

Observing stellar halos in IllustrisTNG

Allison Merritt, with:

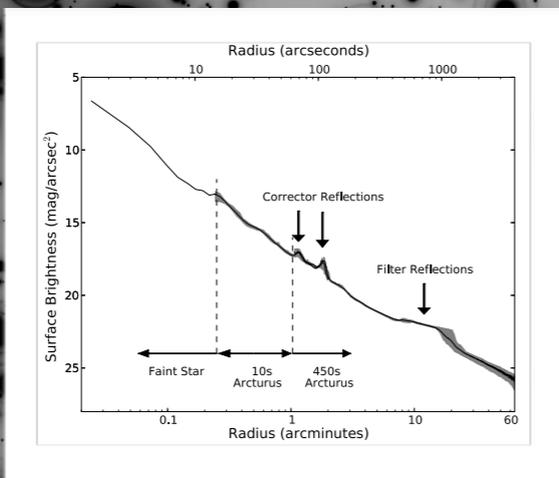
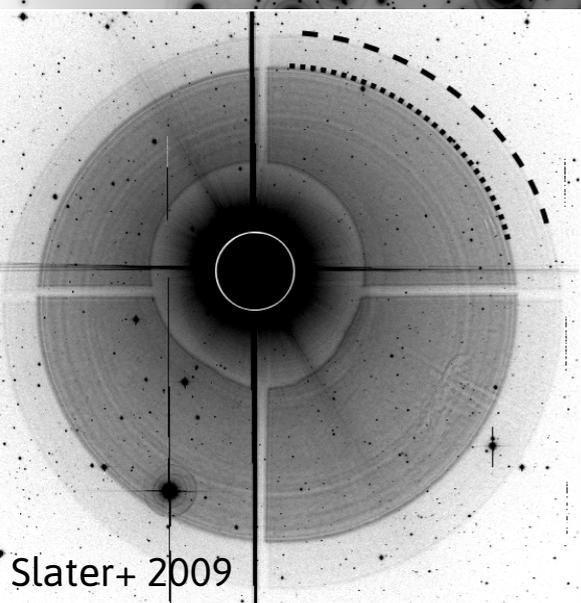
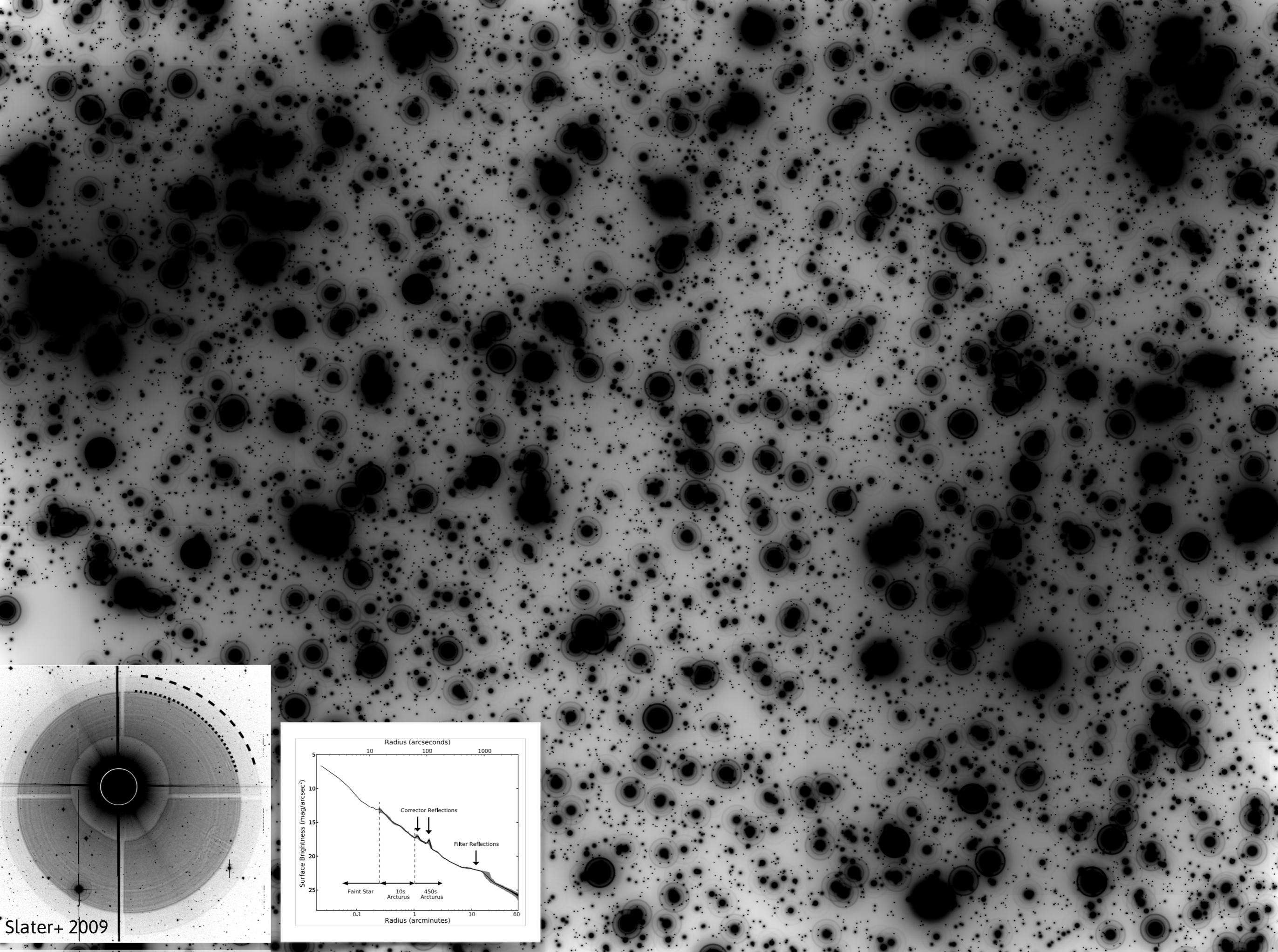
**Bob Abraham, Yotam Cohen, Shany Danieli, Colleen Gilhuly, Deb Lokhorst, Lamiya Mowla,
Pieter van Dokkum, Jielai Zhang, Annalisa Pillepich & the TNG Collaboration**



Hierarchical growth in LCDM

$z = 3.90$





Dragonfly Telephoto Array



Dragonfly Telephoto Array

Dragonfly 1



Dragonfly 2



Dragonfly Telephoto Array

Dragonfly 1



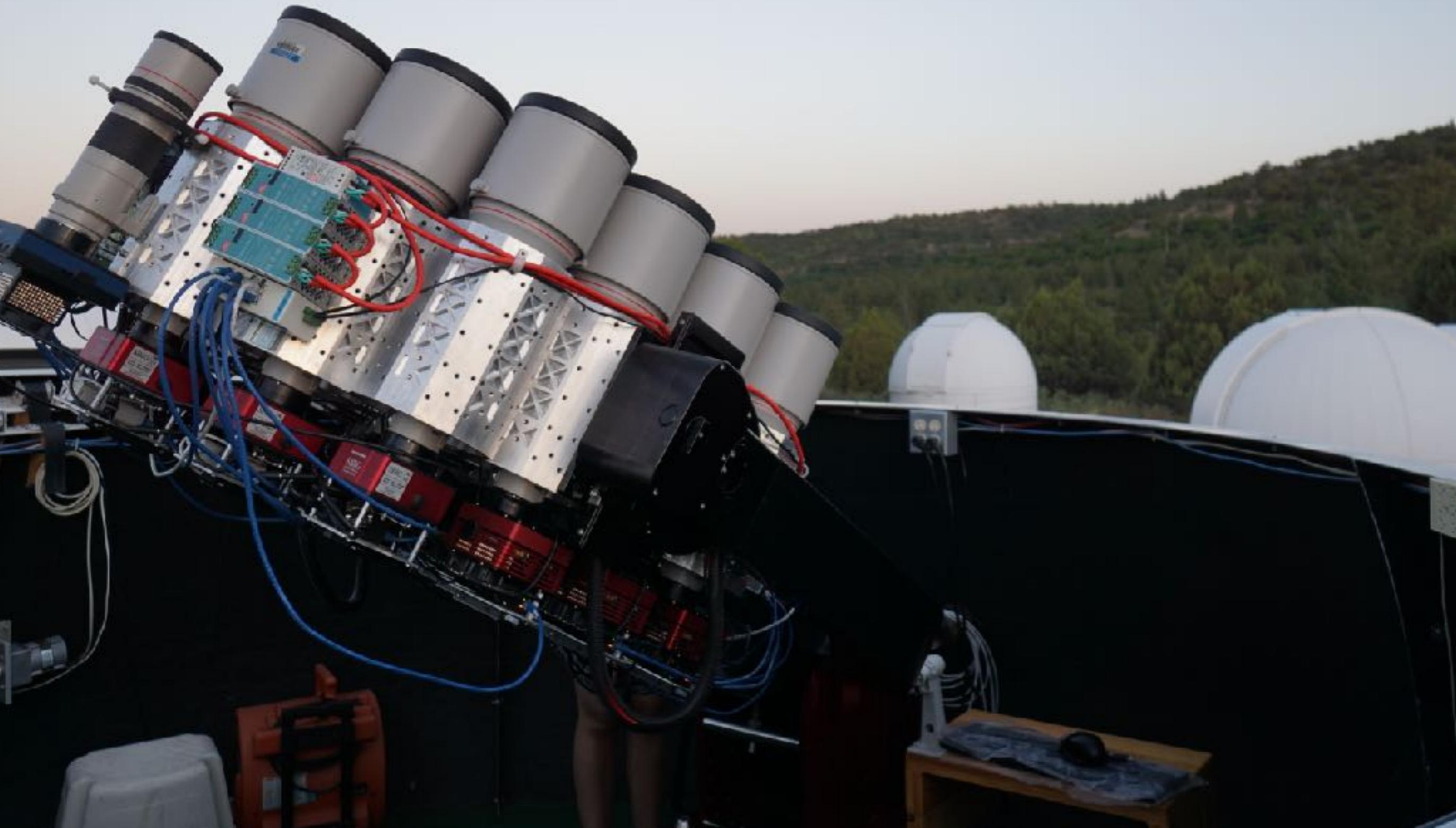
Dragonfly 2



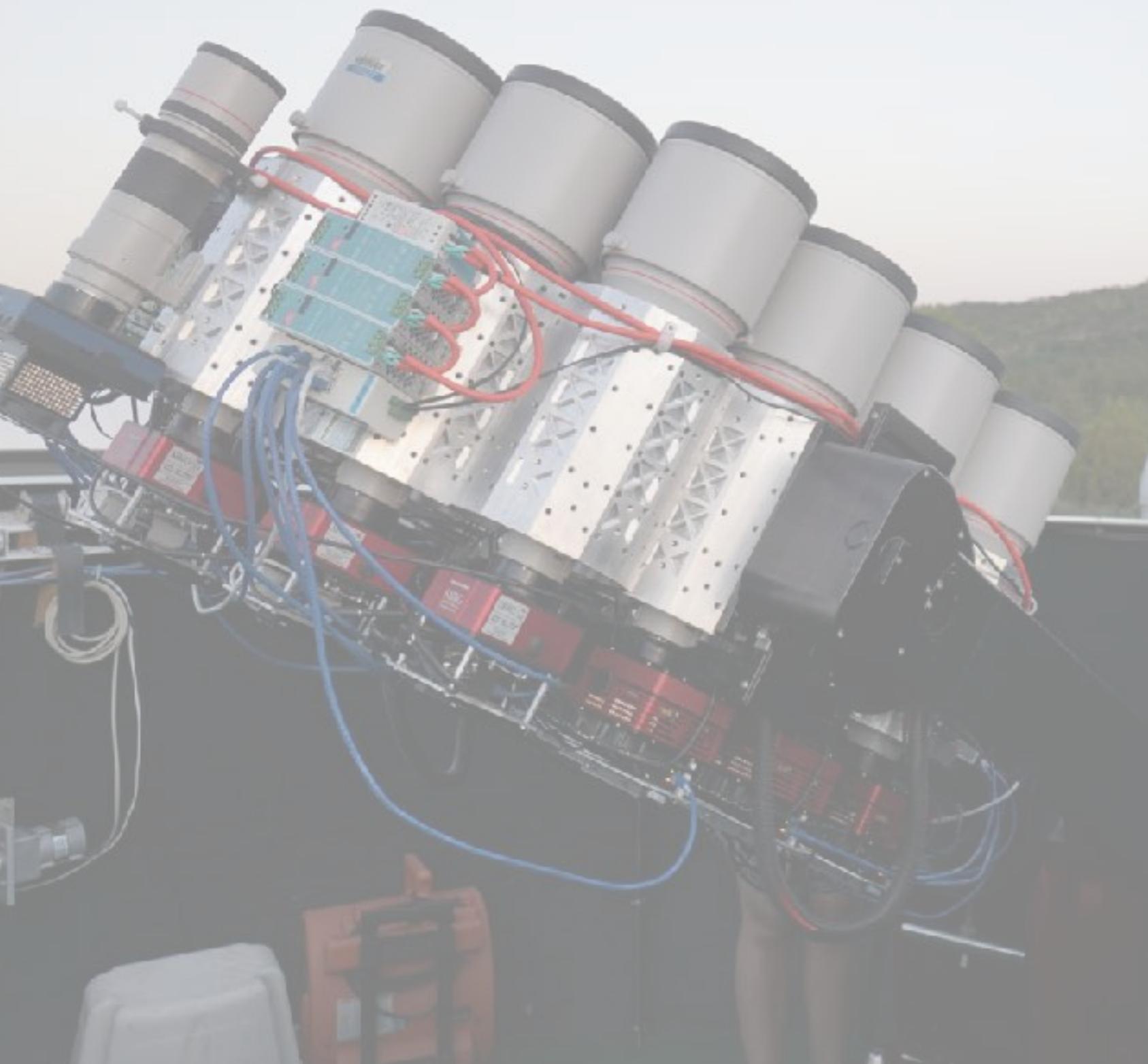
Team Dragonfly, more interested in other telescopes



