Two Distinct Classes of Quiescent Galaxies

Revealed by sizes and morphologies at Cosmic Noon in JWST PRIMER and UNCOVER

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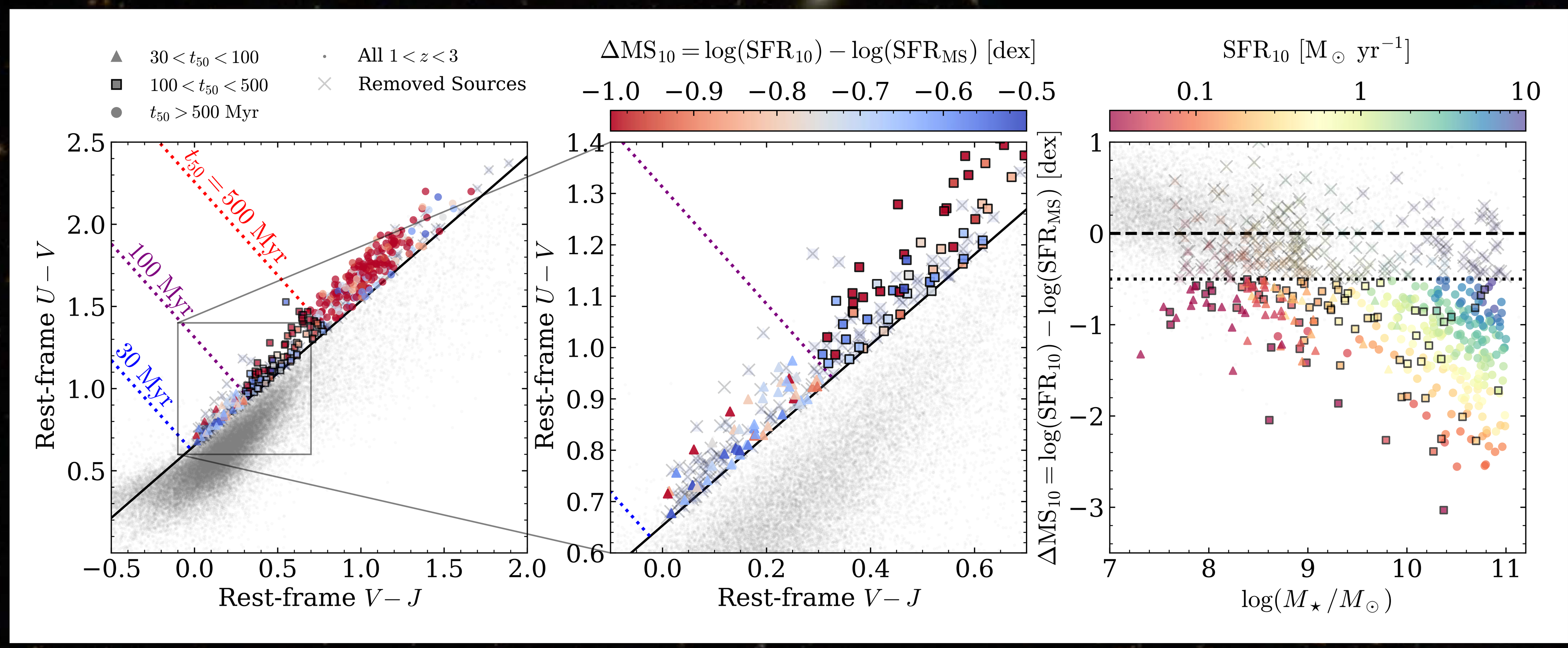
Selecting Low-Mass Quiescent Galaxies

Quiescent galaxies are selected at Cosmic Noon (1<z<3) from the PRIMER and UNCOVER *aperpy* [1] photometric catalogs with SPS measurements and photo-z's from *Prospector-β* [2] via:

1. Rest-frame *UVJ* colors and inferred median stellar ages [3] - (U-V) > 0.88 (V-J) + 0.65 and t_{50} > 30 Myr
2. Specific star formation rates - more than 0.5 dex below the SFMS of [4]

Subsamples are also selected using median stellar age:

