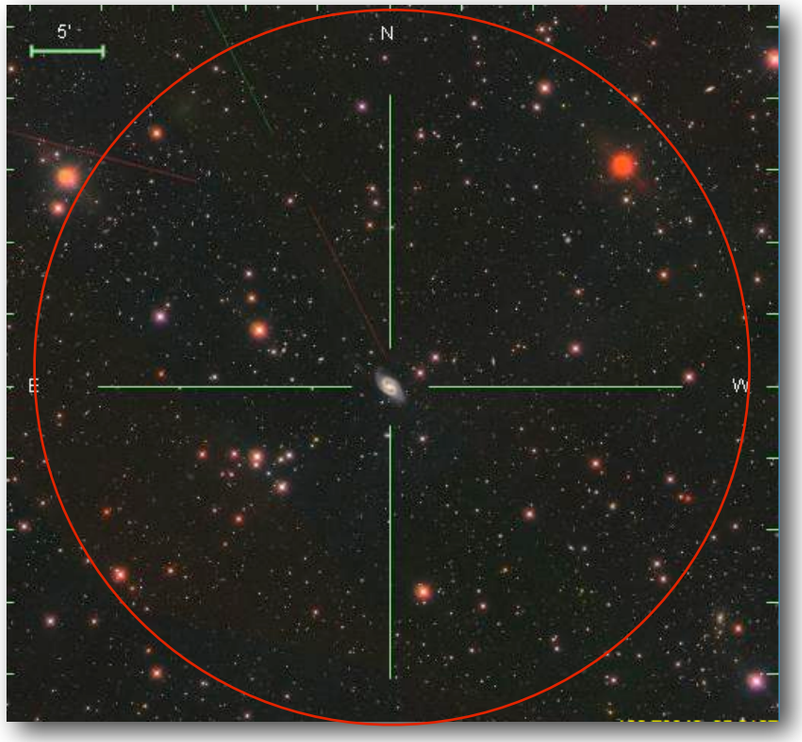
The SAGA Survey

A Statistical Sample of Satellite Galaxies Around Milky Way-like Galaxies

Marla Geha (Yale)



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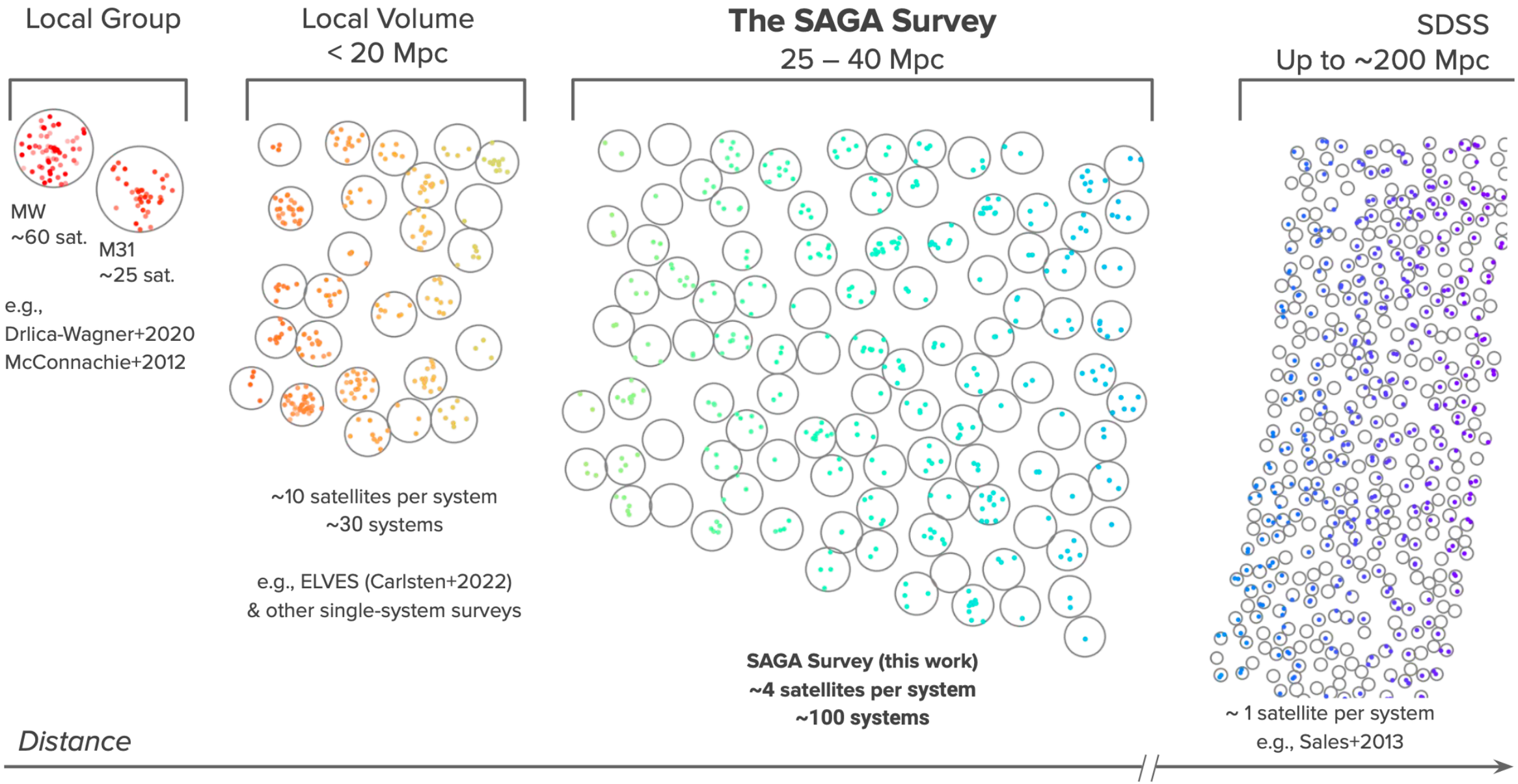
Satellites Around Milky Way Analogs



