

The background of the slide features several simulated galaxies, appearing as clusters of yellow and blue particles against a black space. These galaxies are scattered across the frame, with some being more prominent than others. The overall aesthetic is that of a deep space simulation.

Isolated Ultra Diffuse Galaxies in the (Simulated) Wild

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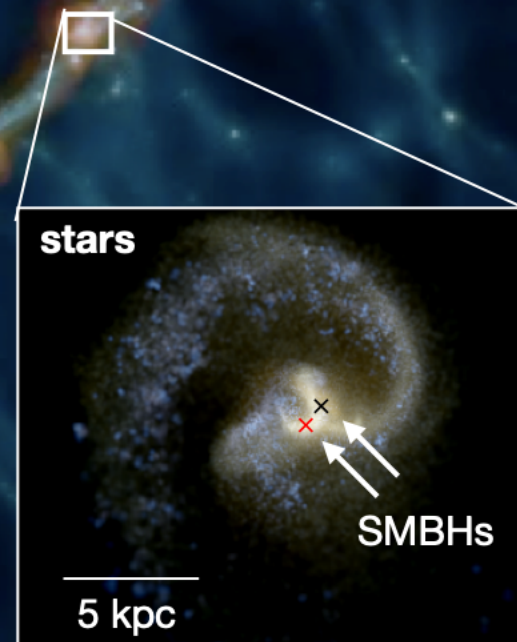
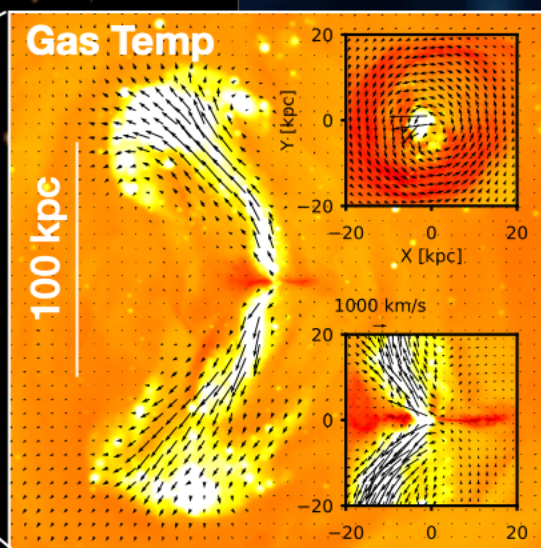
The ROMULUS Simulations

Certified organic, free-range, locally grown supermassive black holes

- ✓ Early Seeding in low mass halos
- ✓ Self-consistent and physically motivated dynamics, growth, and feedback
- ✓ Naturally produces large-scale outflows
- ✓ **No unnecessary additives or assumptions**

ROMULUSC

$10^{14} M_{\text{sun}}$ Galaxy Cluster
Tremmel+ 2019
(stars, uvj colors)



ROMULUS25

25 Mpc Volume
Tremmel+ 2017
(gas temp)

Resolution:
250 pc (grav)
50 pc (hydro)
 $\sim 1e5 M_{\text{sun}}$

CHANGA

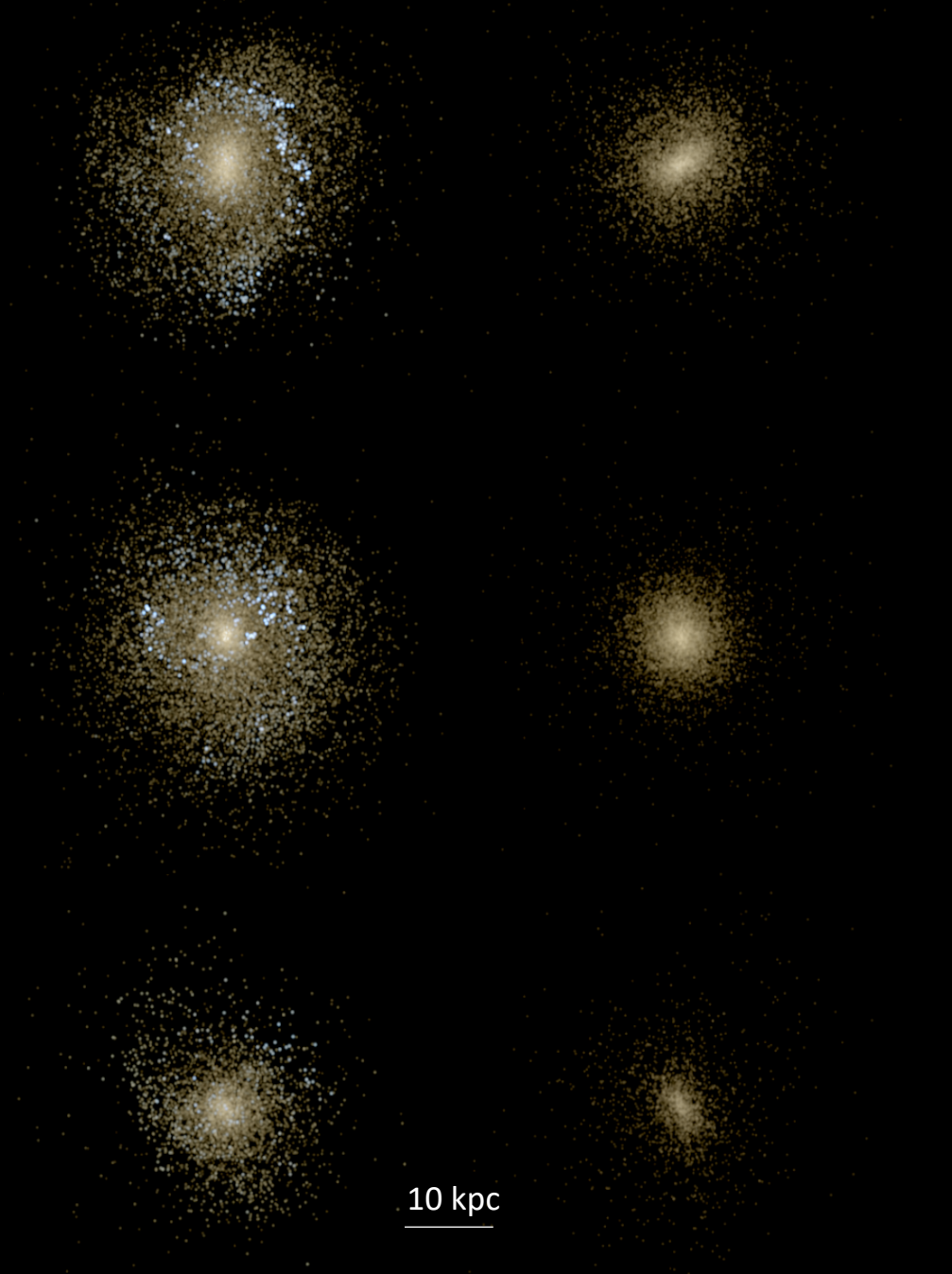
Isolated UDGs

Satellite UDGs

Ultra Diffuse Galaxies (UDGs)