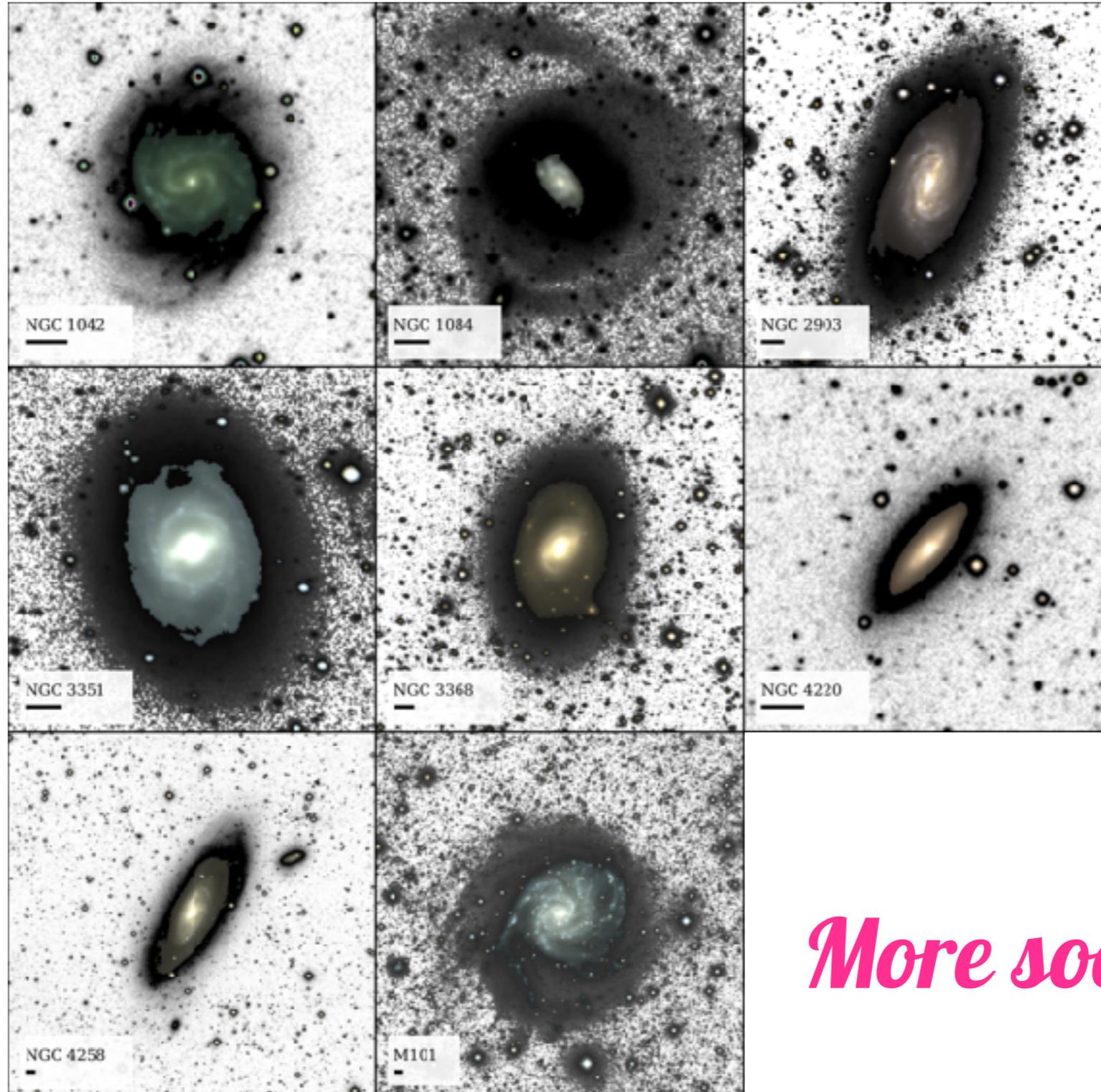
0.5 Dragonfly



8-lens "0.166̄" Dragonfly

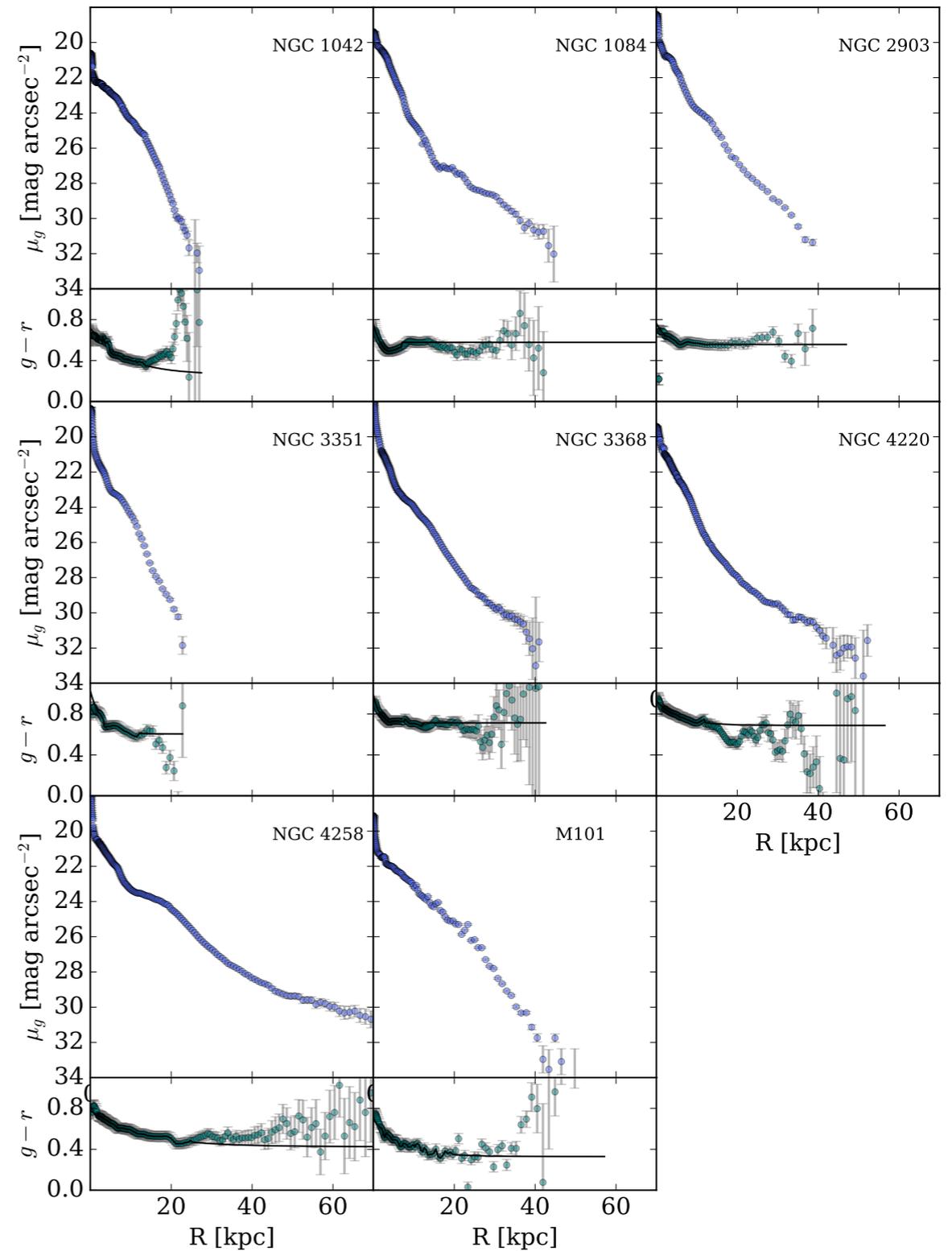
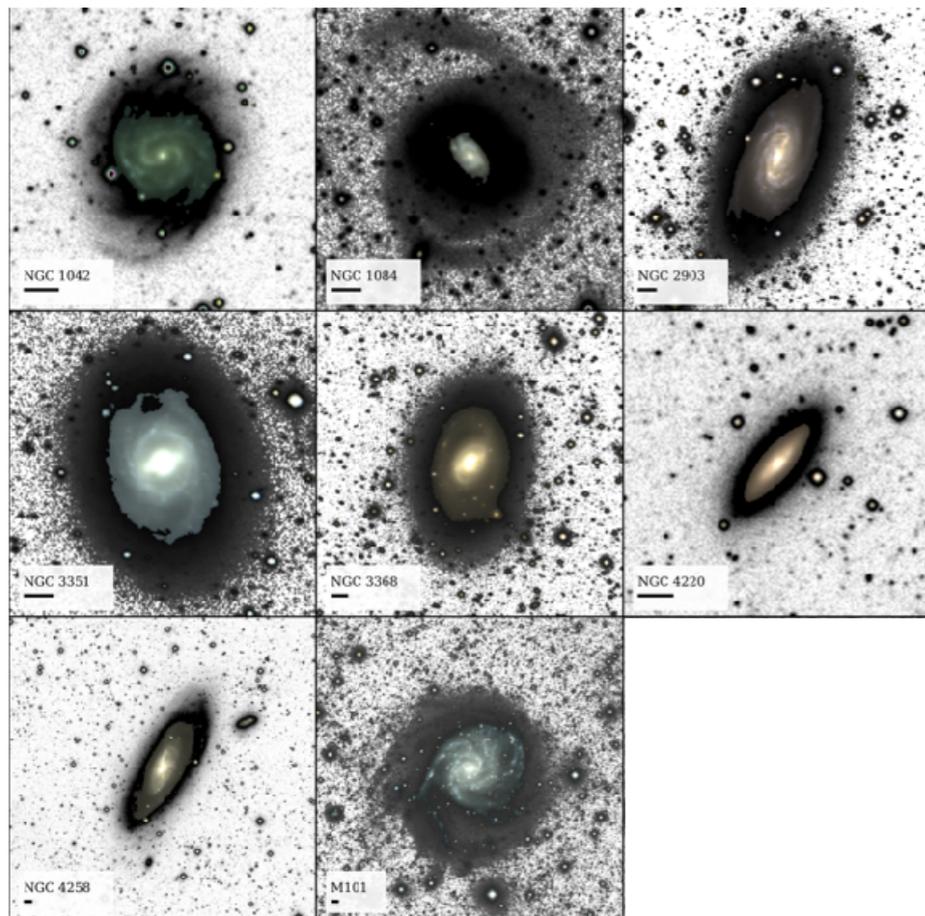


Dragonfly Nearby Galaxies Survey, so far

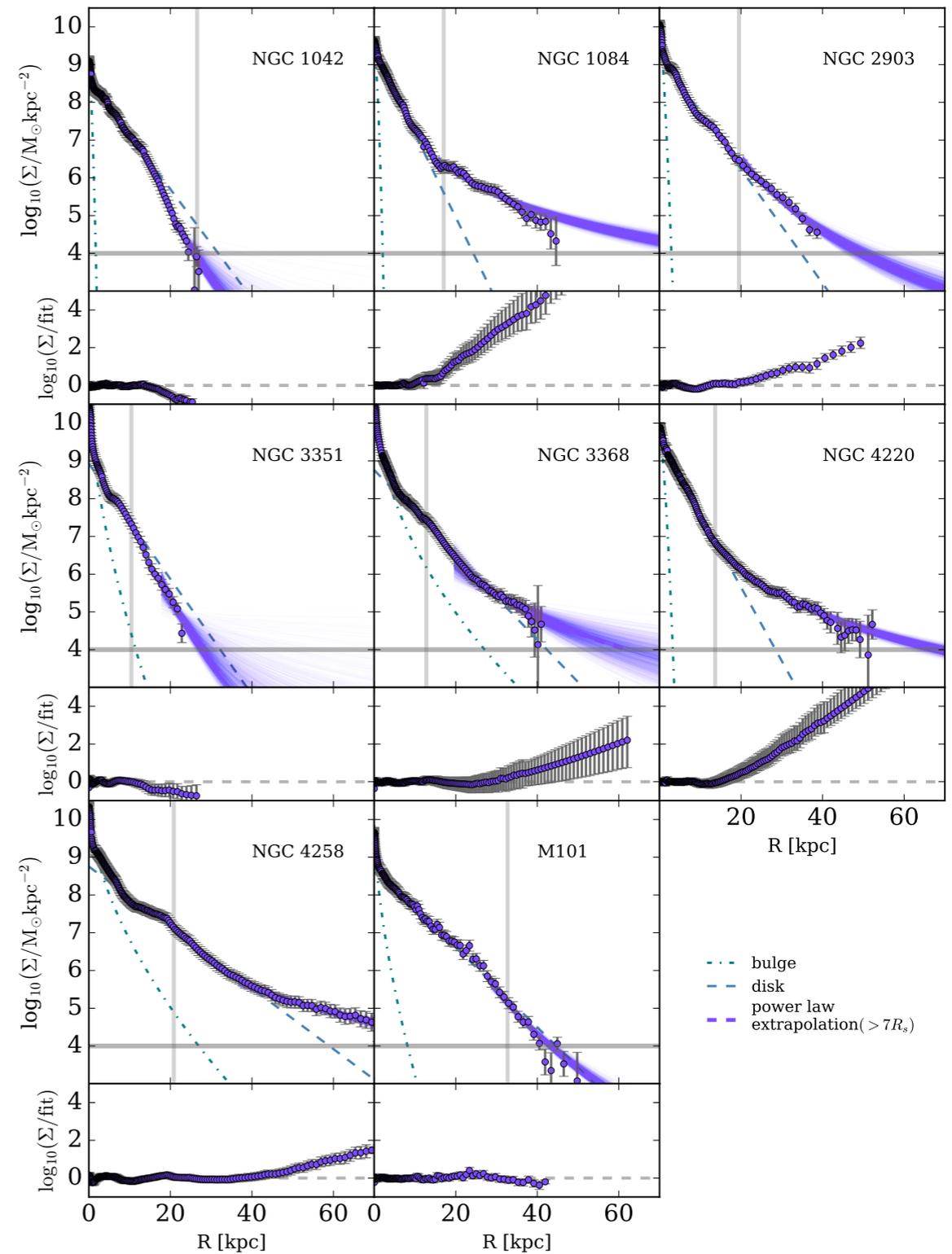
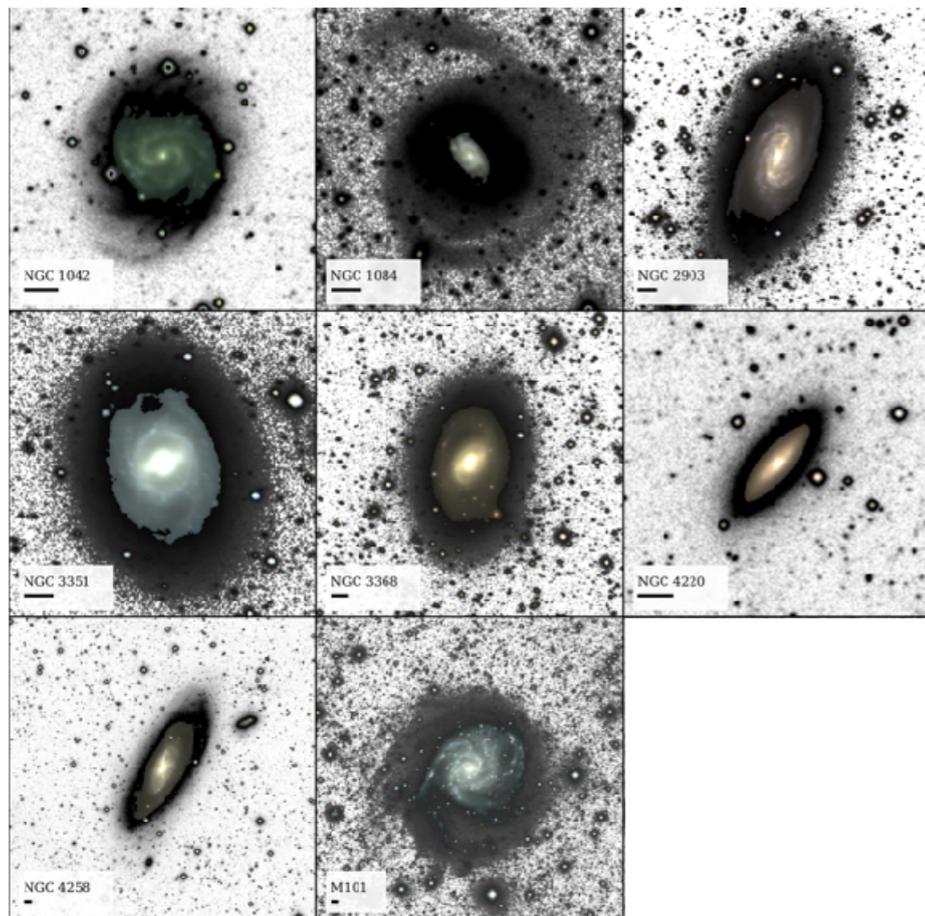


More soon!