- 30<t_{50}<100, 100< t_{50}<500, and t_{50}>50 Myr



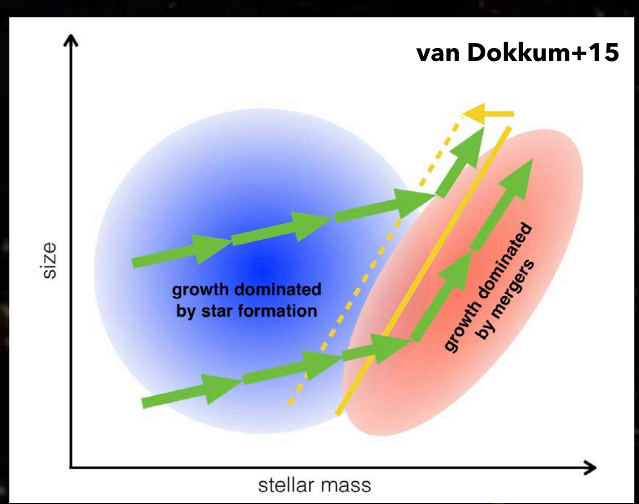
The Size and Structure of Cosmic Noon Quiescent Galaxies

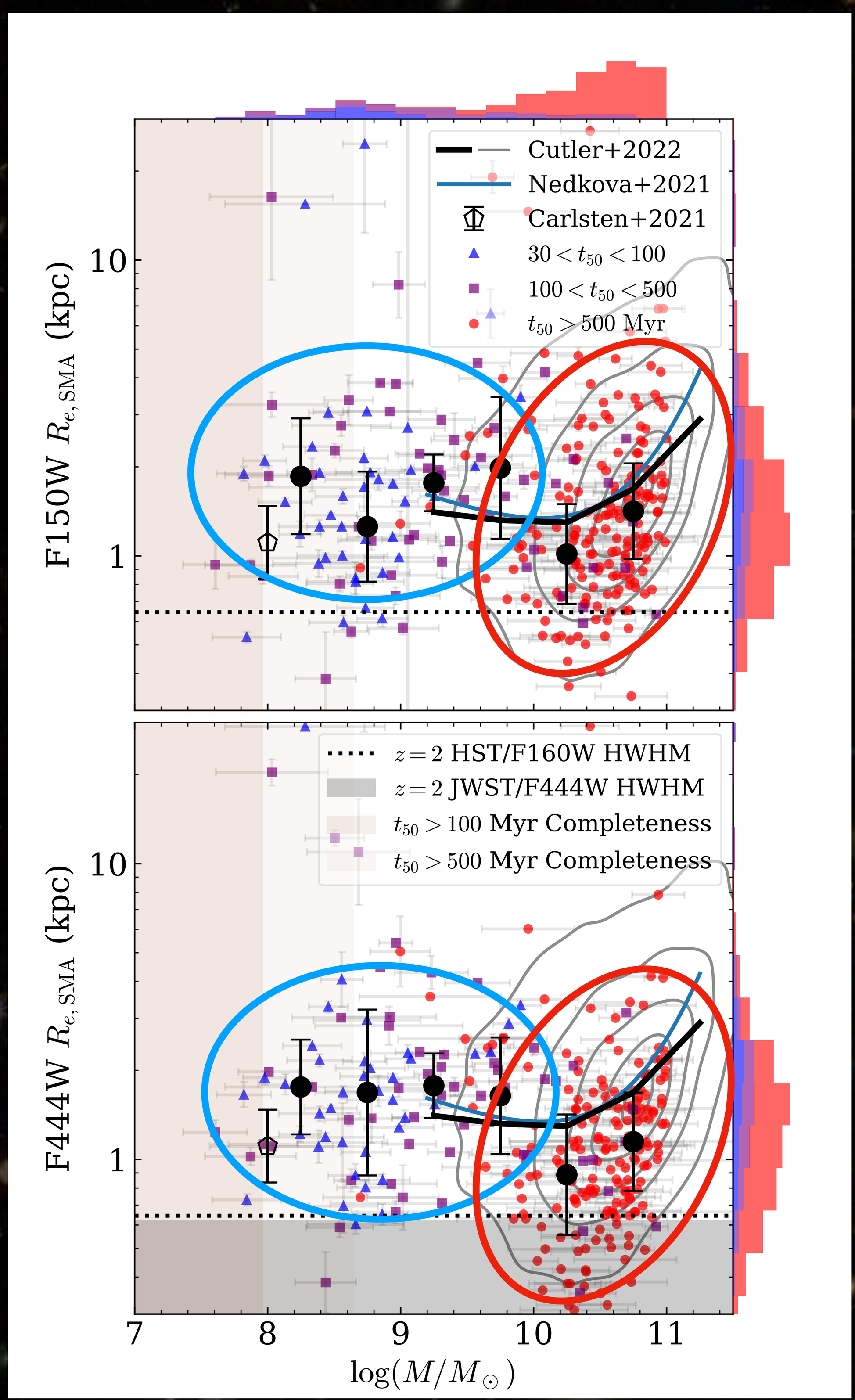
The quiescent size-mass relation differs dramatically below $10^{10.3}$ M⊙

In both rest-UV/optical (F150W) and rest-NIR (F444W), low-mass sizes are comparatively larger and the size-mass relation is flatter – similar in size to star-forming galaxies.