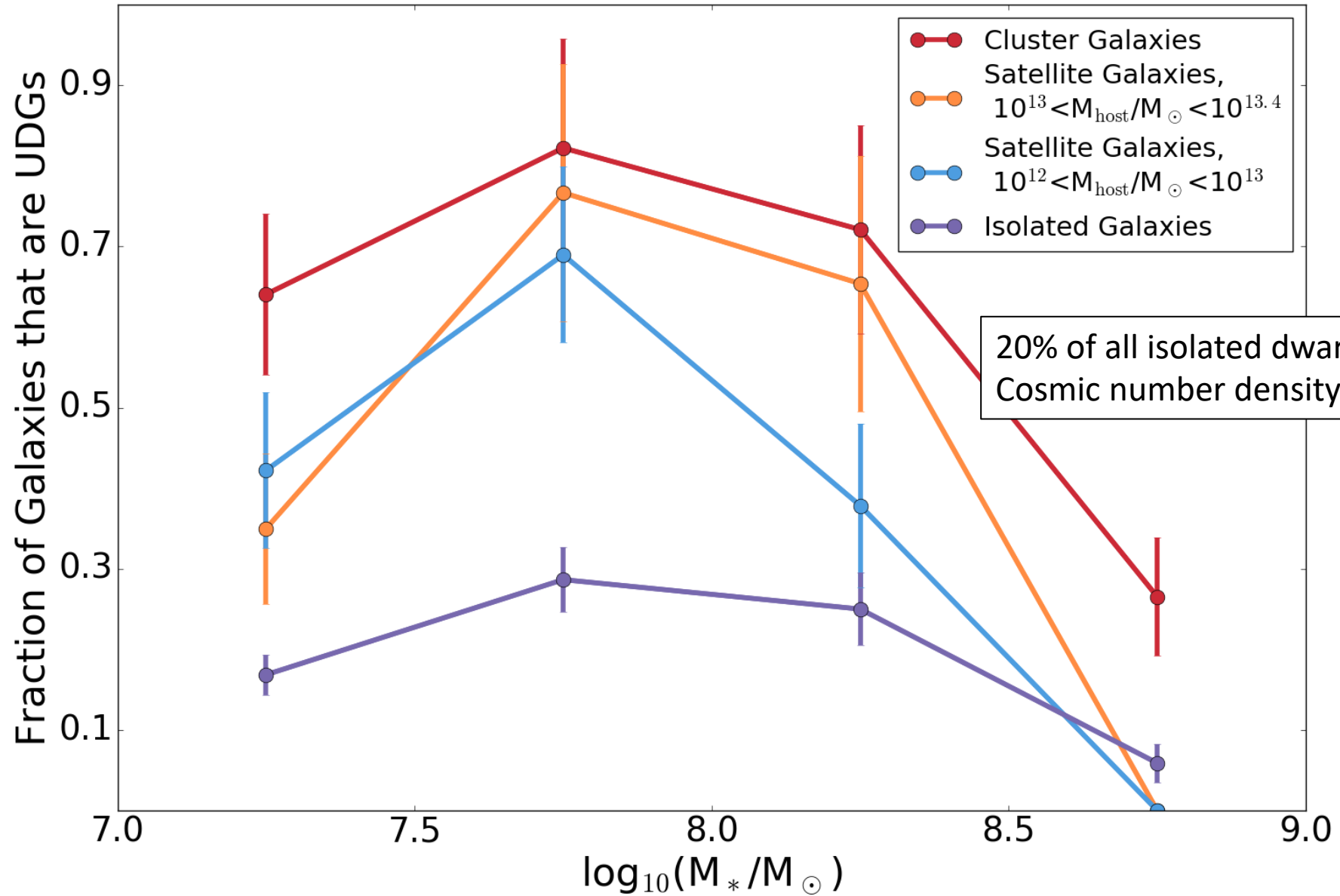
- $\mu_{0,g} \geq 24$ mags/arcsec²
- $r_{\text{eff}} \geq 1.5$ kpc