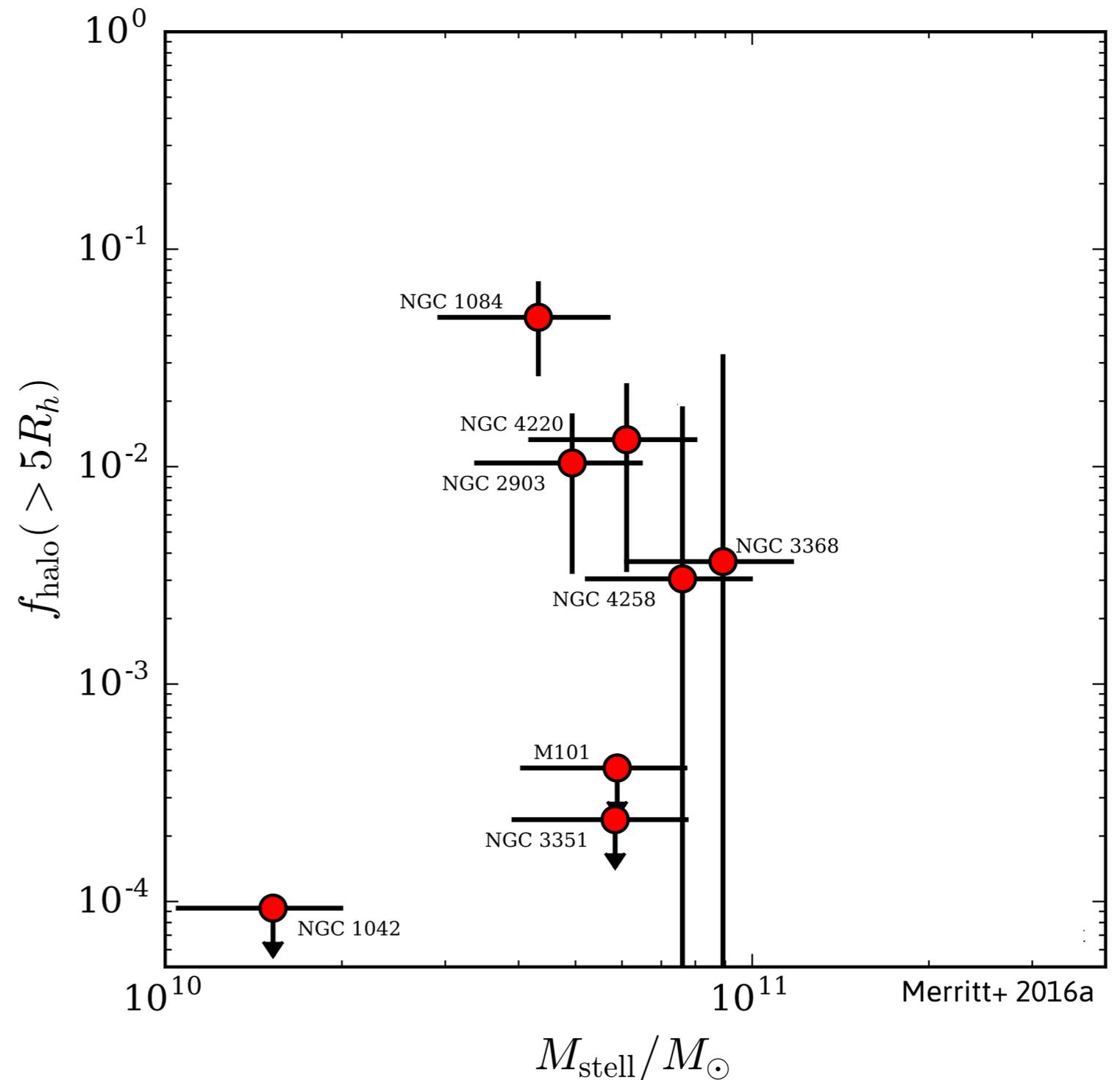
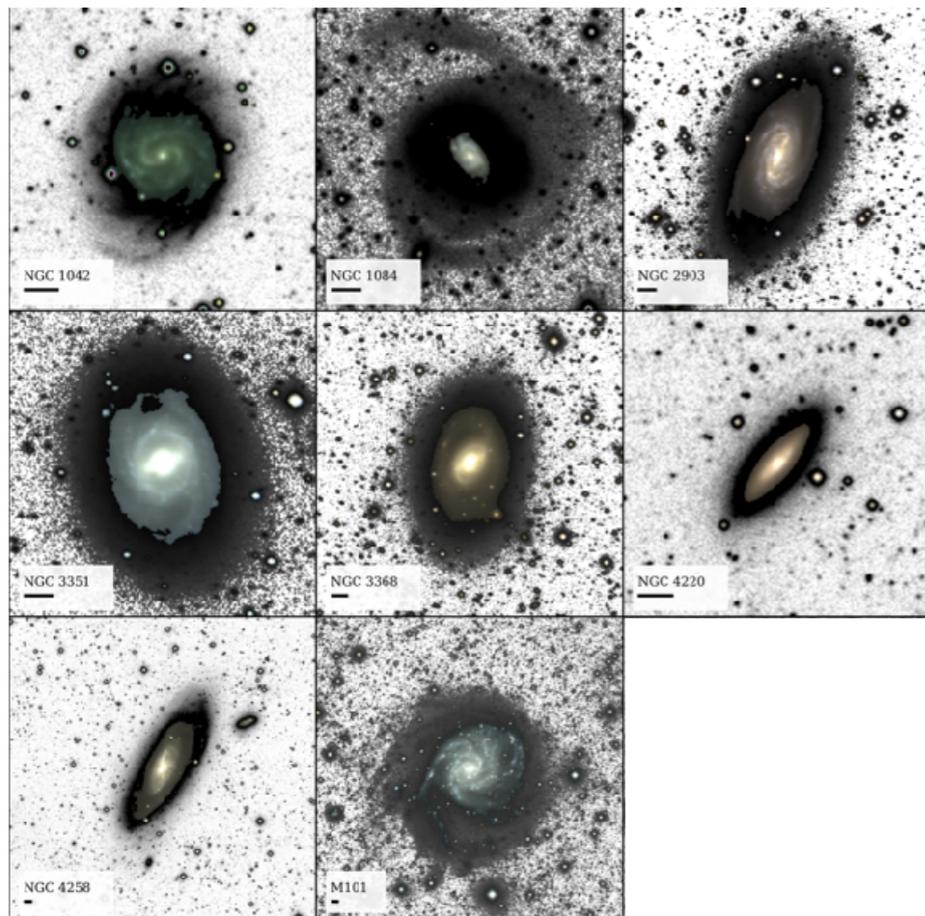
Variation in the outskirts of spiral galaxies



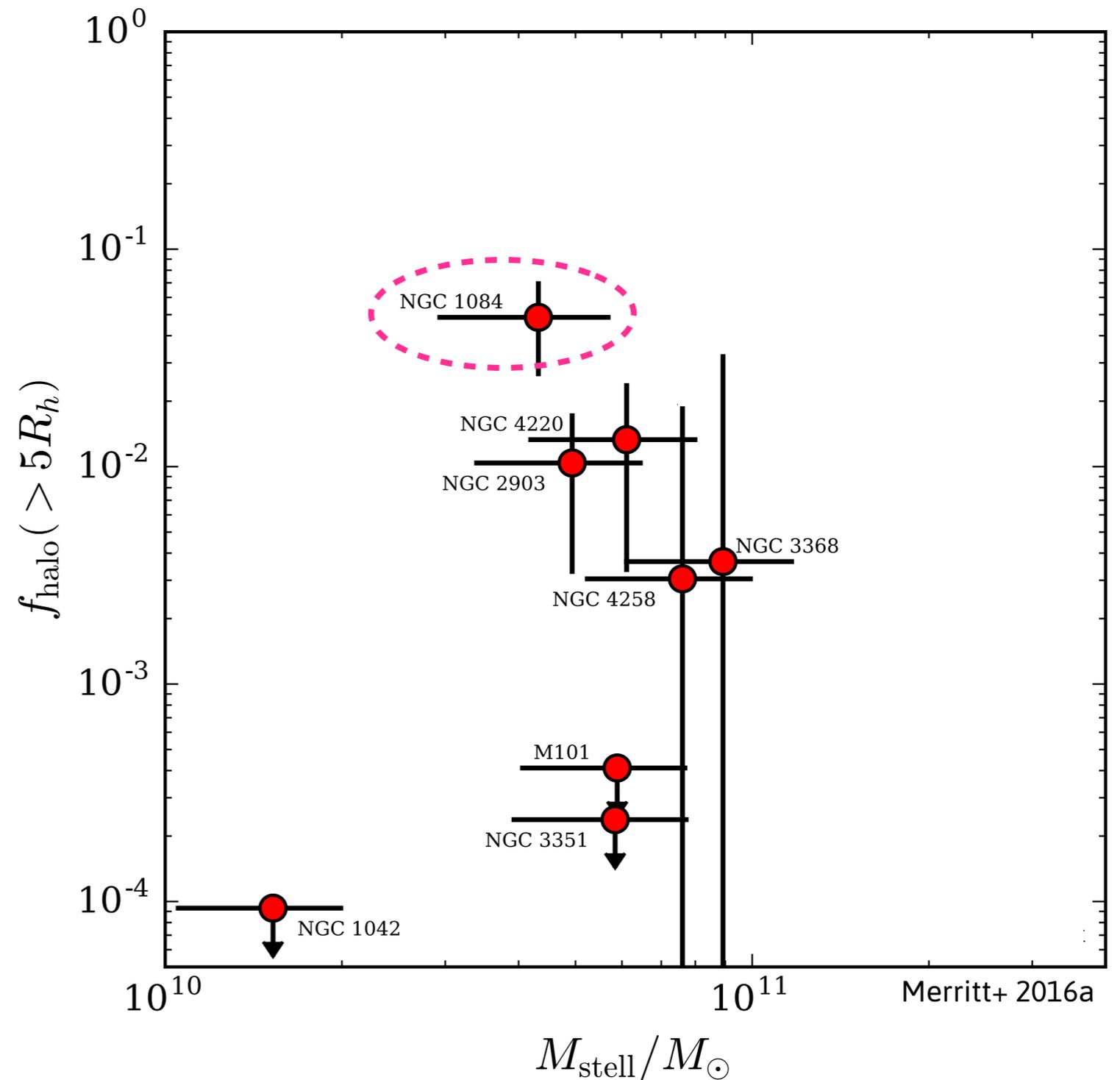
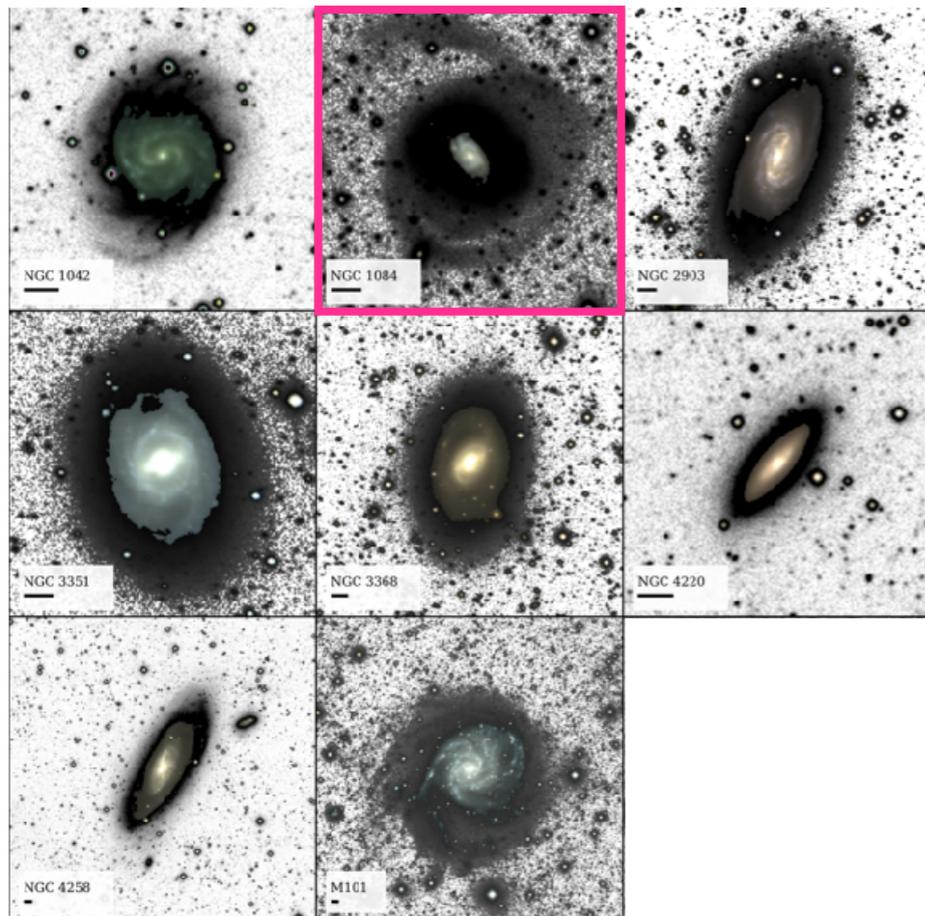
Variation in the outskirts of spiral galaxies



