann+ 2006

Interpretations

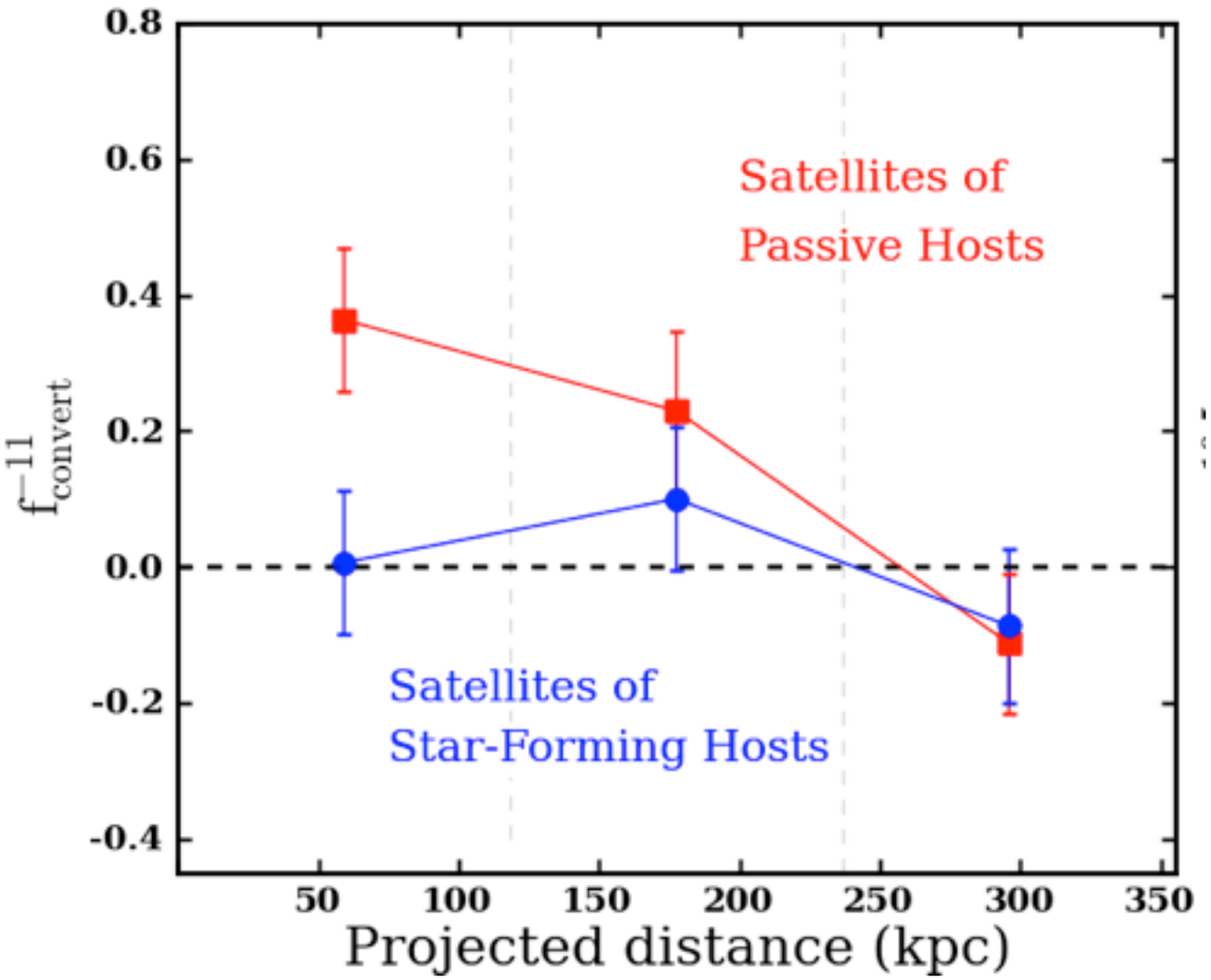
Host circumgalactic medium effect?