~500 UDGs in Romulus25 & RomulusC

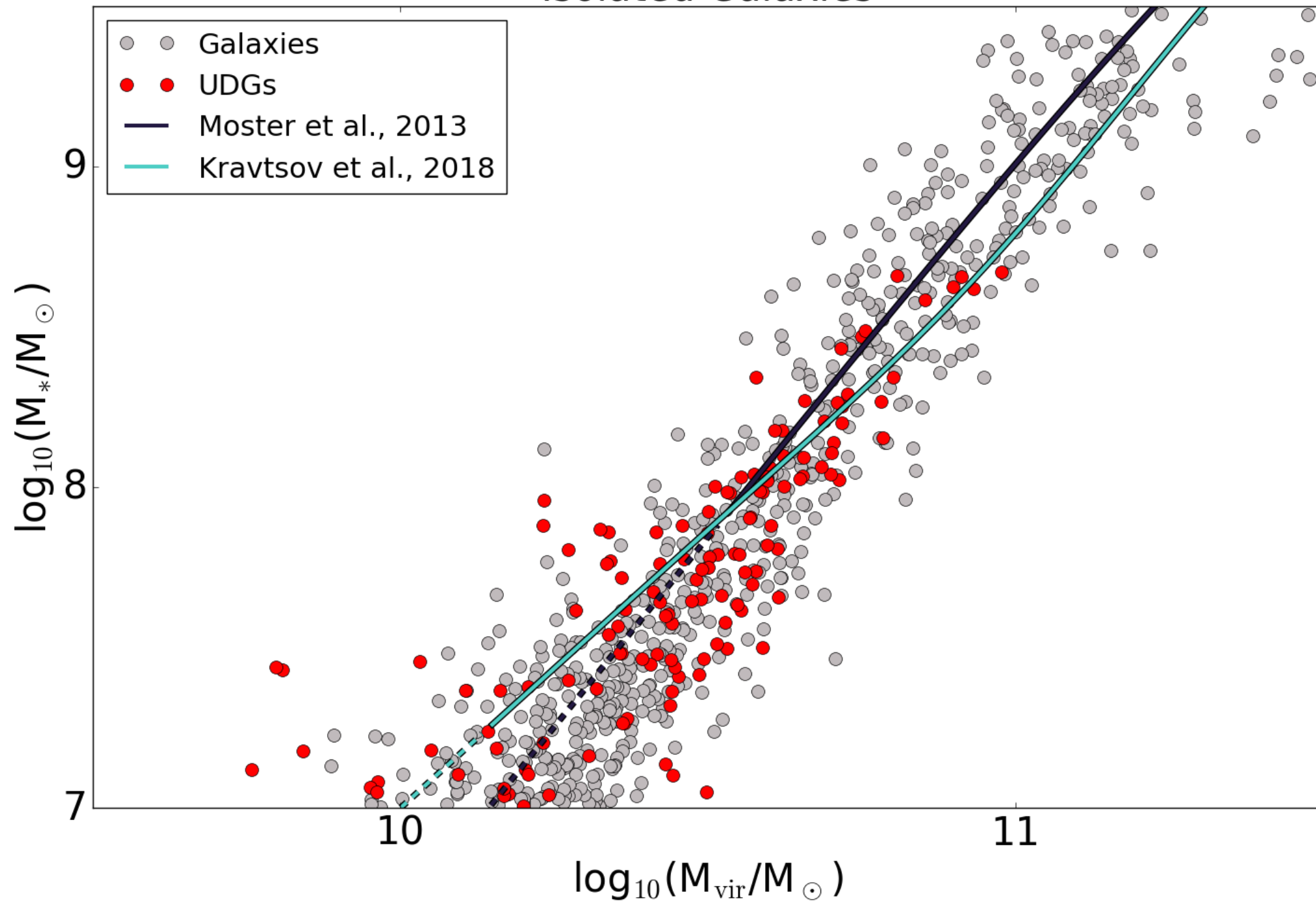


10 kpc

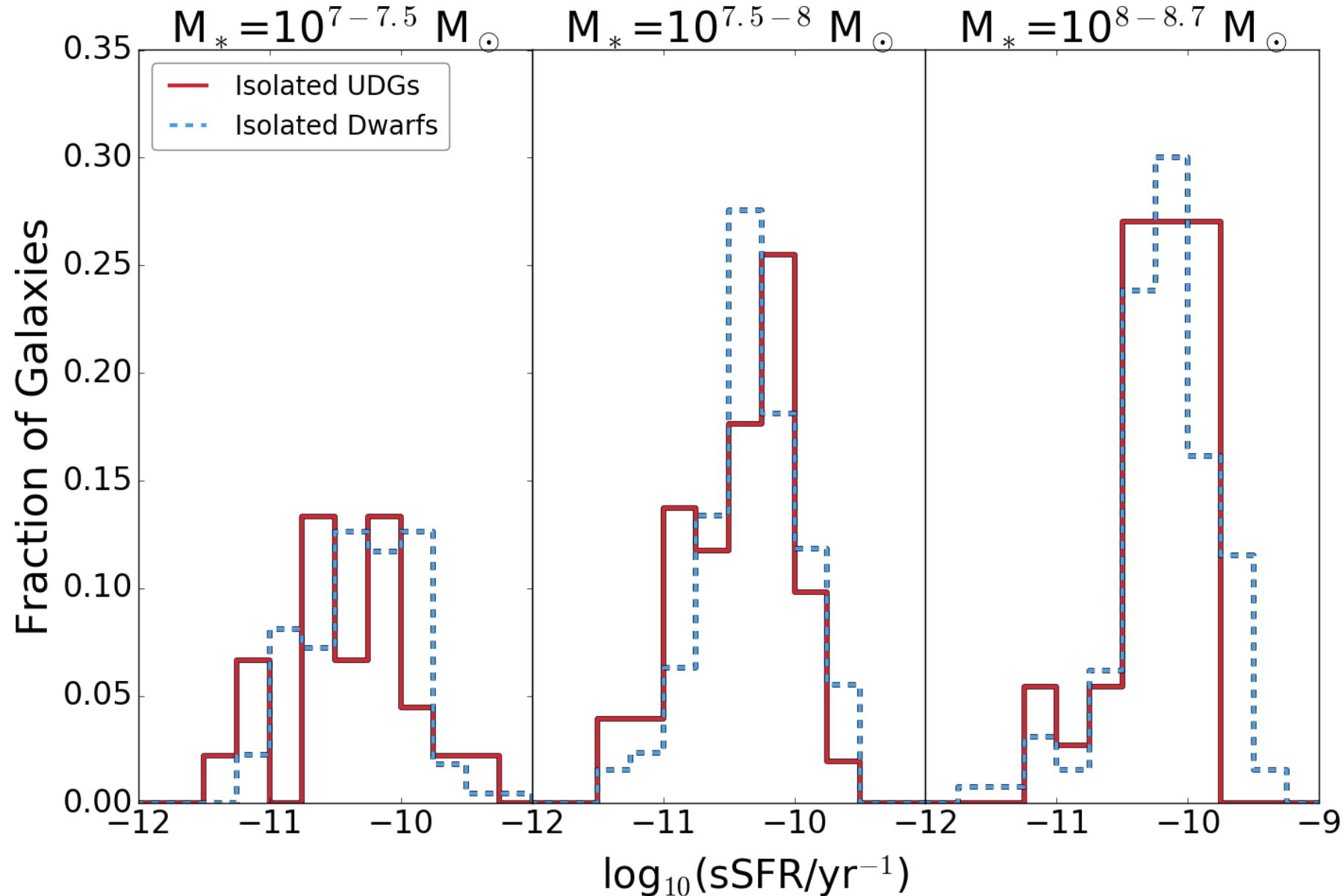
The effect of environment on UDG formation