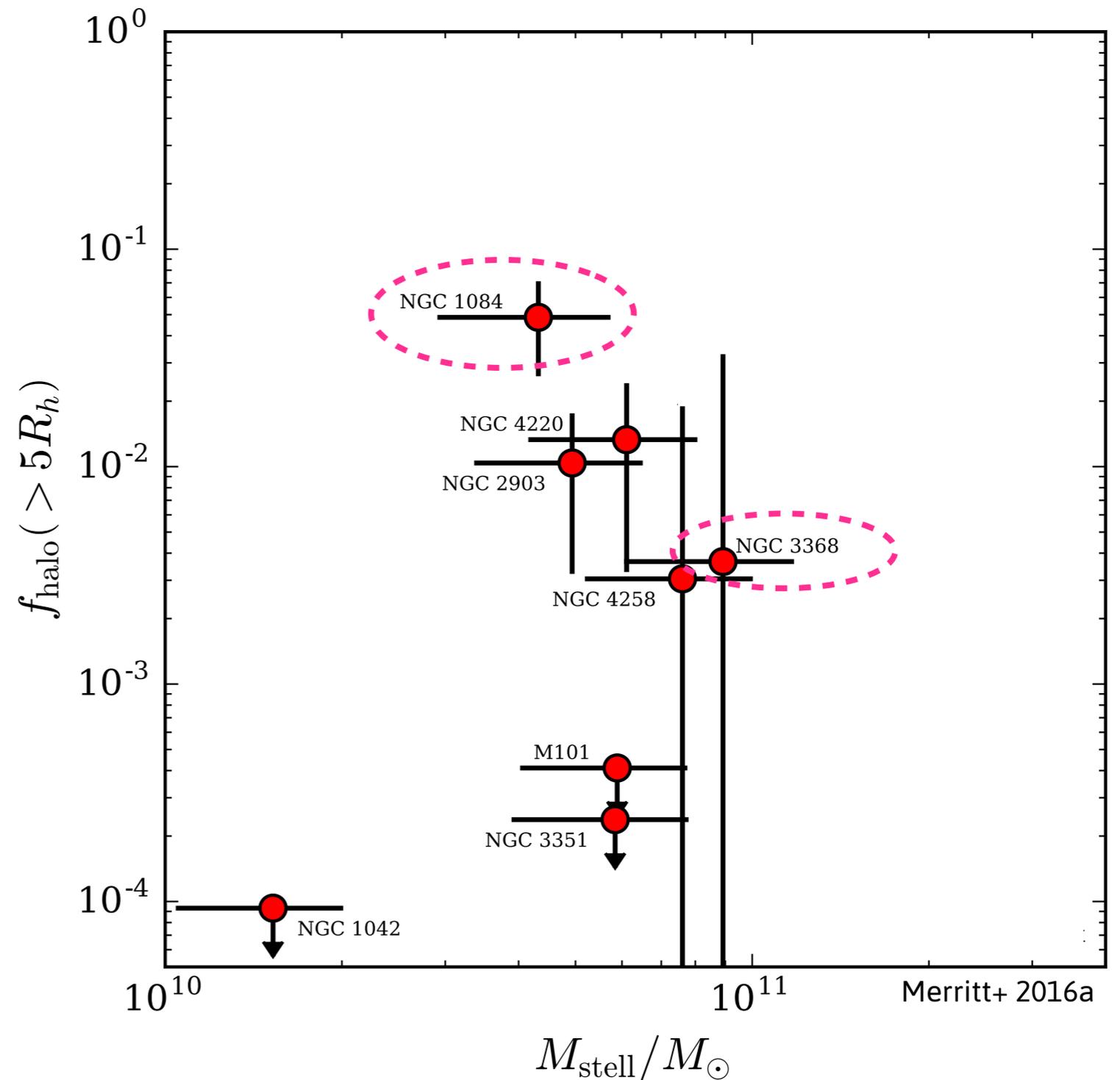
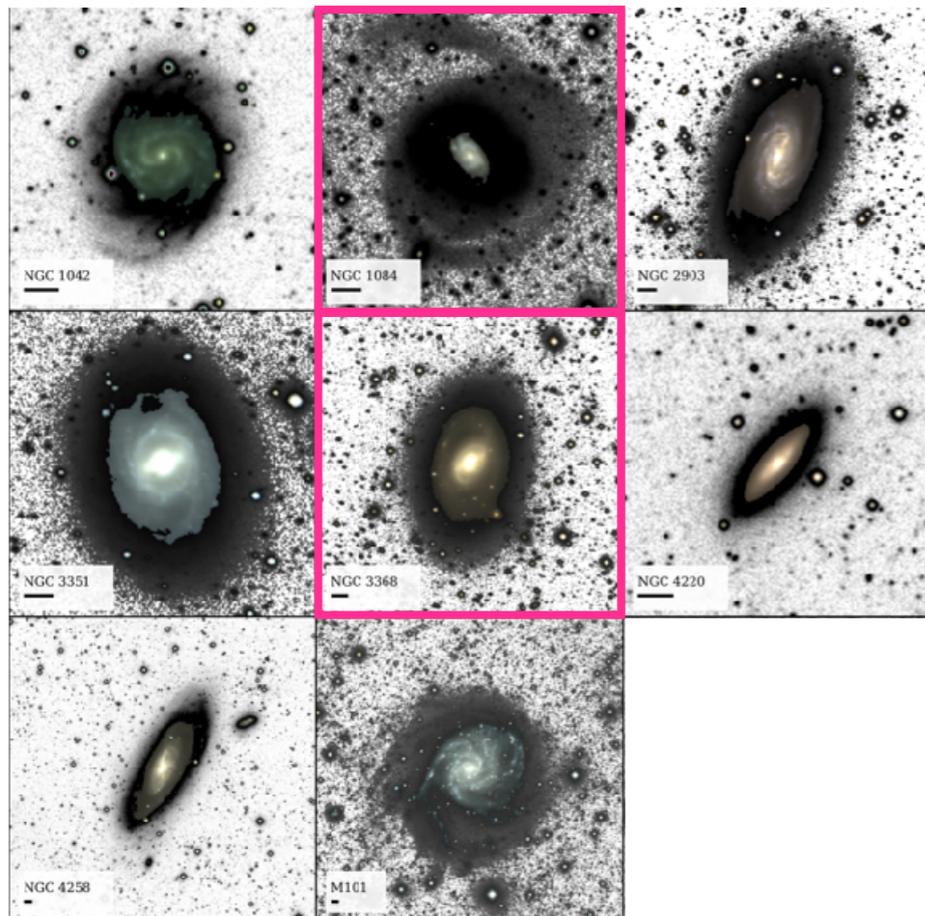
Hints of assembly history from profiles



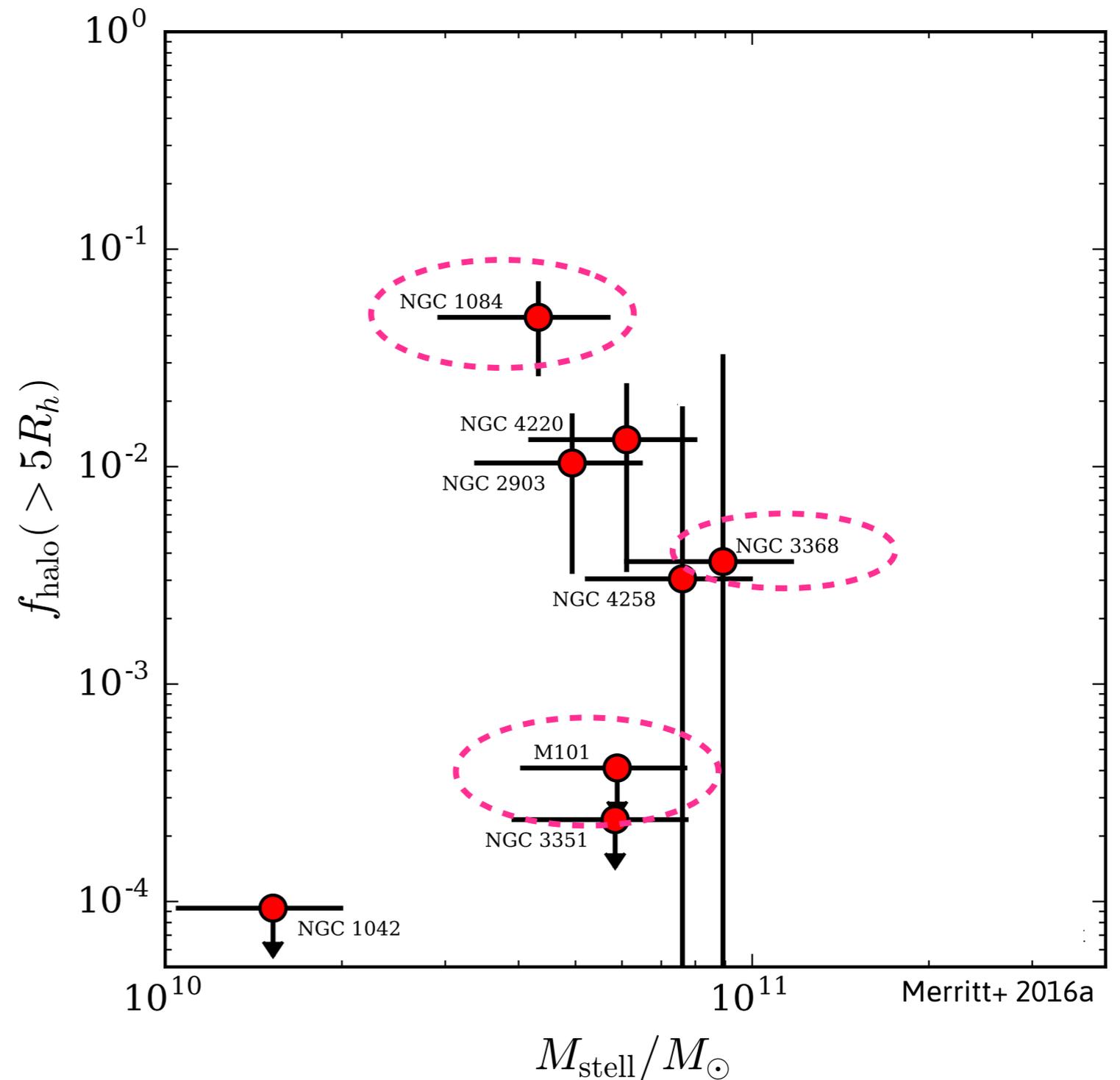
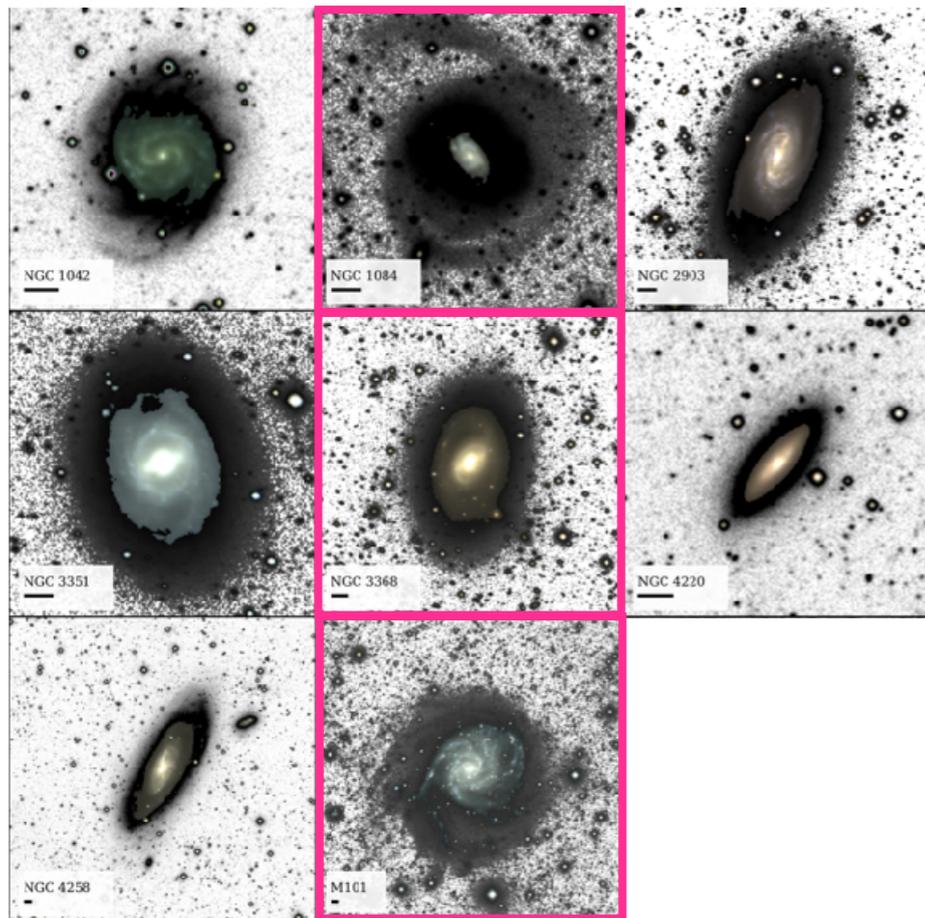
Hints of assembly history from profiles



