Star Formation Main Sequence in a Hierarchical Universe

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ABSTRACT

red motivation, methodology, impact.

In observations star forming galaxies form a tight $log\ M_*$ to $log\ SFR$ relation referred to as the *star formation main sequence* (SFMS) out to $z \sim 2$. Beyond the evolution "along" this SFMS, however, the star formation histories of star forming galaxies have not been precisely characterized. The SFH of these galaxies govern SMF, SFMS, and also observed constraints on the stellar mass to halo mass relation.

By combining high-resolution cosmological N-body simulation with observed evolutionary trends of SF galaxies, we construct a model that tracks the evolution of star forming central galaxies over the redshift $z < 1$. Comparing this model

Observations find a remarkably small scatter in the stellar mass to halo mass relation. Somehow the star formation histories of galaxies must

According to observations, star forming galaxies form a tight $log\ M_*$ to $log\ SFR$ relation referred to as the "star formation main sequence" out to $z \sim 2$.

Subject headings: **methods: numerical – galaxies: clusters: general – galaxies: groups: general – galaxies: evolution – galaxies: haloes – galaxies: star formation – cosmology: observations.**

Checklist

- Check the correlation between halo growth rate with different t_{delay} and δt_{abias} with the total halo growth rate between $z \sim 0$ and $z \sim 1$.

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1. Introduction

- Motivate why we think SF galaxies evolve along the main sequence
- Discuss the current thought process on galaxy assembly bias
- Explain the limitation of SFH derivable from observations (Claire's fisher matrix paper would be really good; ask her about the details)
- Observations also can't provide detail host dark matter halo properties
- So the approach with combining observations with N-body (empirical modeling) is very effective in the context of the halo.
- Maybe talk about how the bigger context of why this is important?
- Why only centrals – because our current best understanding of satellites is that they quench after infall, so it doesn't make sense to look at them

2.

3. Star Forming Central Galaxies

In this section we describe how we

3.1. Selecting $z \sim 0$ Star Forming Central Galaxies

- Multi-panel figure of the group catalog SFMS, mass bin fit of SFMS
- Describe how f_{SFMS} is calculated.
- refer to Tjitske in prep
- Then explain how it's not circular because the integrated M_* has to reproduce the same SMF

3.2. Evolving along the Main Sequence

- Talk about the SFR and M_* prescriptions
- Pedagogical figure describing the SFH model: two panel one SFR as a function of time, the other residual log SFR as a funciton of time for different prescriptions

4. The duty cycle of star formation

- Figure that illustrates the fit to observables
- Figure of sigma M star as a function of duty cycle compared to observations

5. The need for a galaxy assembly bias

- discuss how t_{duty} is not enough to be consistent with σ_{M_*}.
- first clarify what you mean by galaxy assembly bias
- discuss implementation of galaxy assembly bias
- Figure (pedagogical) of dlogSFR versus dMh dt for different correlation amounts
- Figure of different tdelay and dtabias
- Figure of sigma M star as a function of duty cycle and realistic dt abias and t delay

6. Rethinking the Main Sequence?

- Test the SMHMR for Louis's SFHs

7. Summary

Acknowledgements

REFERENCES

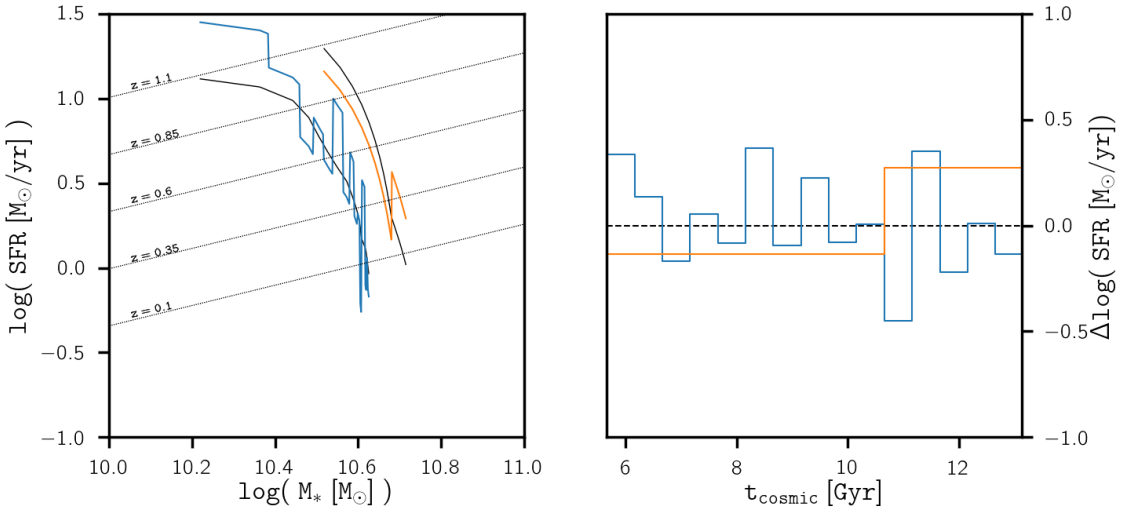

Fig. 1.— Pedagogical figure that illustrates how star forming central galaxies in our model evolve along the SFMS.