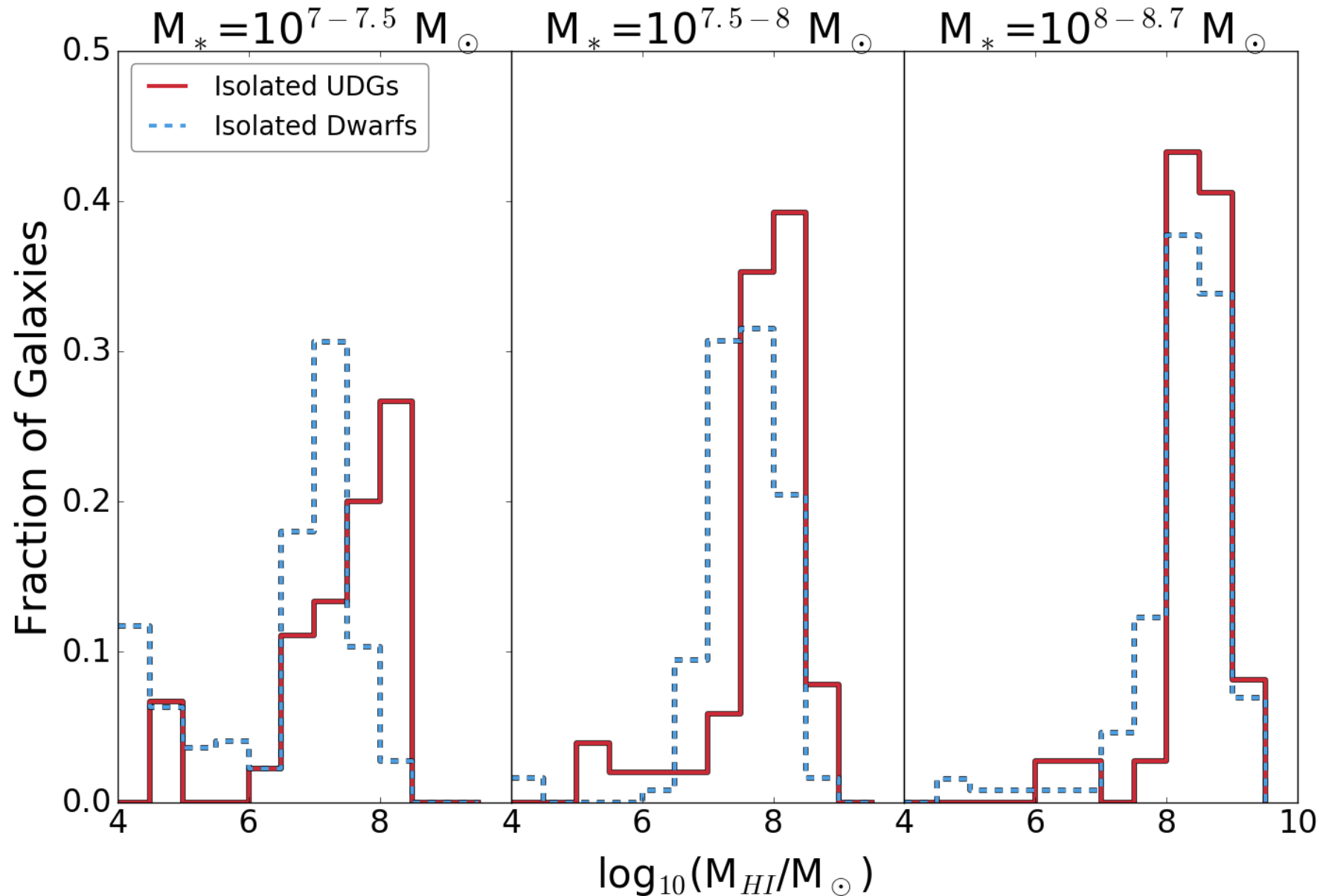
Isolated Galaxies



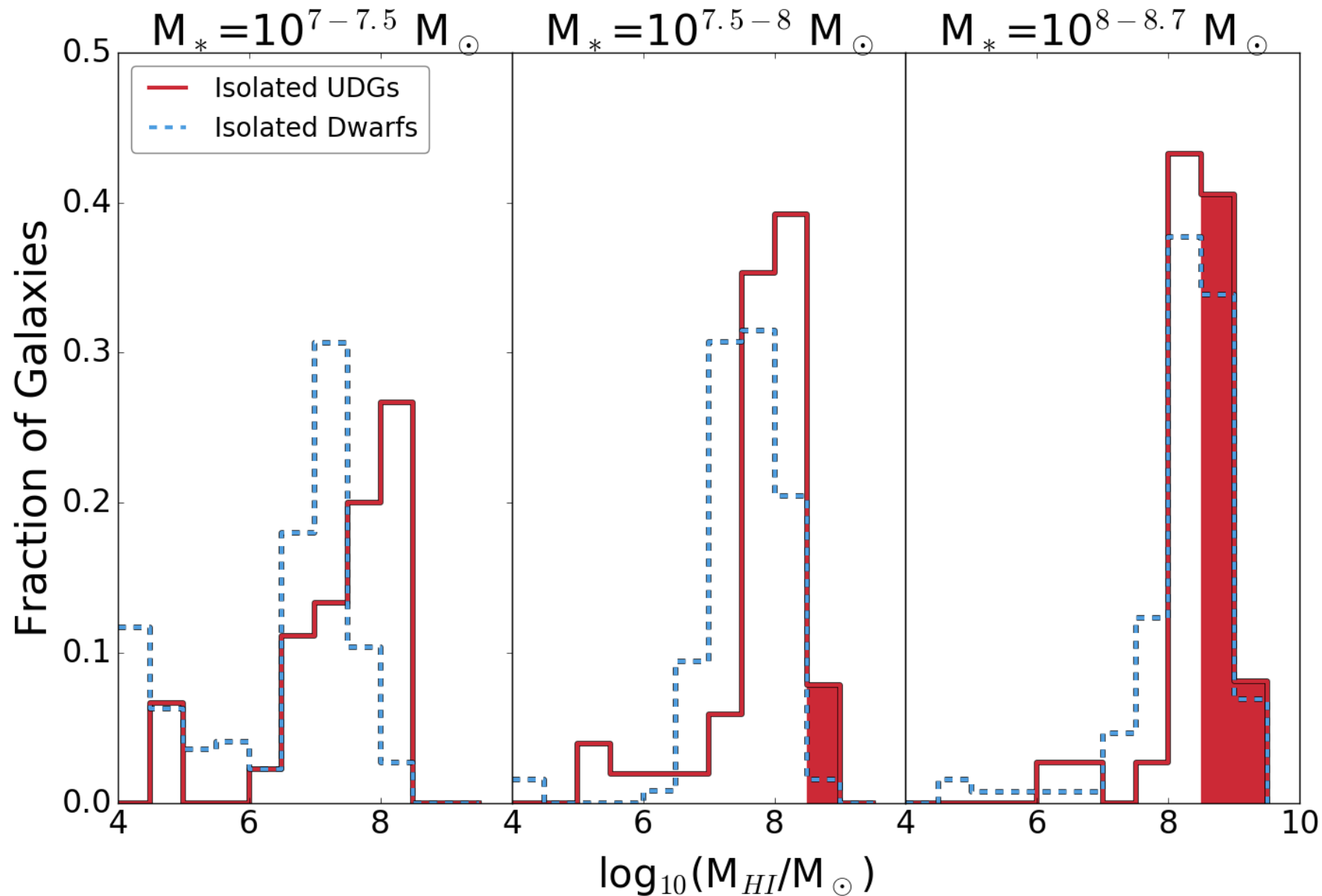
Star formation in isolated UDGs