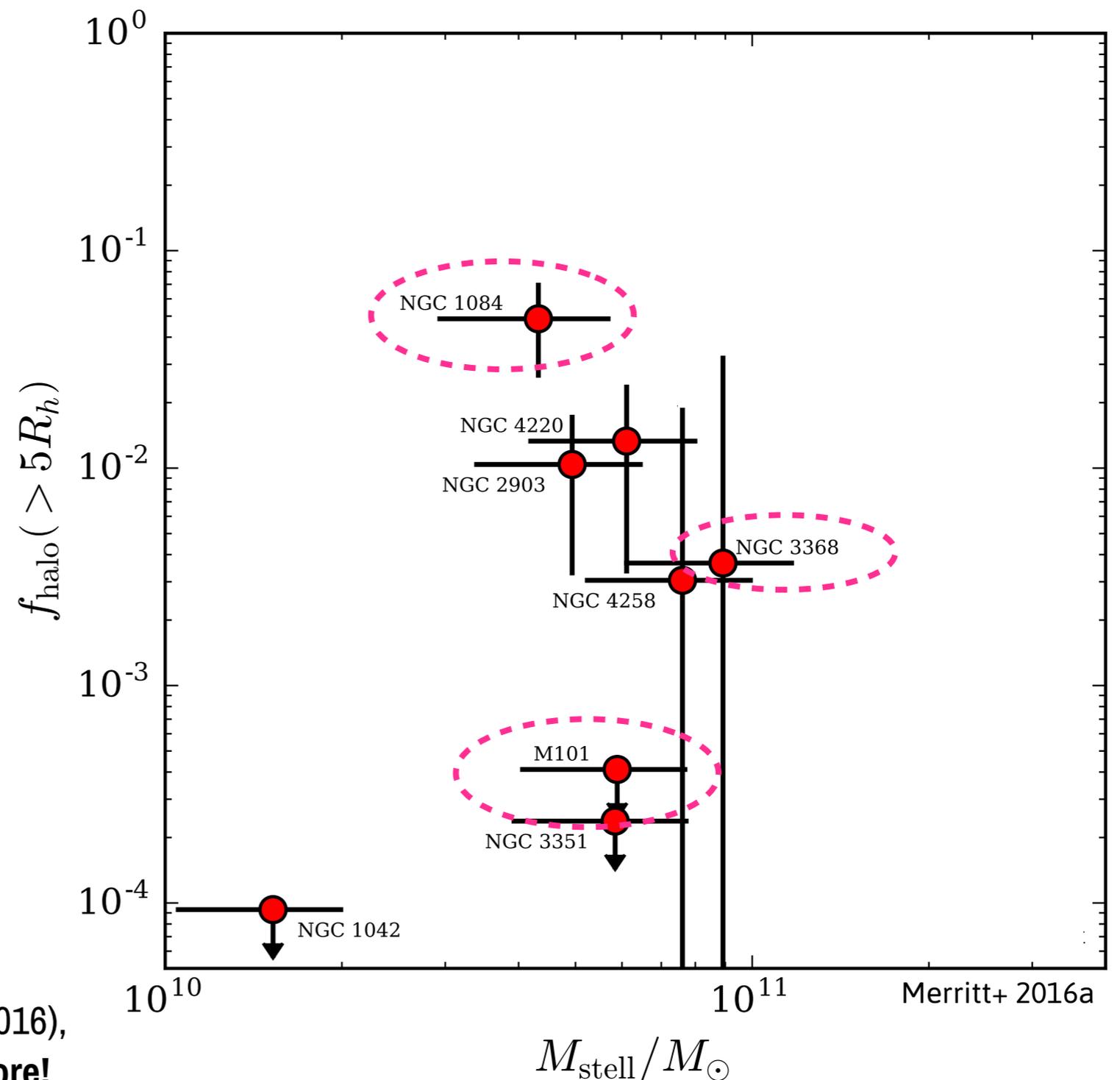
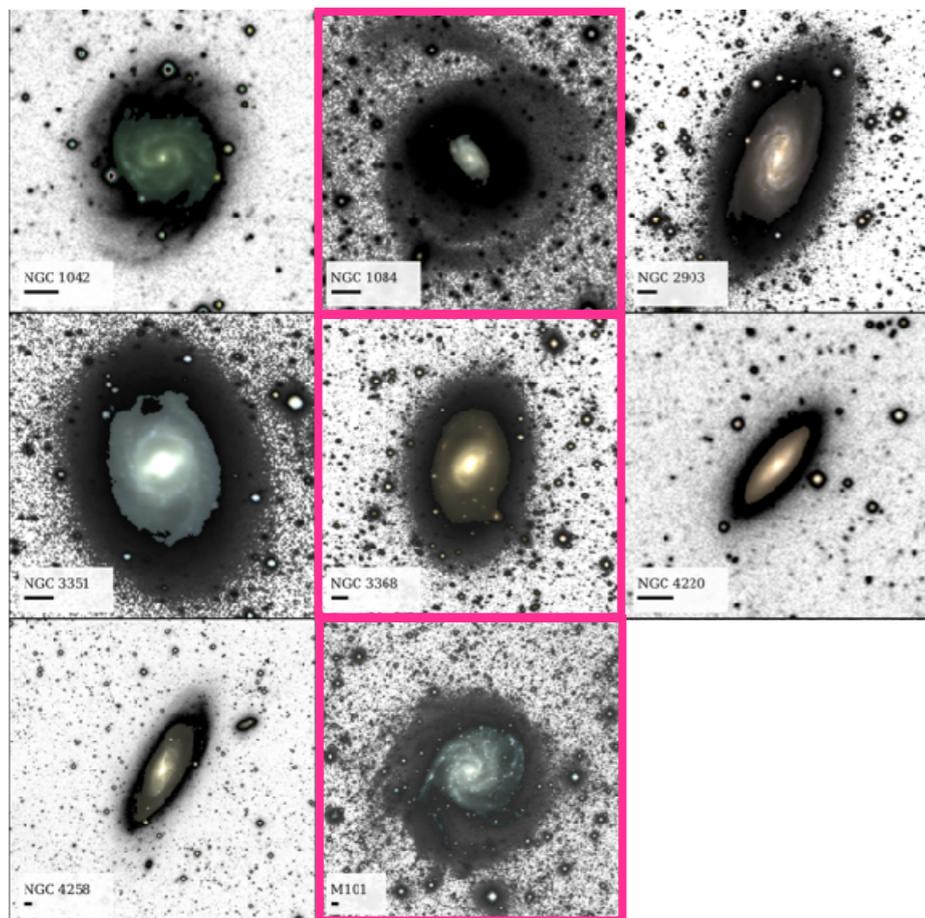
Hints of assembly history from profiles



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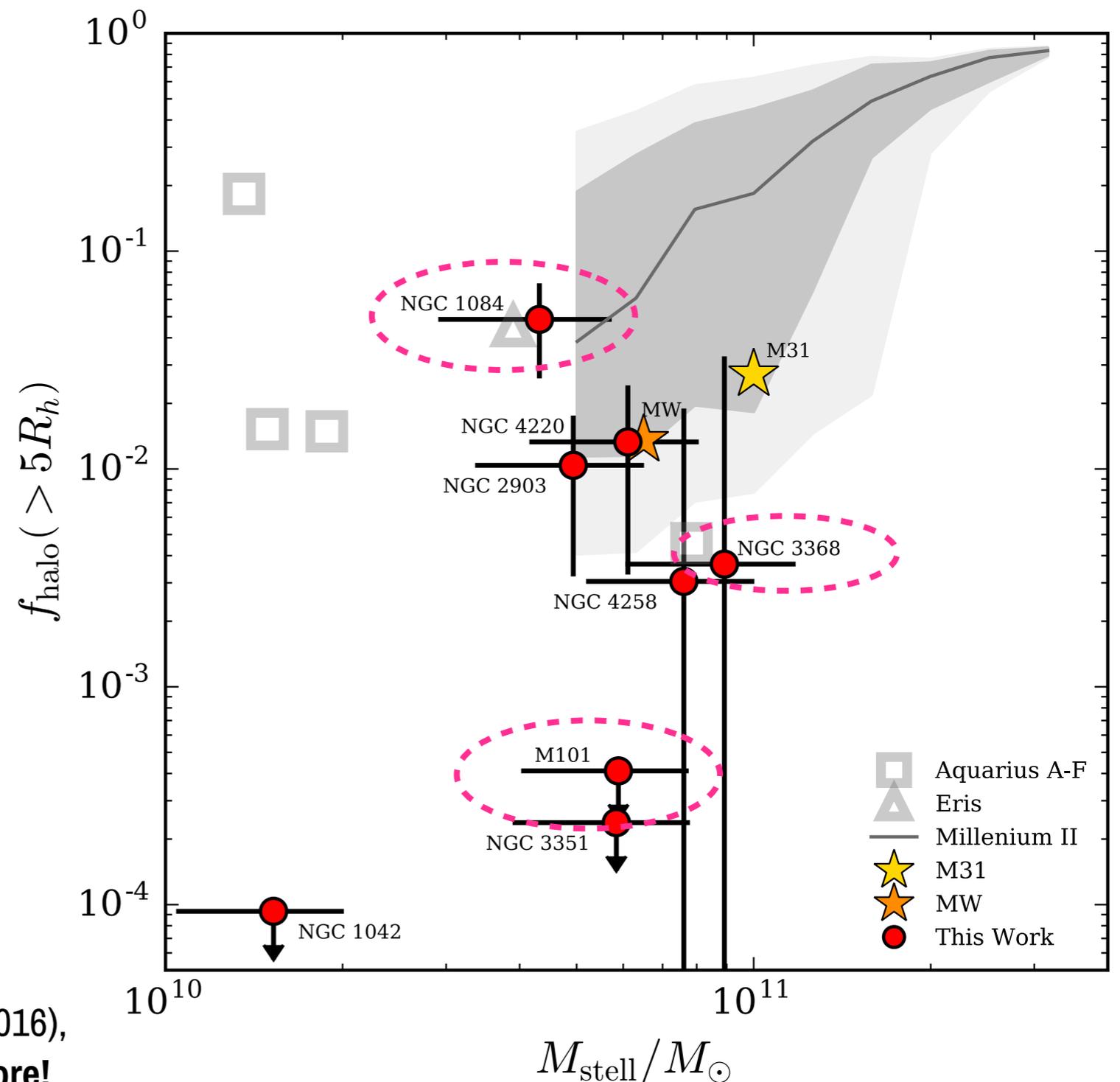
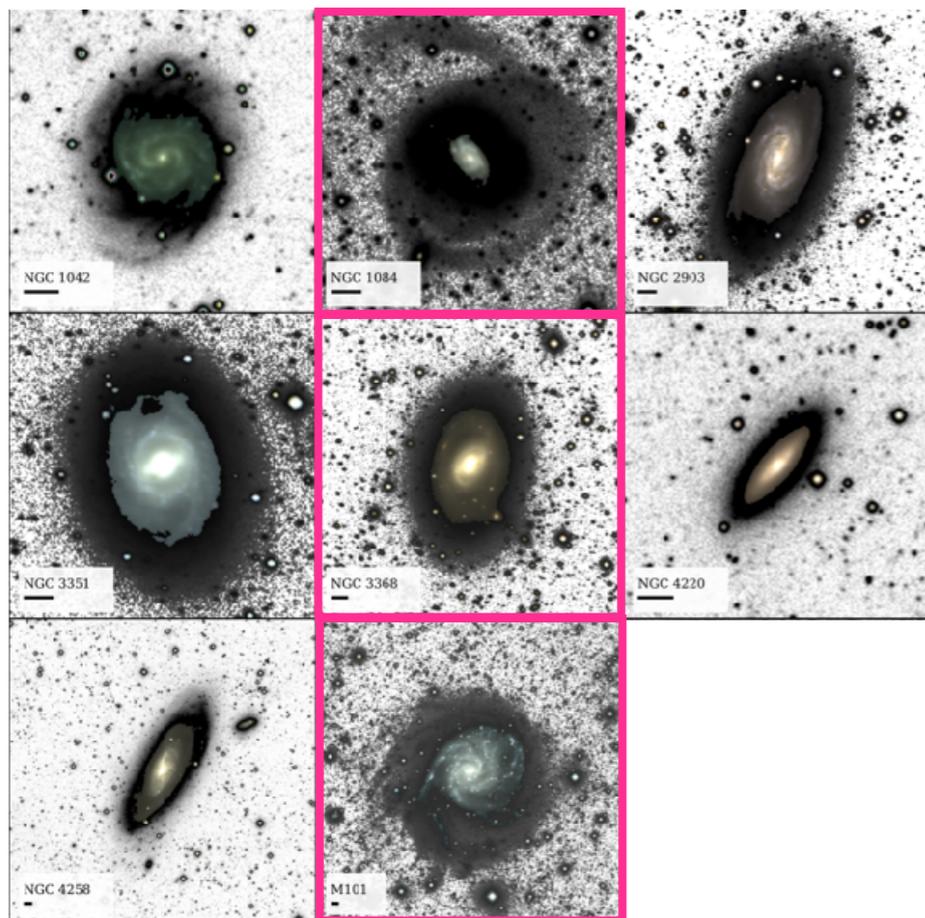


Hints of assembly history from profiles



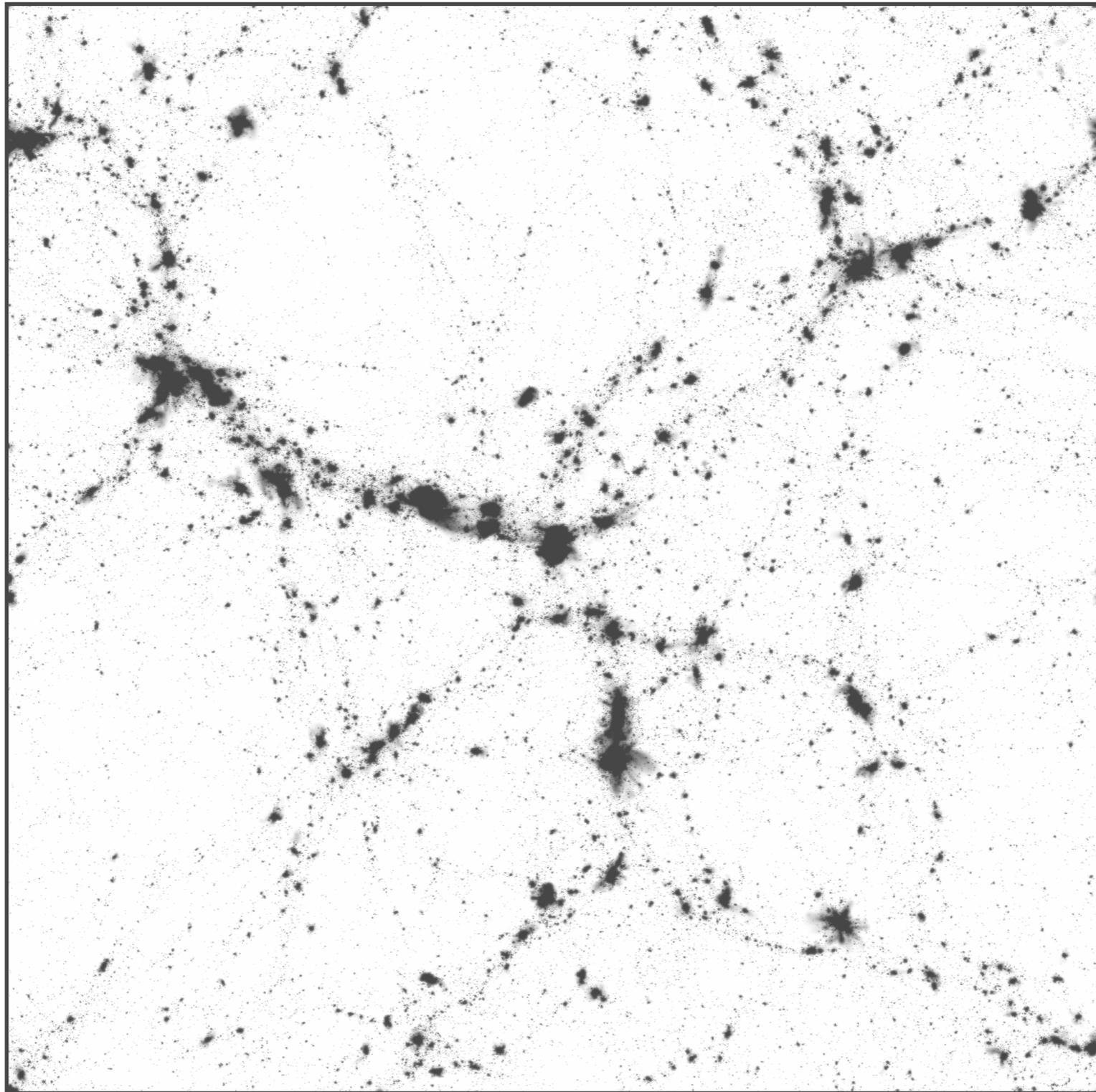
Further progress towards filling out observations:
See also: GHOSTS (e.g. Harmsen+ 2017, Monachesi+2016),
HERON, MADCASH, PISCeS, Subaru/HSC, & many more!