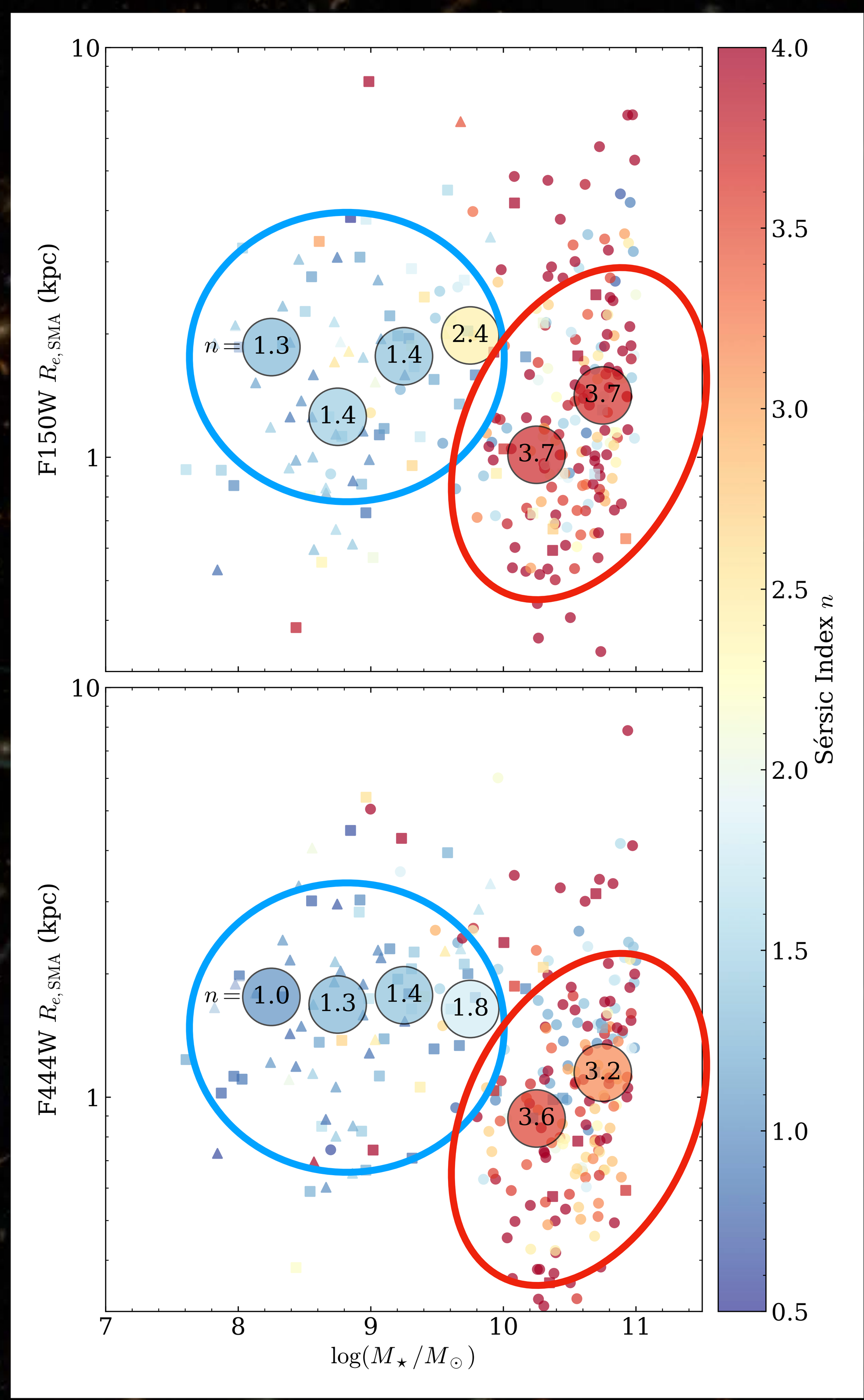
Massive galaxies have steeper size dependence (merger-driven growth) and more compact sizes overall.