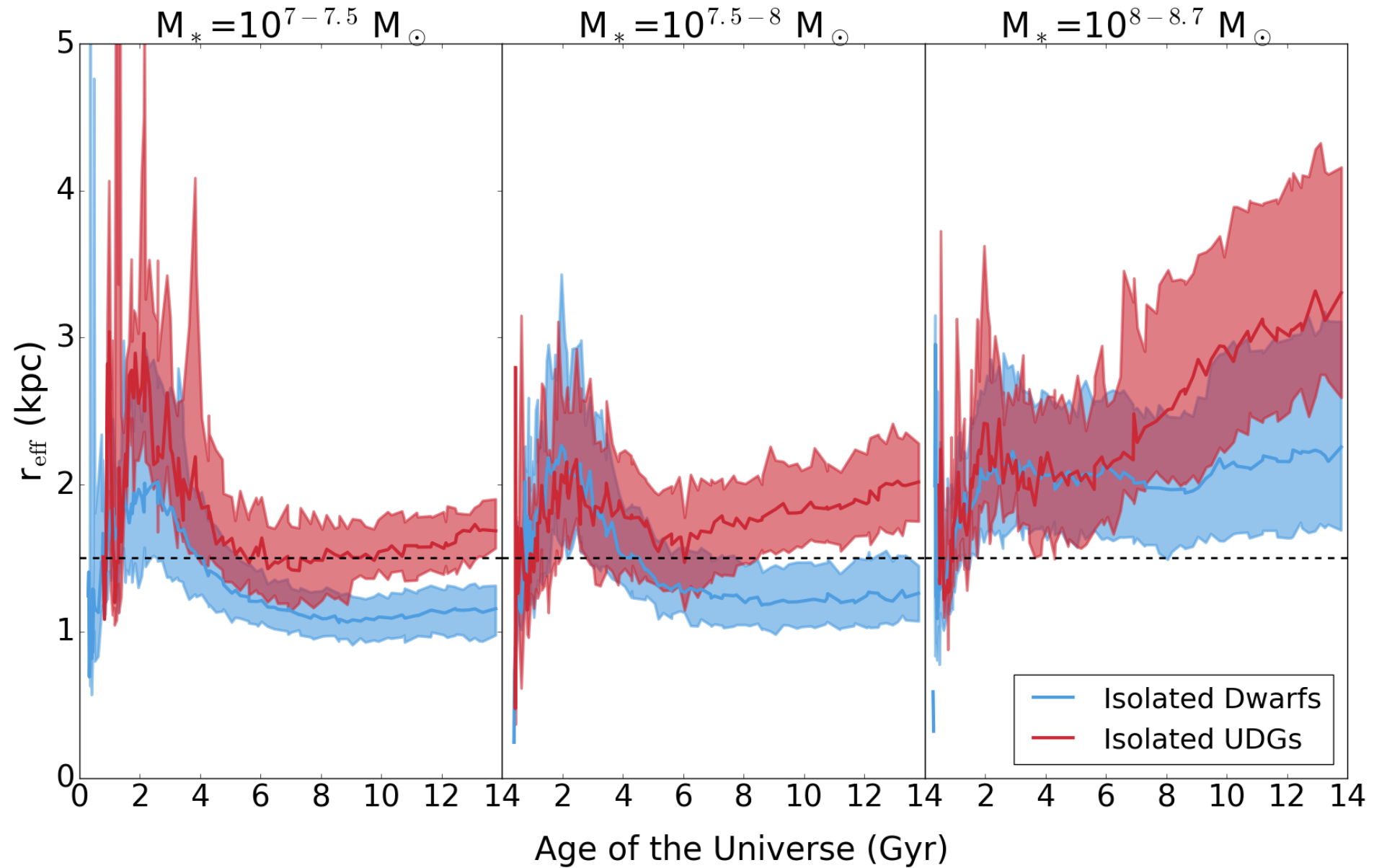
HI in isolated UDGs



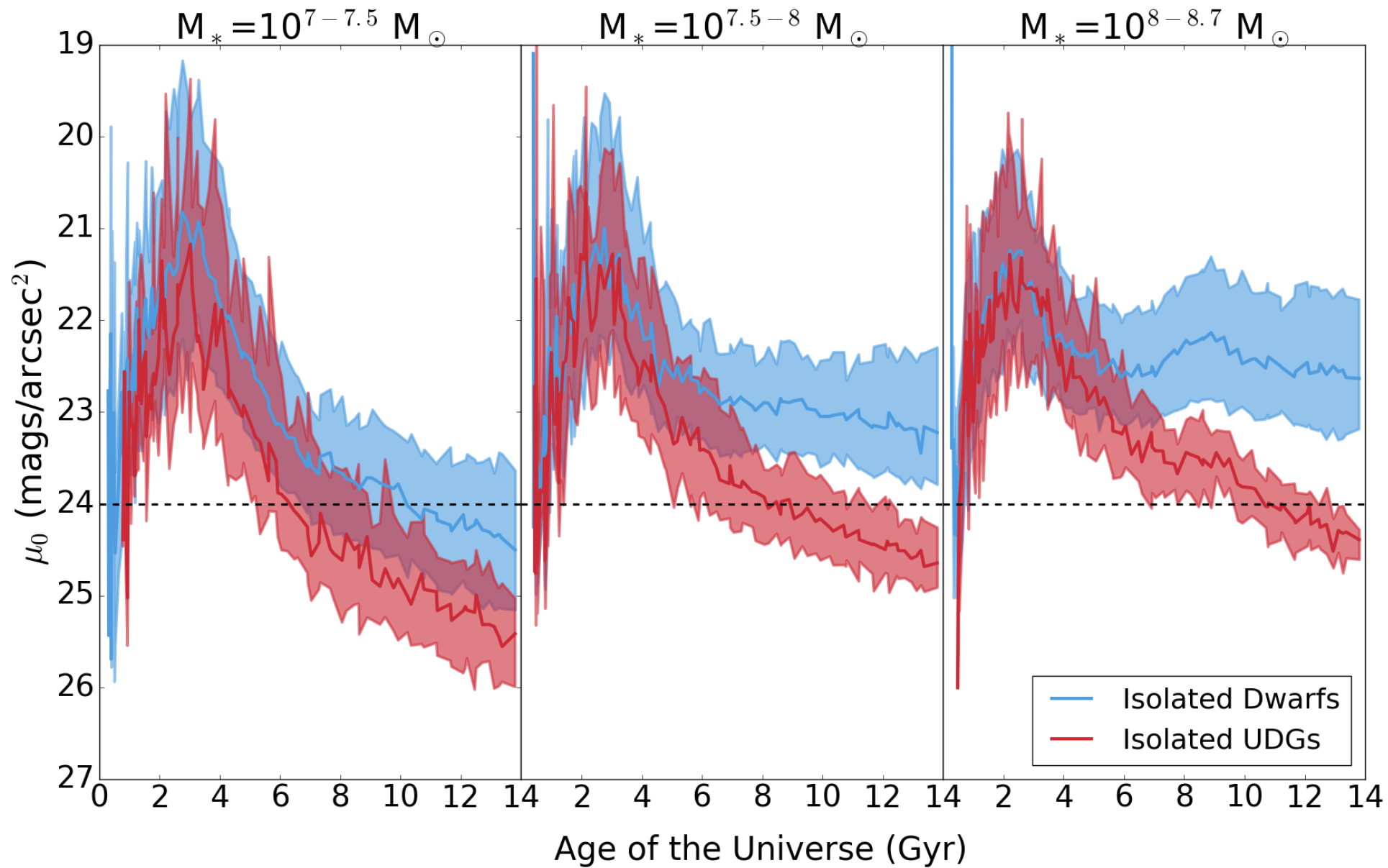
HI in isolated UDGs



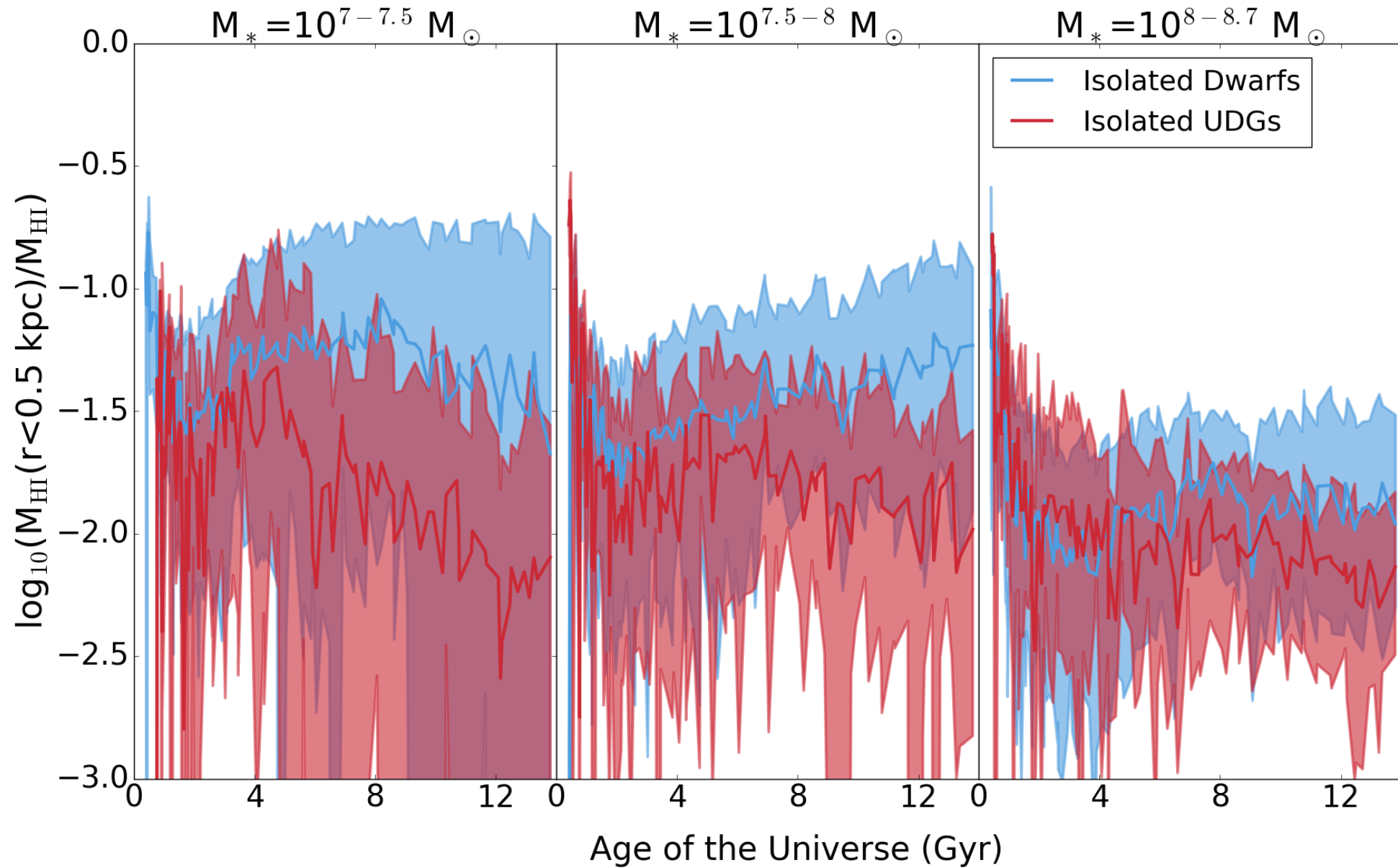