Hints of assembly history from profiles



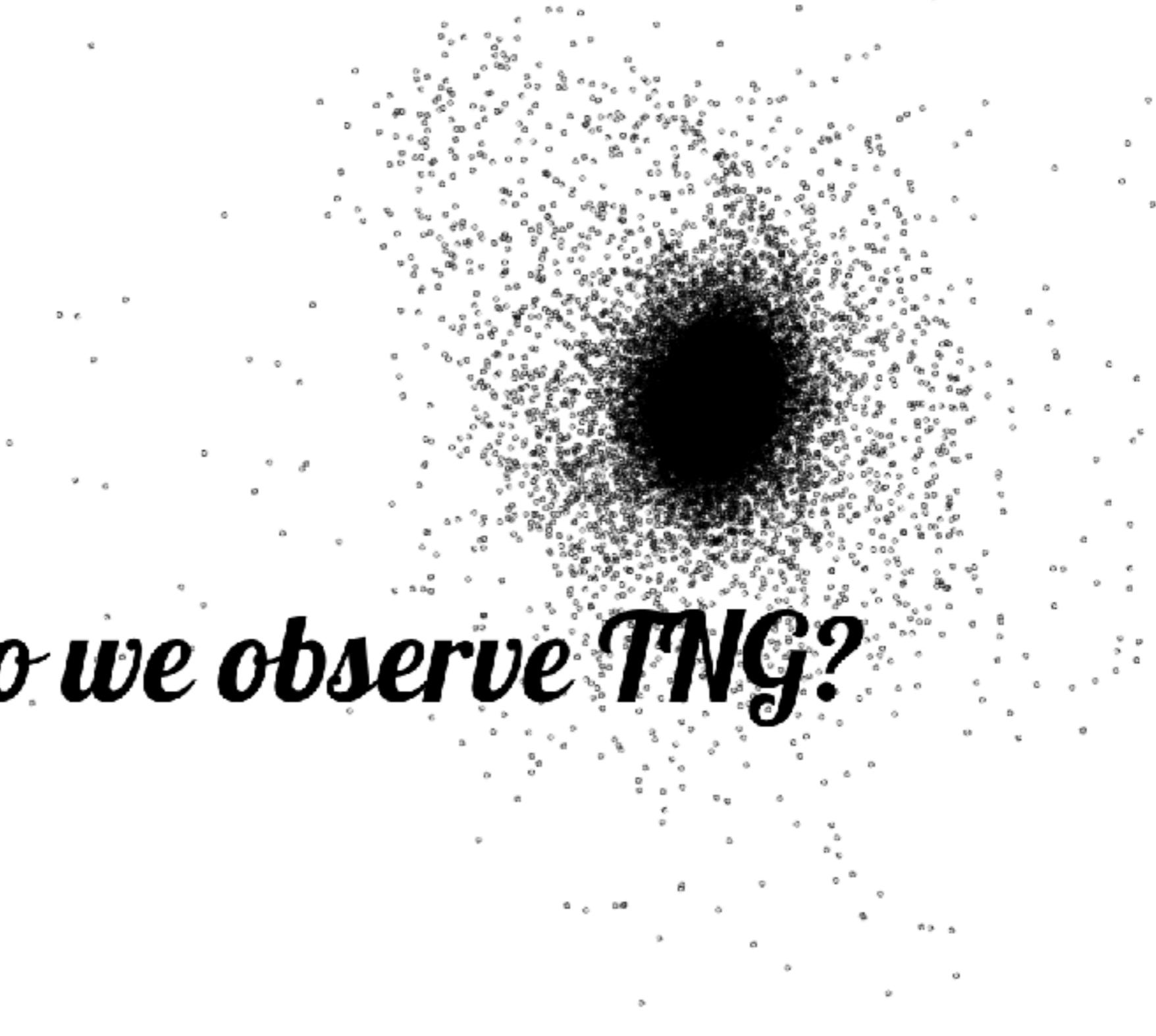
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TNG 100



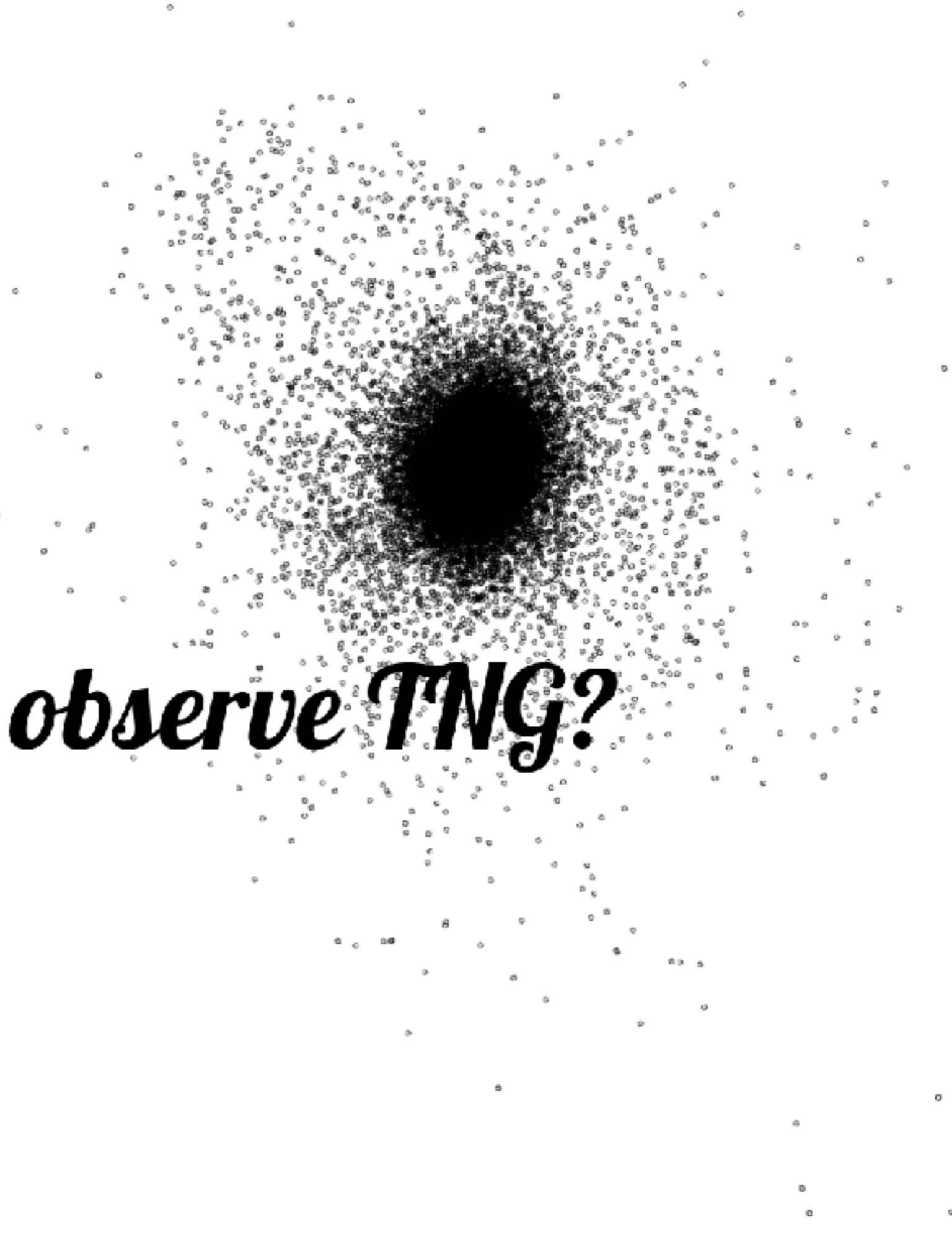
100 kpc

Image credit: TNG collaboration

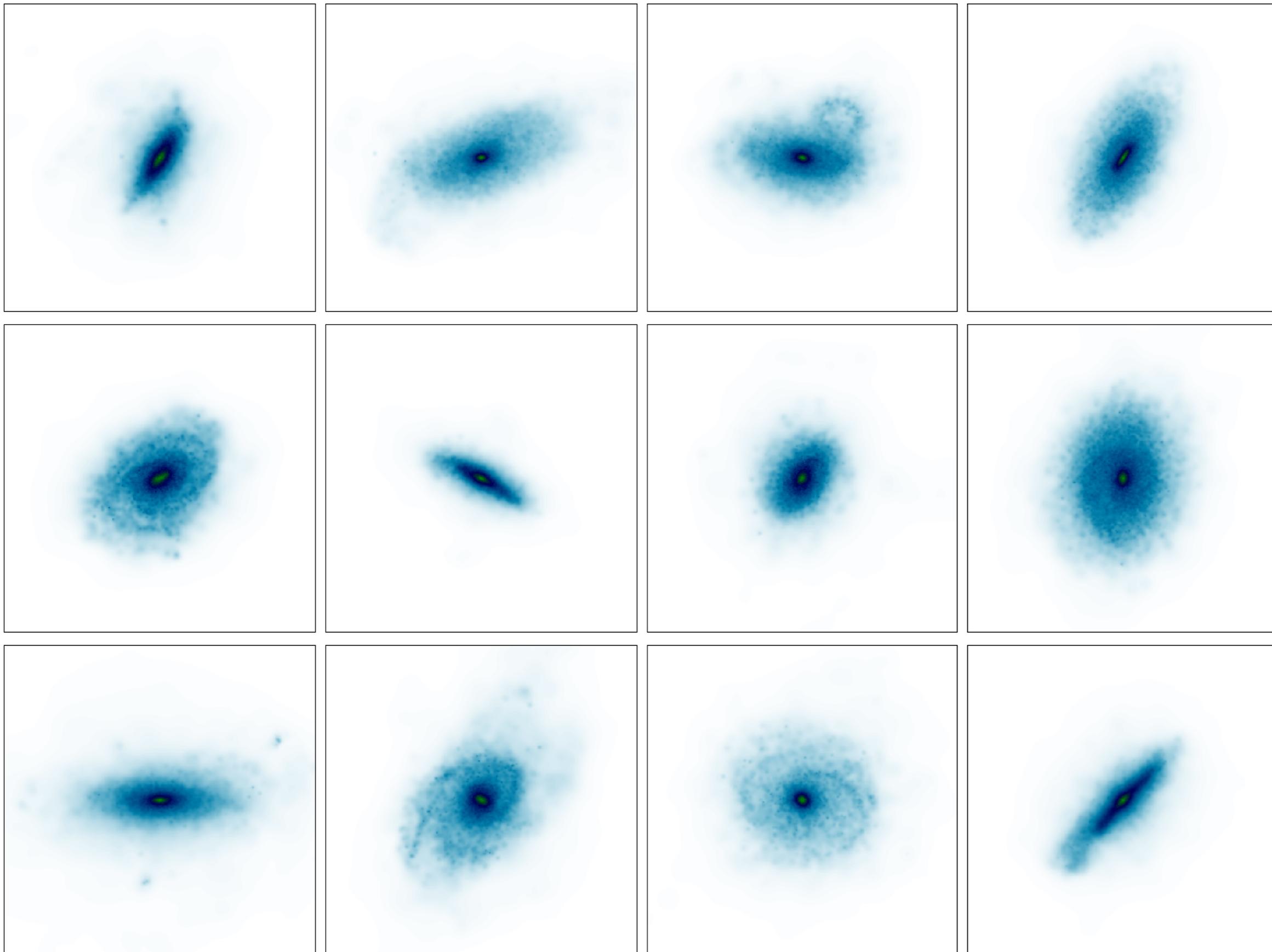


How do we observe TNG?

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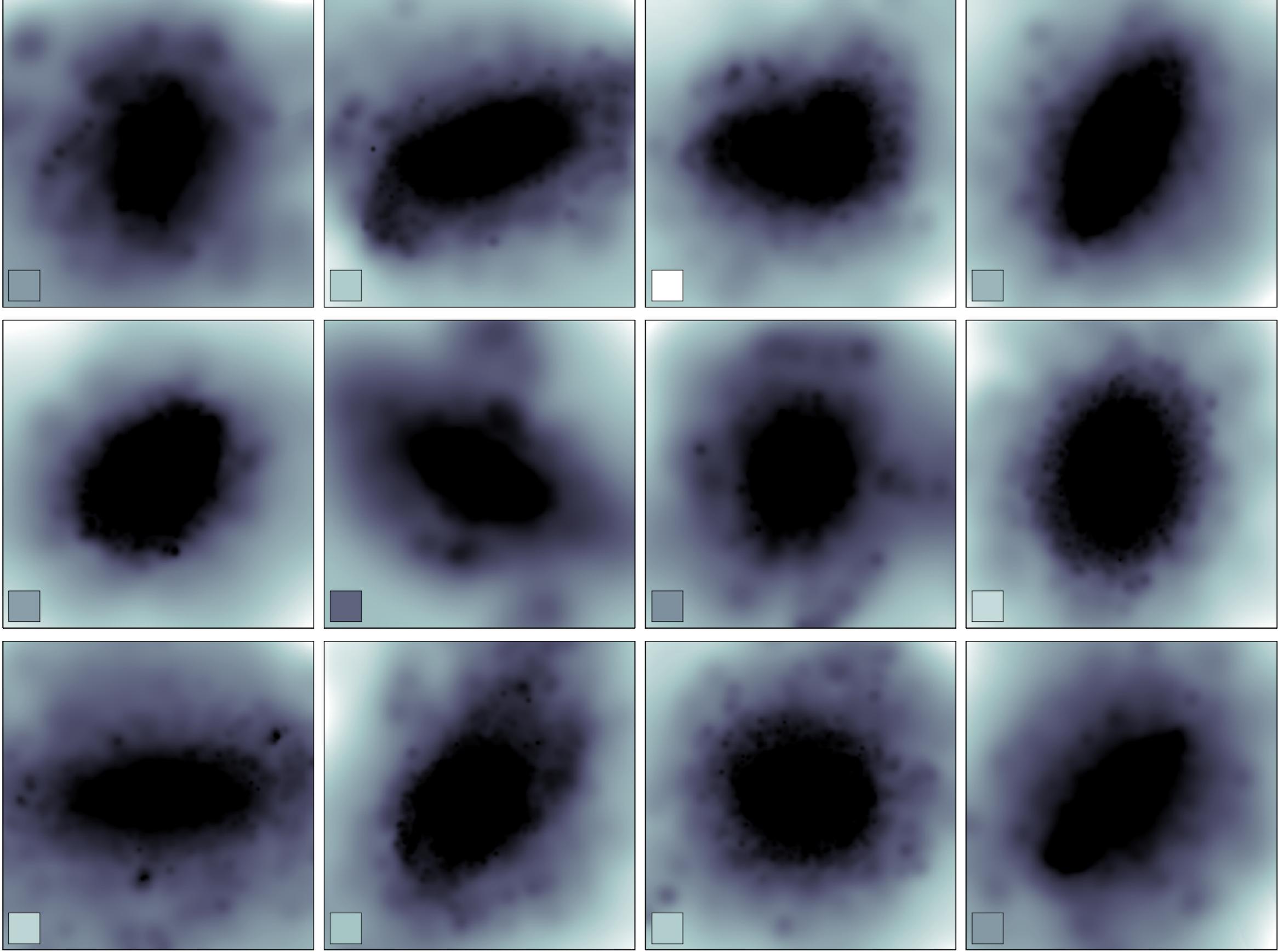