NGC 1521



Humphrey+ 2012

Interpretations



Radial gradient in conversion fraction around passive hosts

Interpretations

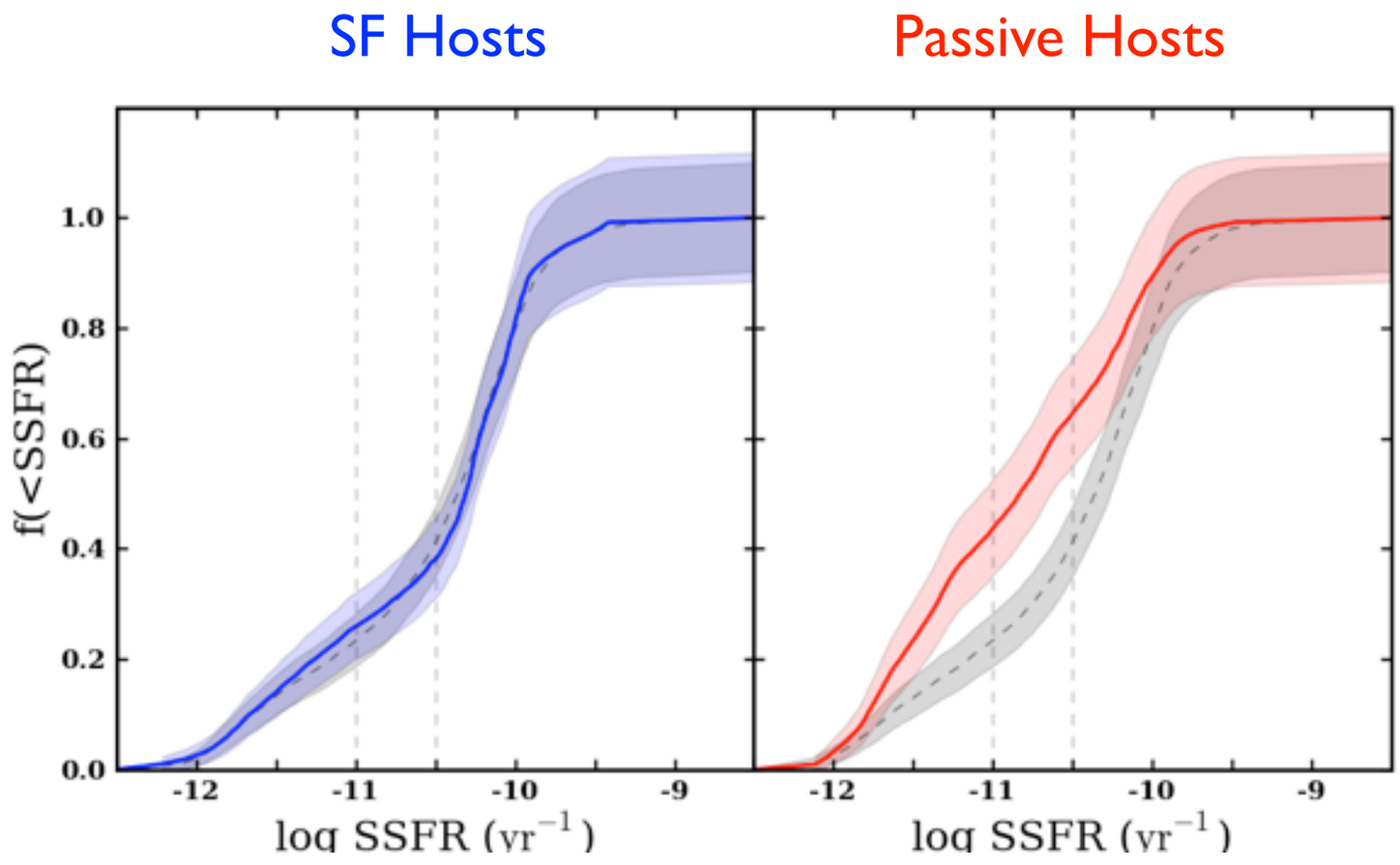
Host halo mass effect?

Host circumgalactic medium effect?

Formation/infall time effect?

???

Summary



- SF hosts: **do not quench** their satellites
- Passive hosts: **quench** their satellites.
- Satellite morphologies same as field galaxies at fixed SFR
- Satellite quenching increases at small radius
- For further results (e.g. stellar mass effects), talk to me!