- Low-mass quenching is not associated with compaction
- Fits nicely with the size-growth picture from [5] - shown below





At low-masses, quiescent galaxy morphologies are notably disk-like



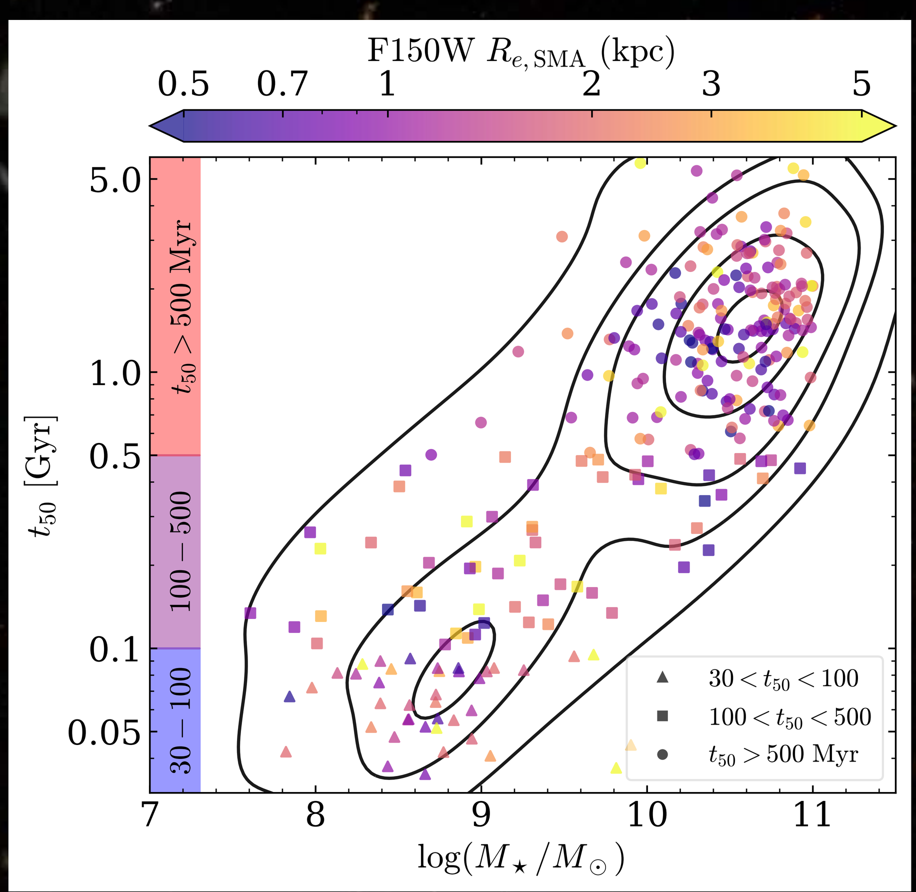
Massive quiescent galaxies are more elliptical and centrally-concentrated.

- Possibly caused by central starbursts, bulge formation, etc., followed by mass-driven quenching or cosmological starvation
- Explains the minimum average size at $10^{10.3}$ M⊙ – galaxies at this mass have undergone compaction events recently, while more massive galaxies have grown quickly via mergers

Low-mass, quiescent galaxies are disk-like.

- Low-mass quenching leaves galaxy structure intact
- Environmental quenching (gas stripping) or feedback?
- Absence of mergers due to the shape of the quiescent mass function [6] "freezes" low-mass quiescent galaxy sizes at larger star-forming values

Two Populations and a Characteristic Mass?