Evolution of effective radius



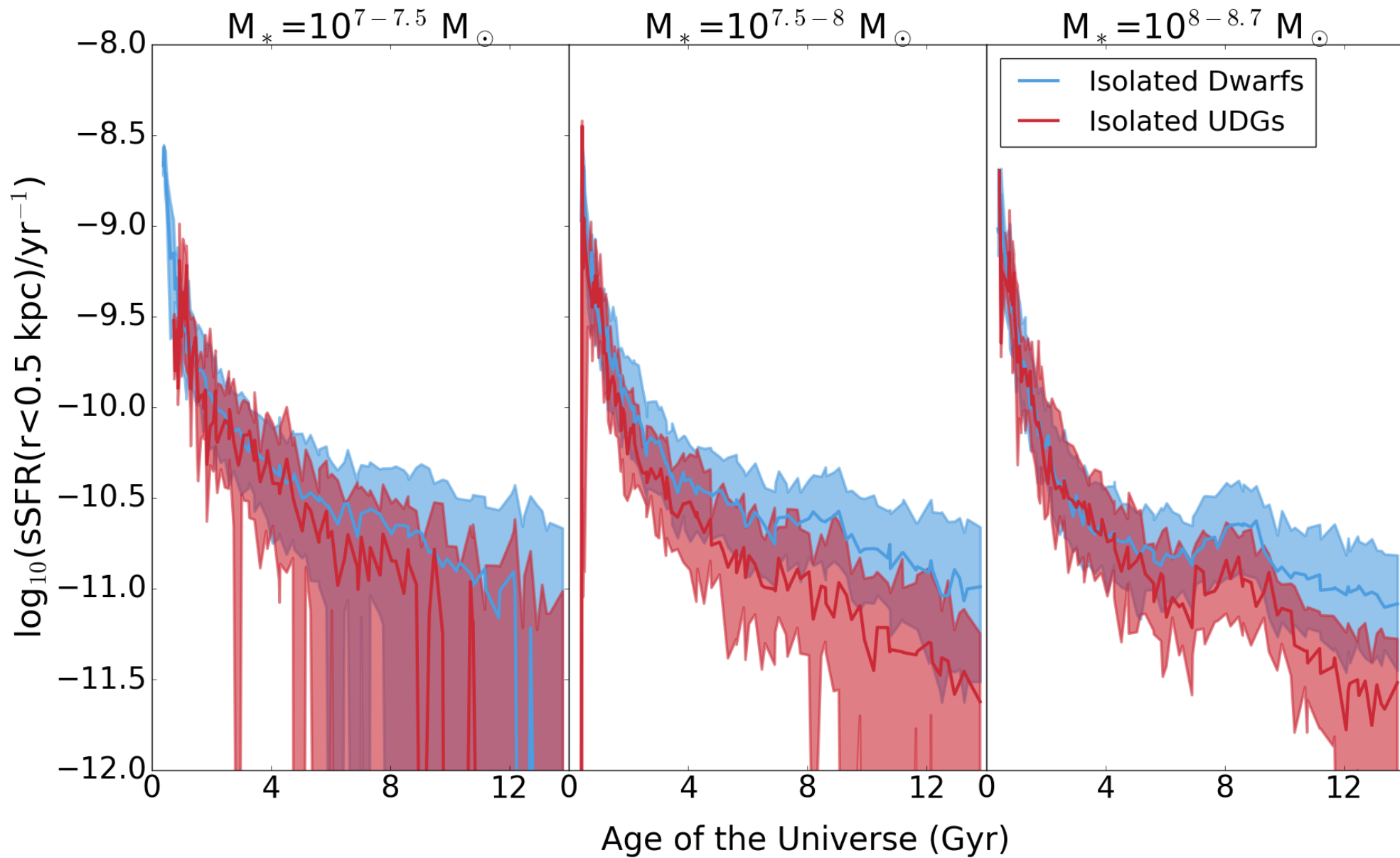
Evolution of central surface brightness



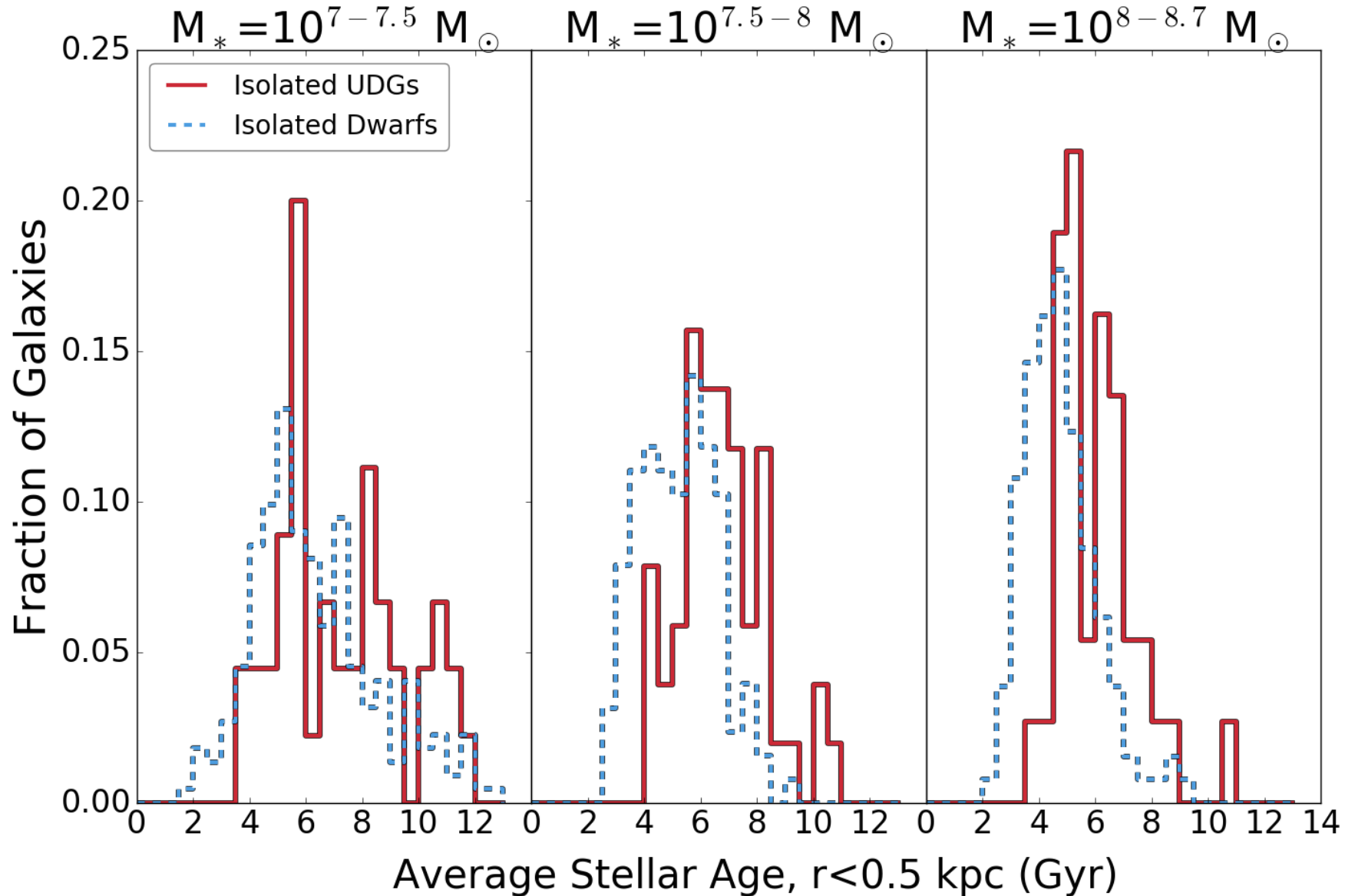