Merian ->

Mao+24: Figure 1

The SAGA Survey: 101 Milky Way Analog Systems

SAGA Observational Goal:
Characterize the satellite populations down to $M_r = -12.3$ around 100 Milky Way-like galaxies.

✓ **Stage 1:** Build complete sample of a few MW analogs using gri color cuts.

✓ **Stage 2:** Use data from Stage I to design an efficient targeting strategy.

✓ **Stage 3:** Efficiently measure satellite LF for 100 MW analog to $M_r = -12.3$.

Geha et al. (2017)
8 hosts
27 satellites
14 newly discovered
(12,000 redshifts)

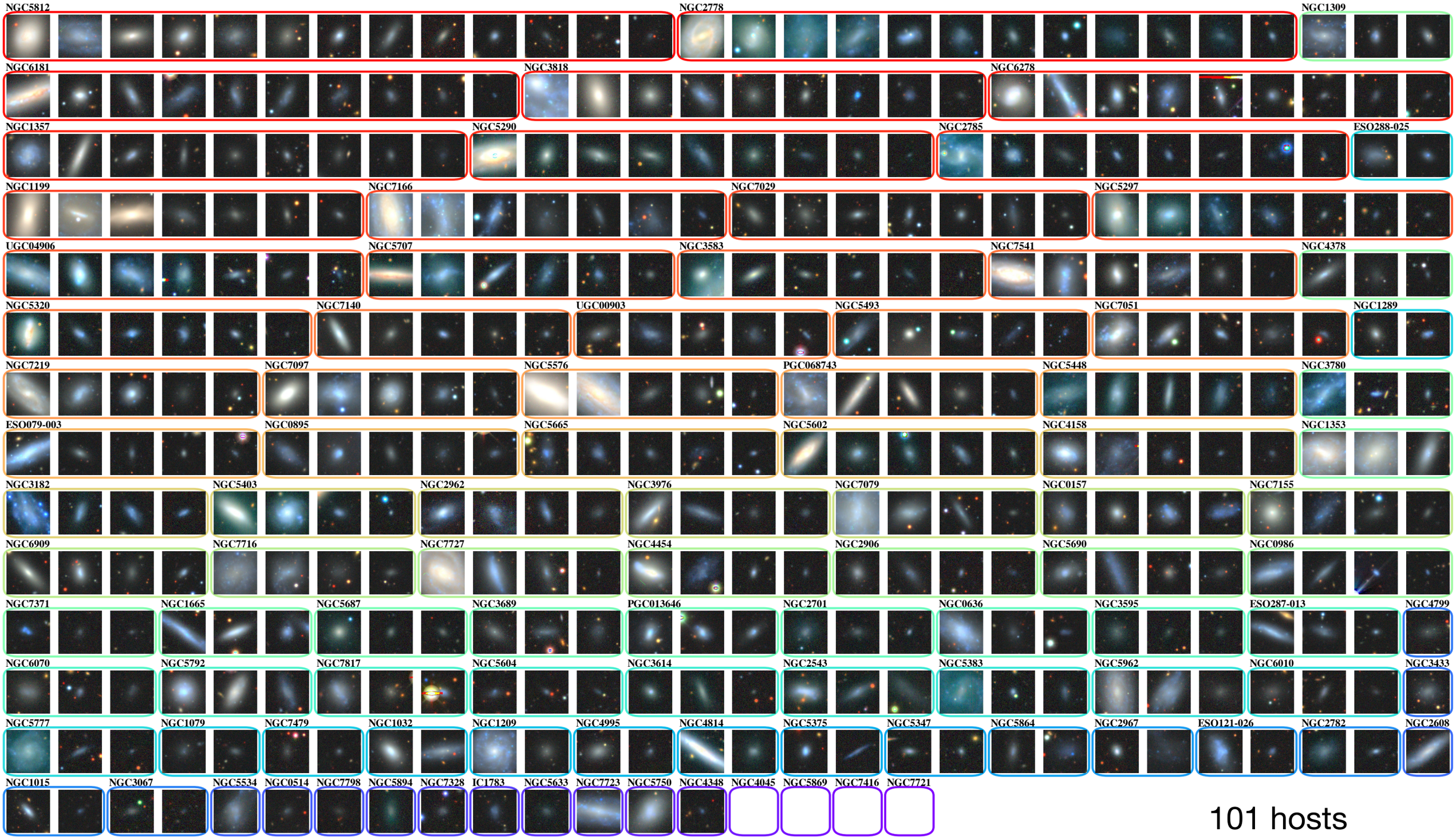
Mao et al. (2021)
36 hosts
127 satellites
69 newly discovered
(25,000 redshifts)