Disks in TNG

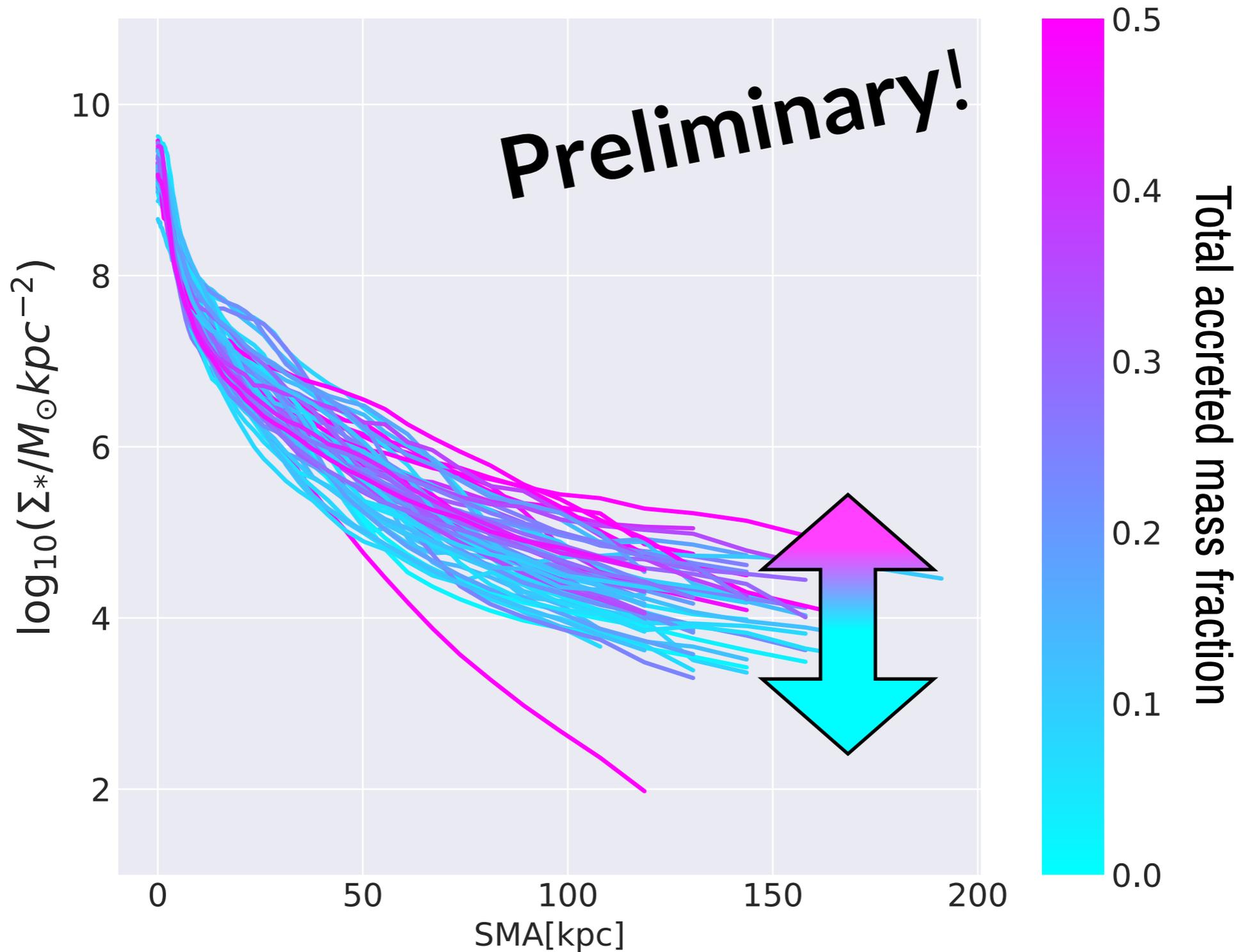


200 kpc

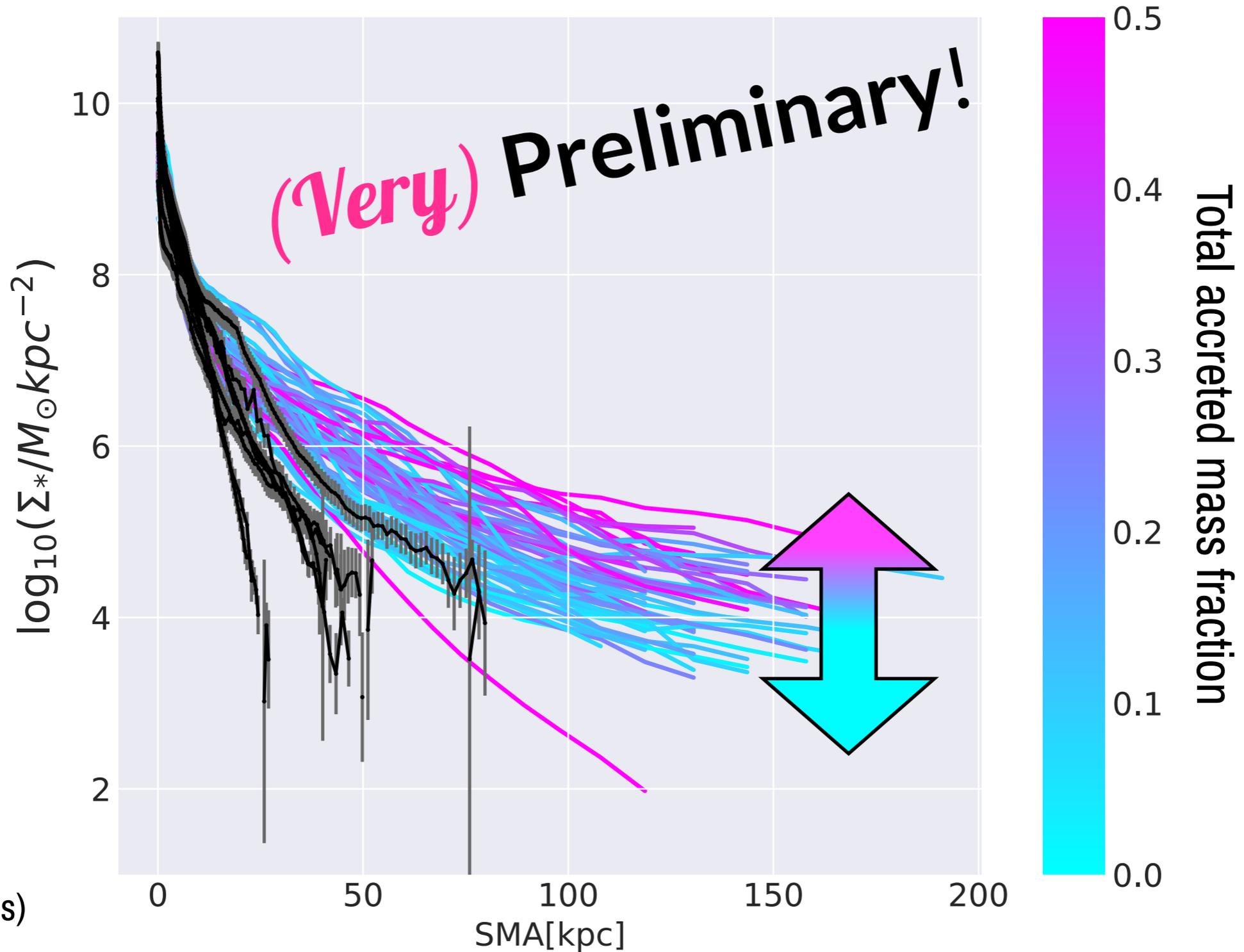
Disks in TNG



More active assembly: more mass in profile outskirts

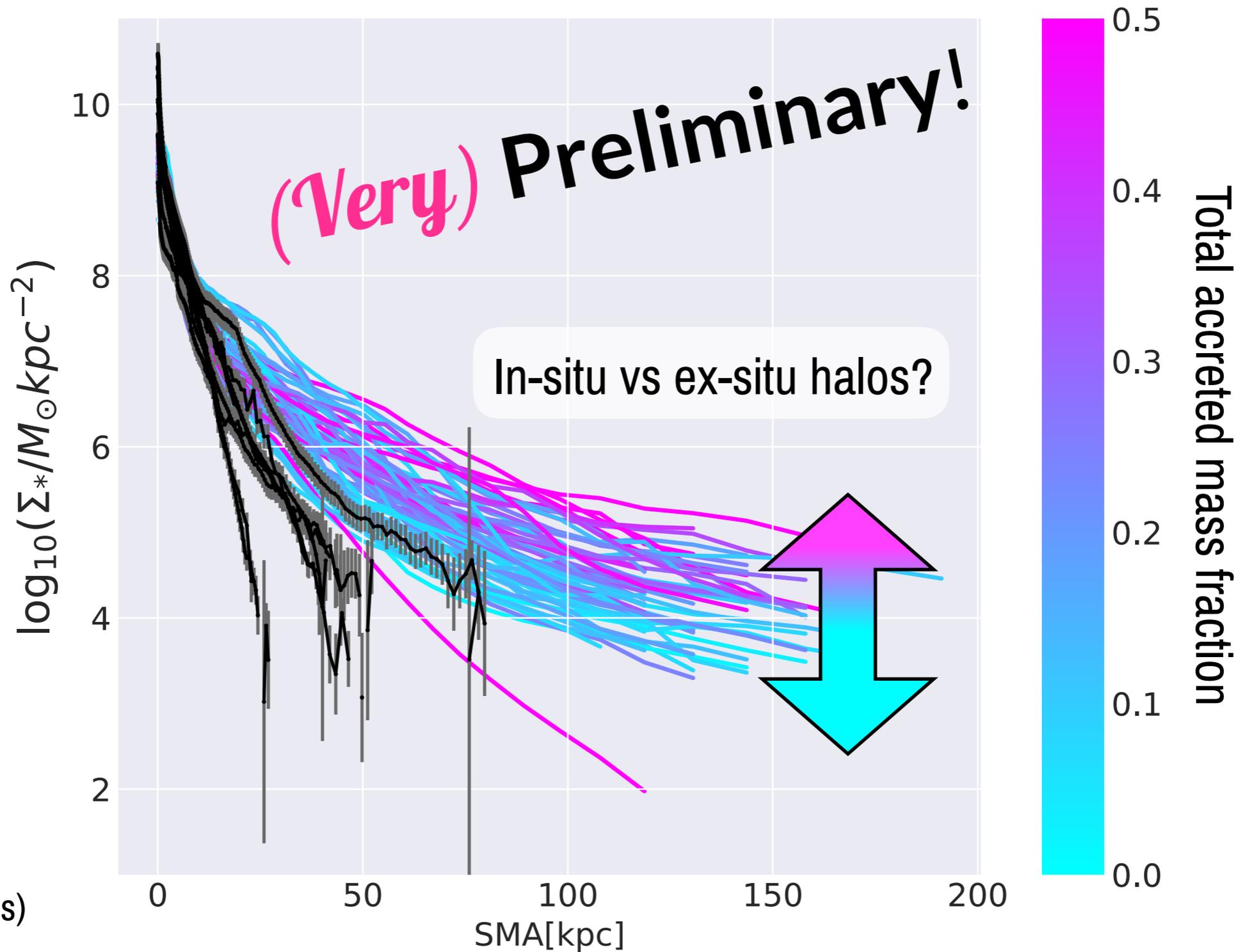


More active assembly: more mass in profile outskirts



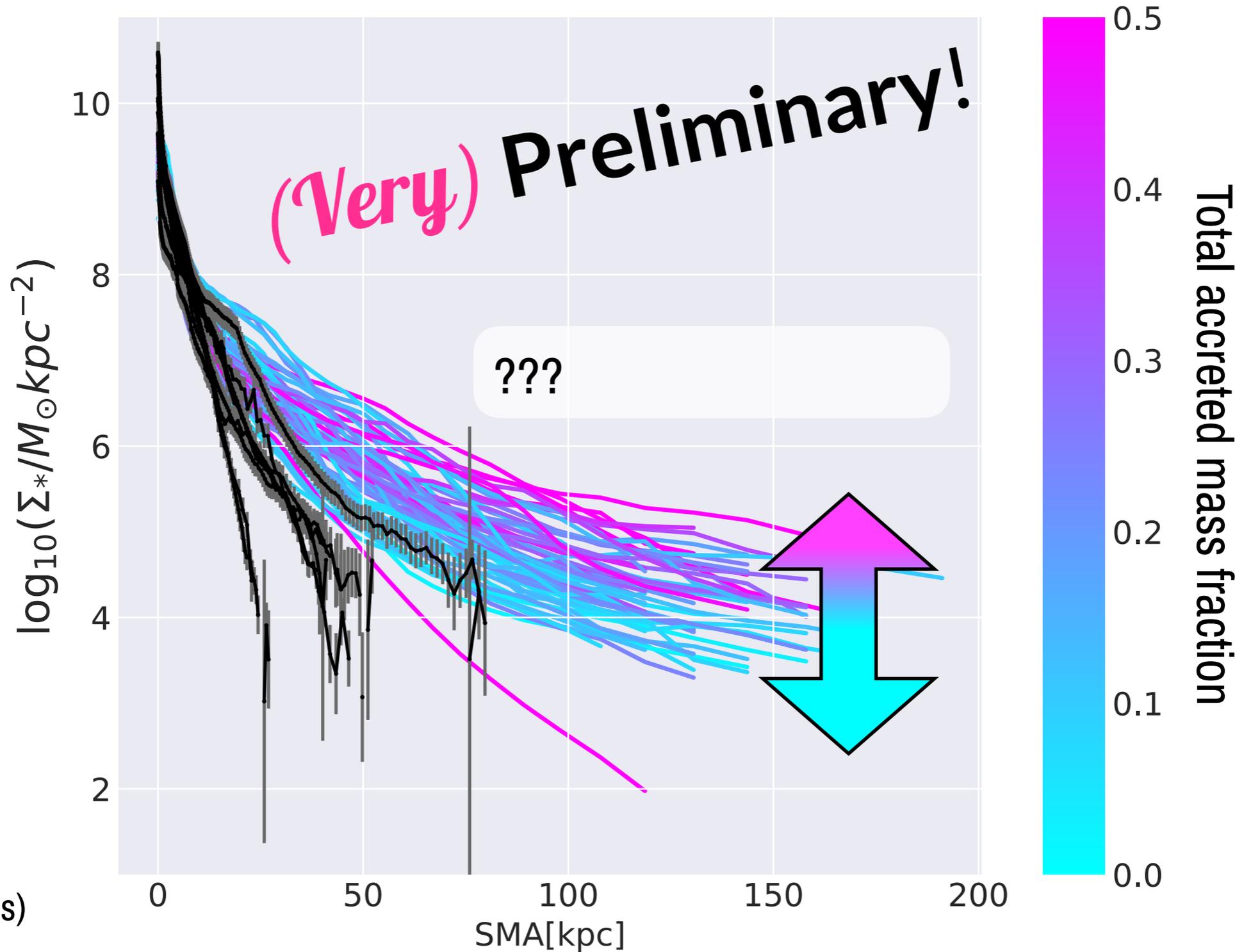
See also:
Elias+2018 (Illustris)