Evolution of central HI fraction



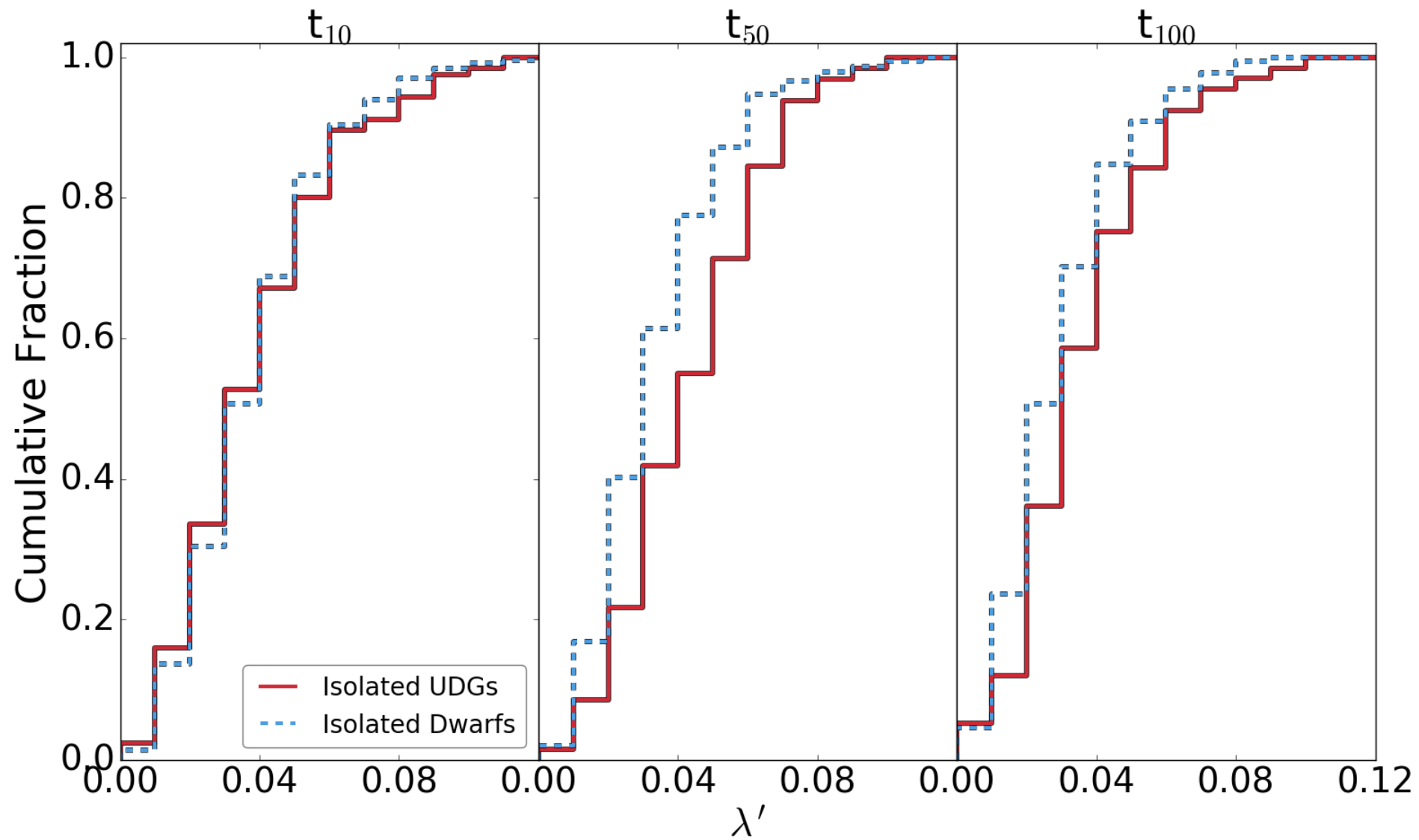
Evolution of central specific star formation rate