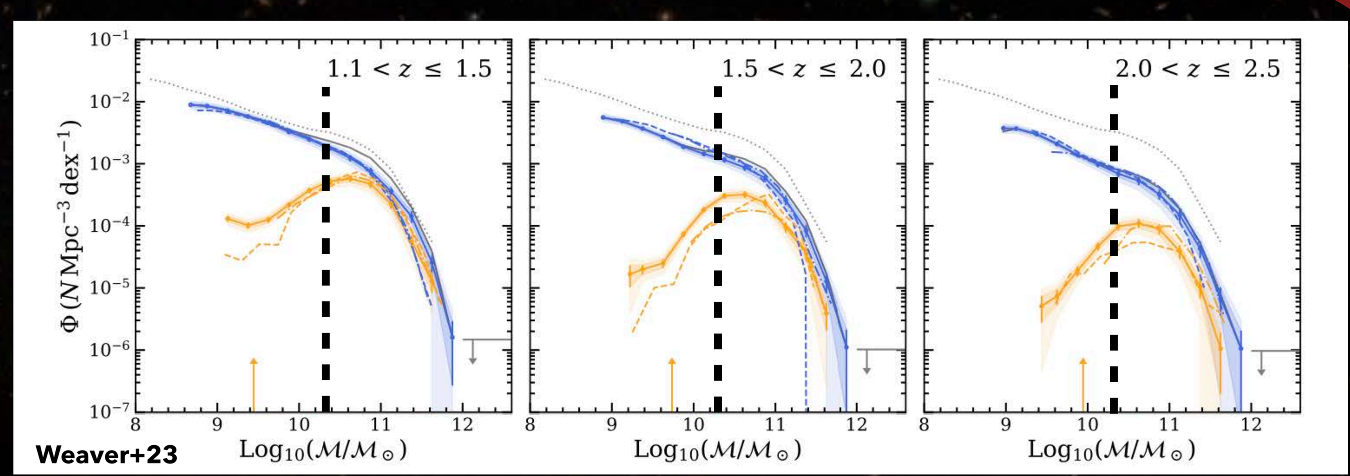


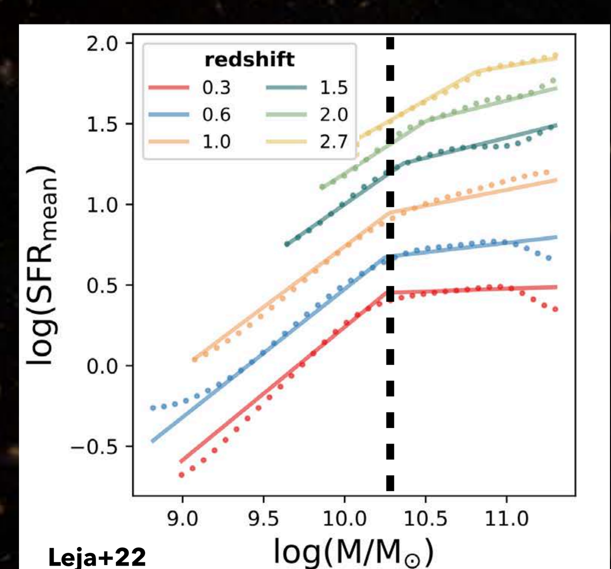
The two populations above separate clearly in mass-age space.

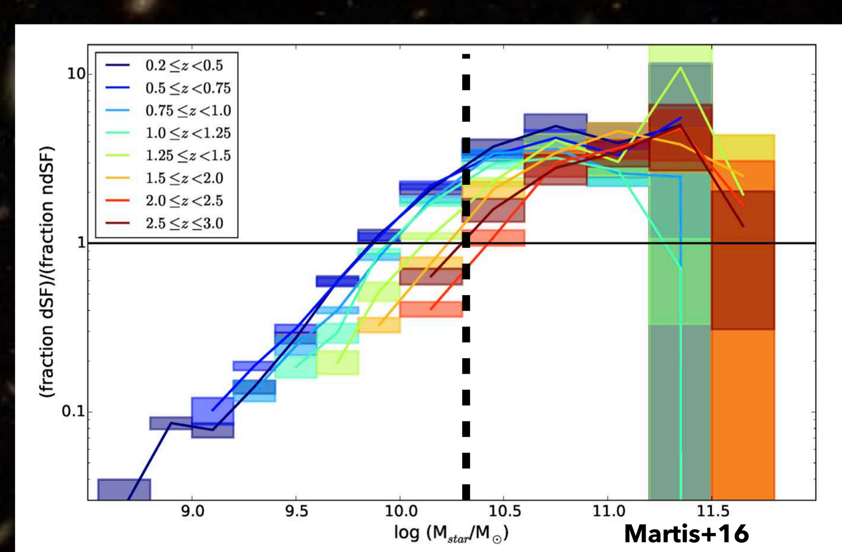
- Different physical processes behind low-mass and massive galaxy quenching
- Caveat: biased selection function and/or contamination from "mini-quenched" galaxies [7] could explain lack of old, low-mass sources

The quiescent size-mass relation changes at ~$10^{10.3}$ M⊙ (the minimum of the massive quiescent relation). This characteristic mass also aligns with:

- Quiescent mass function turnover [6] - top
- SFMS slope change [4] - left
- Shift to mostly dusty SF galaxies [8] - right
- Stellar-halo mass relation peak [9]







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