More active assembly: more mass in profile outskirts



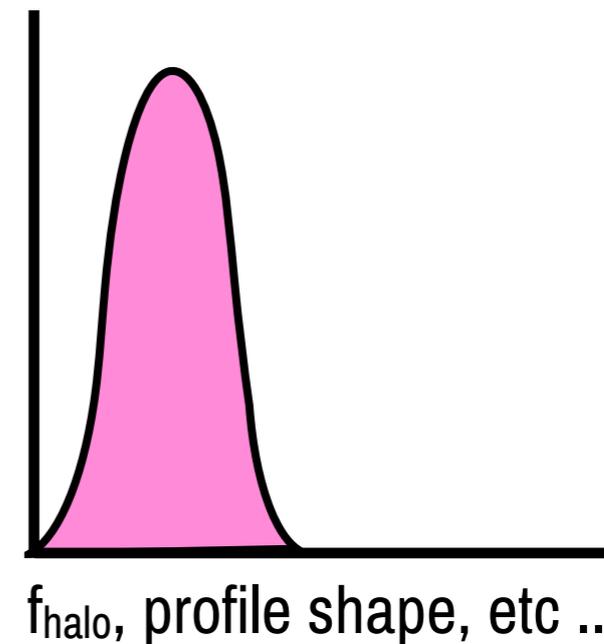
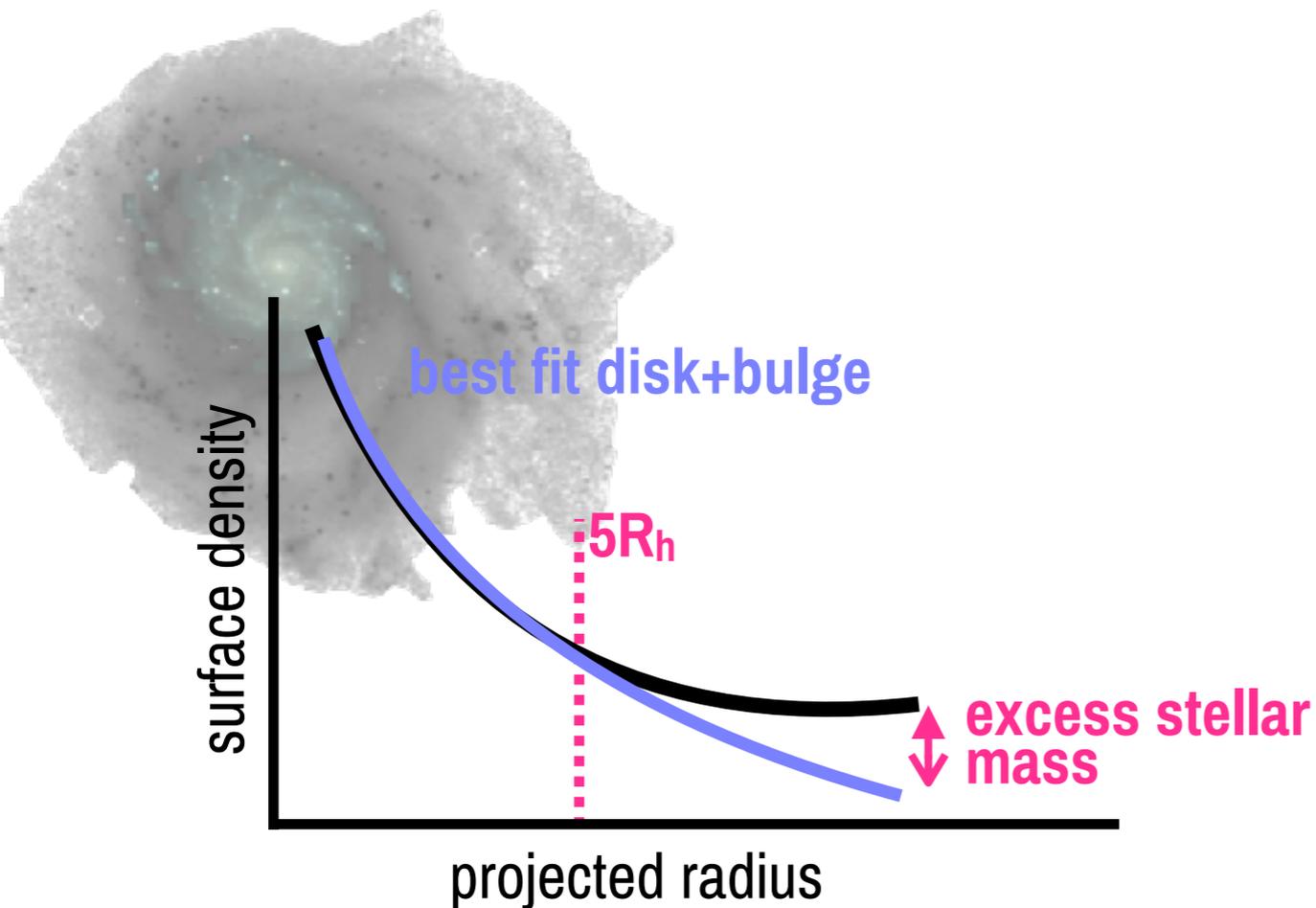
See also:
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More active assembly: more mass in profile outskirts



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What can we ask with TNG?

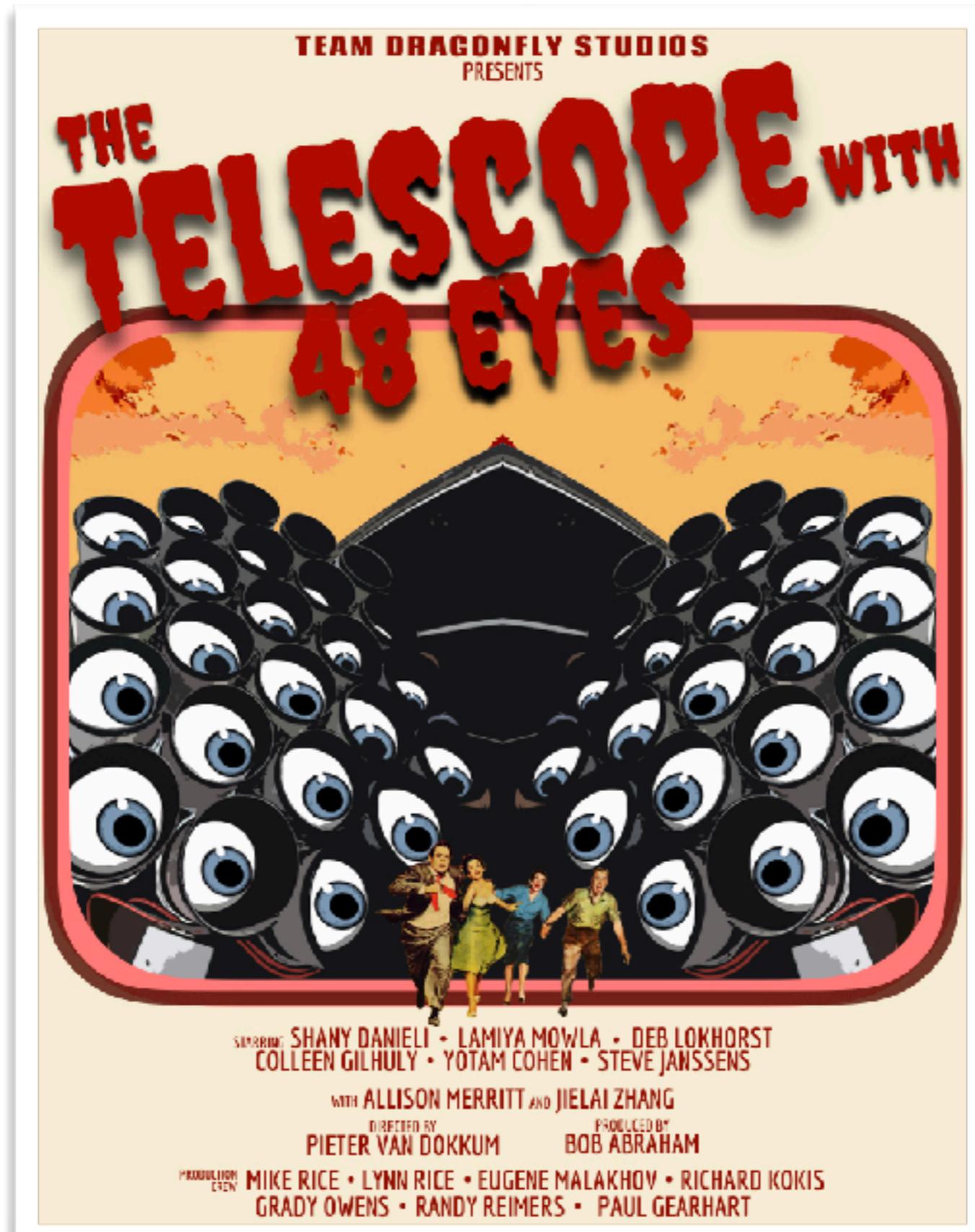


Ideal method(s) for quantifying assembly history?

See also:
Sanderson+2017 (FIRE)
Elias+2018 (Illustris)

Likelihood of matching observed $\langle f_{\text{halo}} \rangle$ and RMS scatter?

Future surveys with dragonfly ...



The Dragonfly Edge-on Galaxies Survey

Colleen Gilhuly¹, Roberto Abraham¹, Allison Merritt²

1: University of Toronto, 2: Max-Planck-Intitut für Astronomie

Motivation

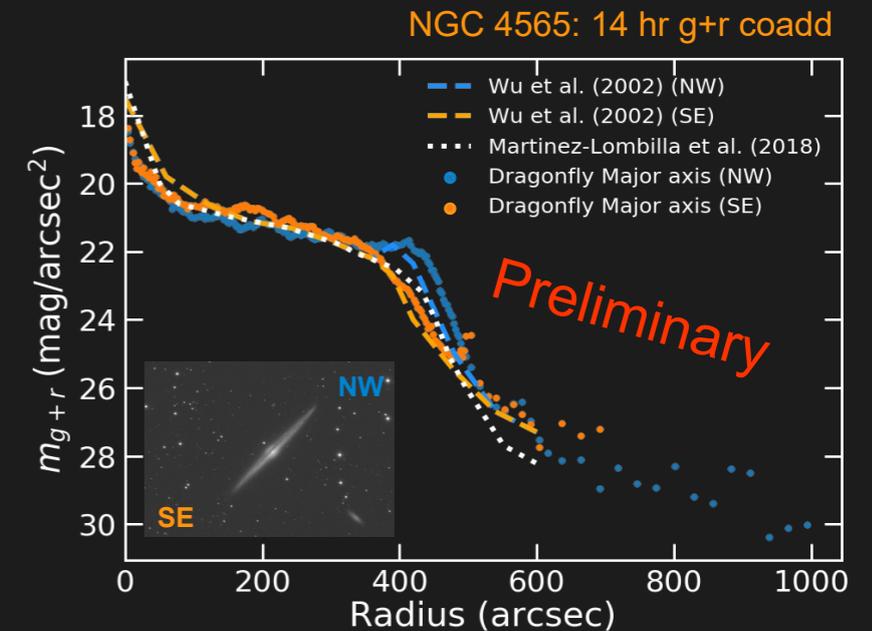
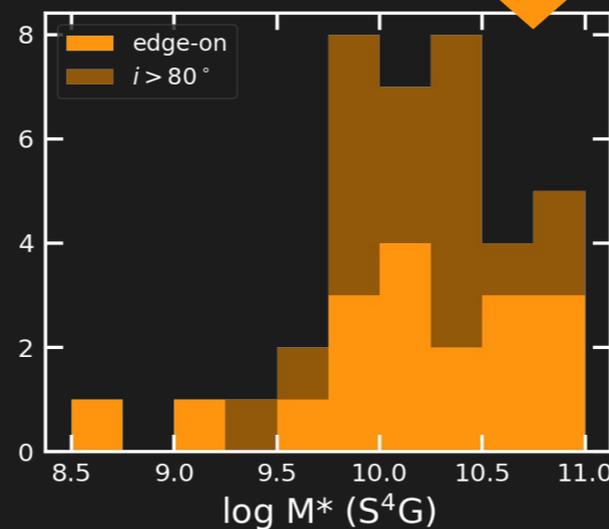
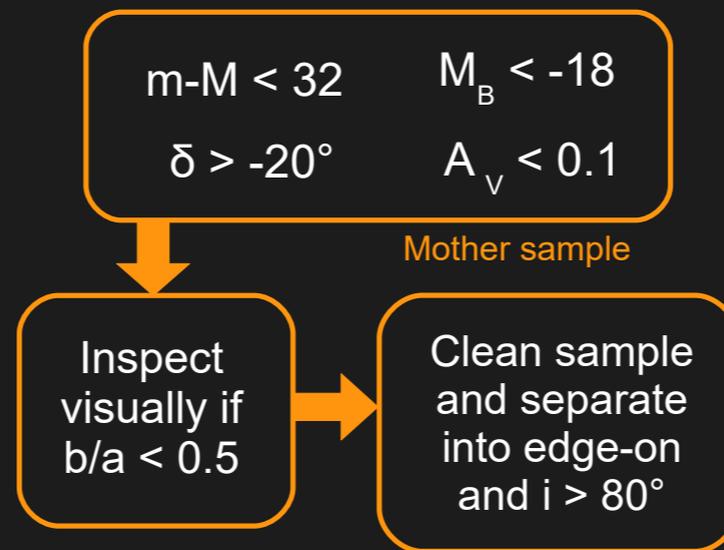
The viewing geometry of edge-on galaxies minimizes the interference of the bright disc with the faint stellar halo. In addition, the prospects of distinguishing stellar halo and thick disc components are improved. The unique perspective of edge-on galaxies is also useful for probing disc truncations and the spatial distribution of satellite galaxies.

Dragonfly's wide field of view and exquisite sensitivity to low surface brightnesses is perfectly suited for studying the faint and extended features surrounding edge-on galaxies. The wide range in stellar masses we have targeted will extend existing stellar halo studies to lower masses while also better constraining the variation in Milky Way-mass galaxies (e.g. in stellar halo mass fraction)



Survey timeline

Three galaxies in our sample were previously observed with Dragonfly. Two edge-on galaxies were observed in Spring 2018, and the remaining 14 edge-ons will be observed in 2019. The nearly edge-on galaxies present a possible avenue for expansion of the survey



NGC 4565: A poster child edge-on

We have collected 92 h of raw exposure time on the Needle Galaxy NGC 4565. This will be Dragonfly's deepest field to date. We replicate the previously observed disc truncation and southeast/northwest asymmetry with a subset of our data (Martínez-Lombilla et al. 2018, Wu et al. 2002). With the full data set, we will probe the limits of the disc (does it truly end or does it continue at very low surface brightness; see Zhang et al. 2018) and characterize the stellar halo. The edge-on geometry reduces the ambiguity of these faint components.

Acknowledgments

Images of edge-on galaxies in top and bottom banner are from SDSS. HyperLeda and NED were used in the generation of the mother sample and final sample.



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Thanks!