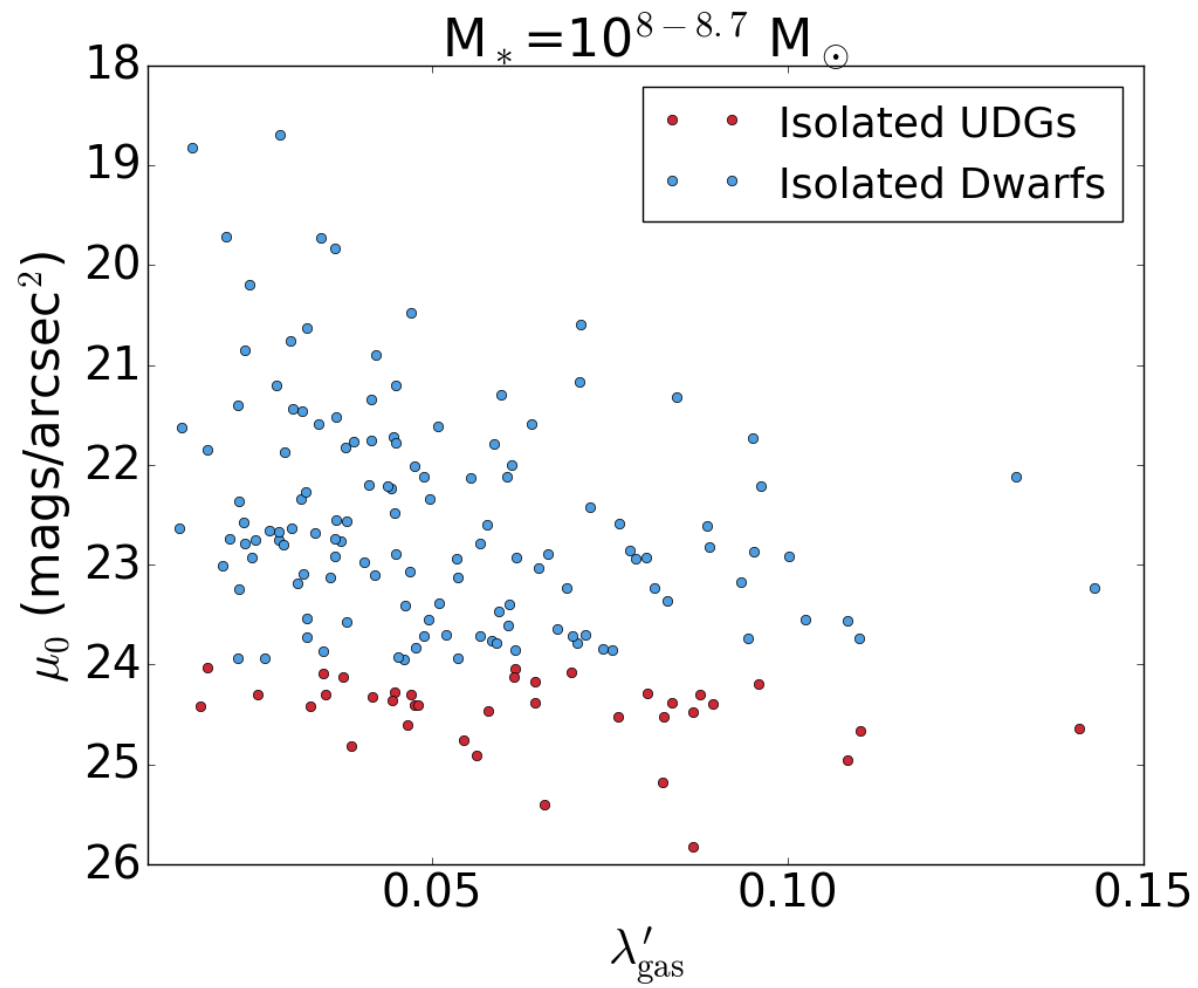
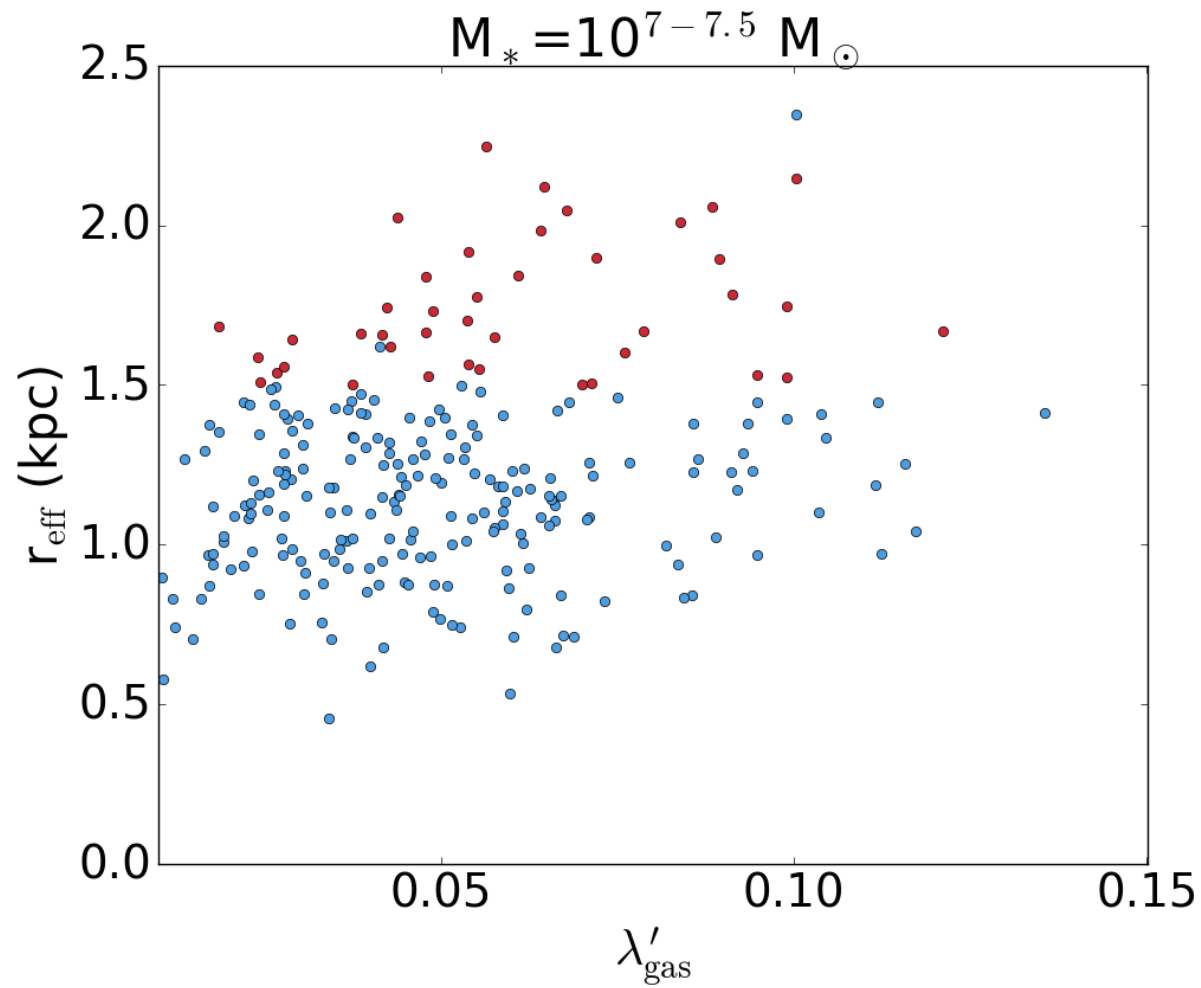


Ages of central stellar populations



Evolution of angular momentum





Summary

- Isolated UDGs account for 20% of isolated dwarfs
- Isolated UDGs are predominantly HI-bearing and star-forming, much like typical isolated dwarfs
- High mass UDGs are UDGs because they're faint; low mass UDGs are UDGs because they're physically large. This cannot be explained by elevated spin
- Relative to typical isolated dwarfs, UDGs have less HI and star formation in their centers, leading to older central stellar populations and lower central surface brightnesses

If you're interested in our results on cluster UDGs, keep an eye out for Tremmel et al., in prep!