Mao et al (2024)
Geha et al (2024)
Wang et al (2024)
101 hosts
378 satellites
229 newly discovered
(46,000 redshifts)

SAGA DR2: Mao+ 2021

36 hosts
127 satellites
69 newly discovered
(25,000 redshifts)

SAGA DR3: Mao+ 2024



101 hosts
378 satellites
229 newly discovered
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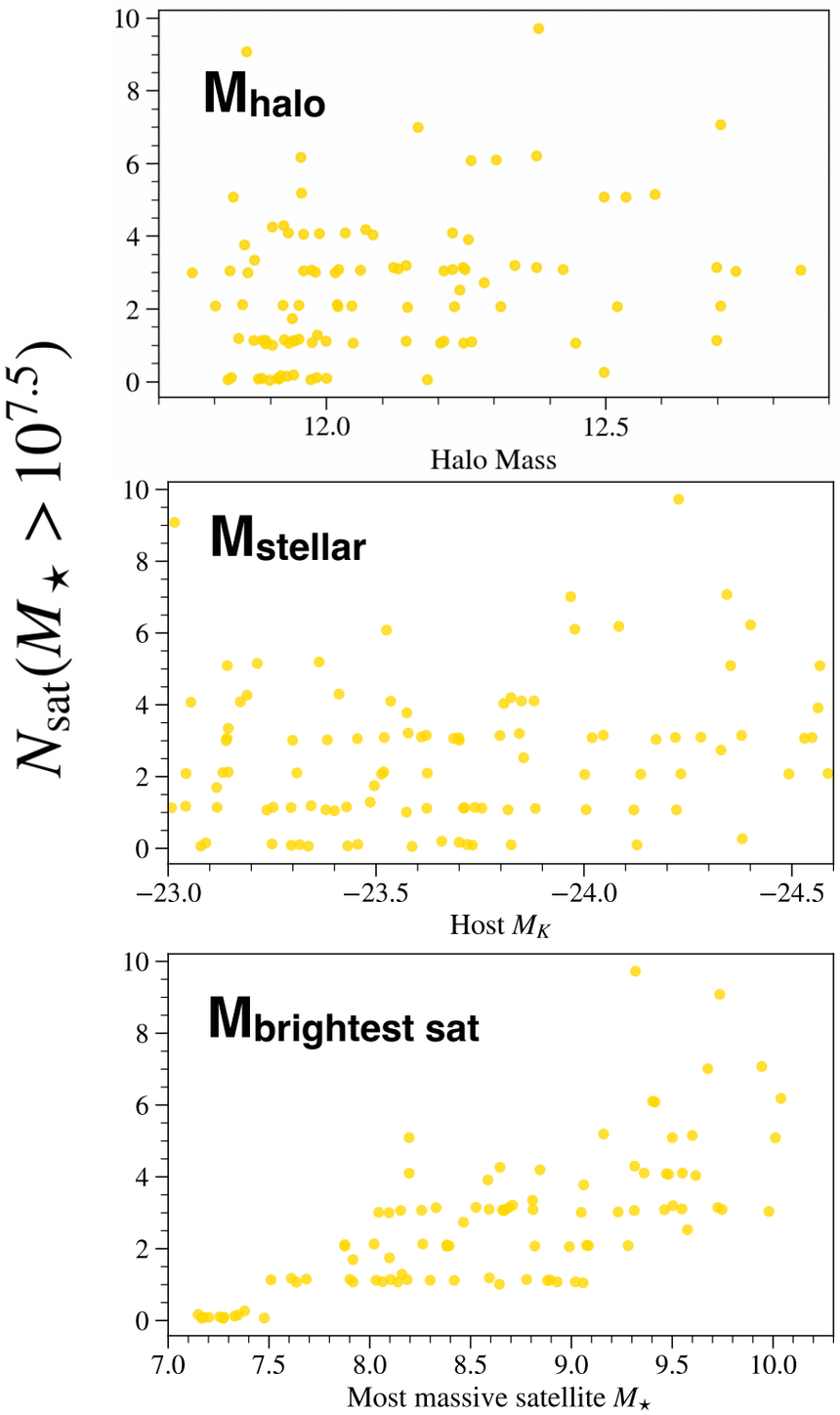
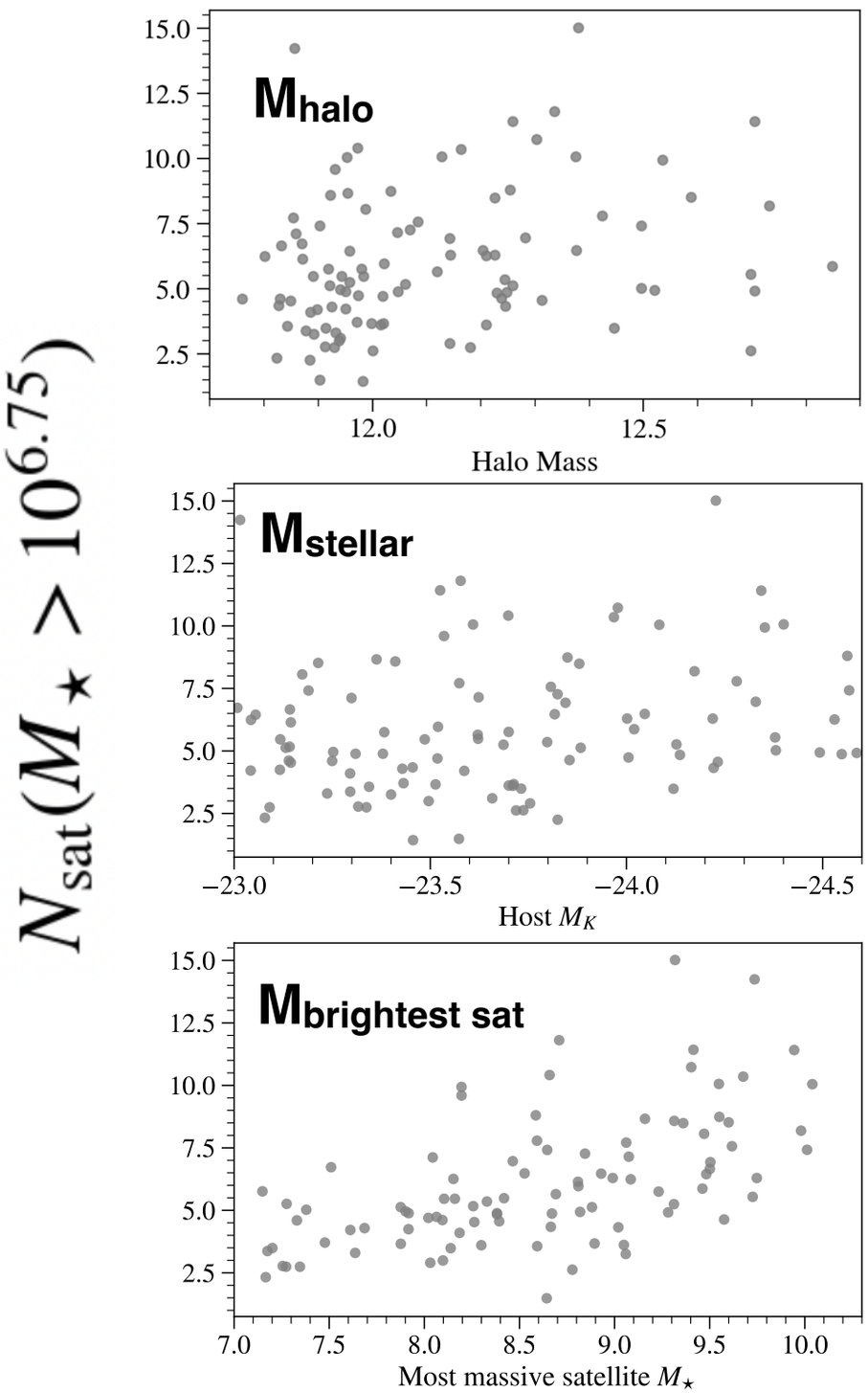
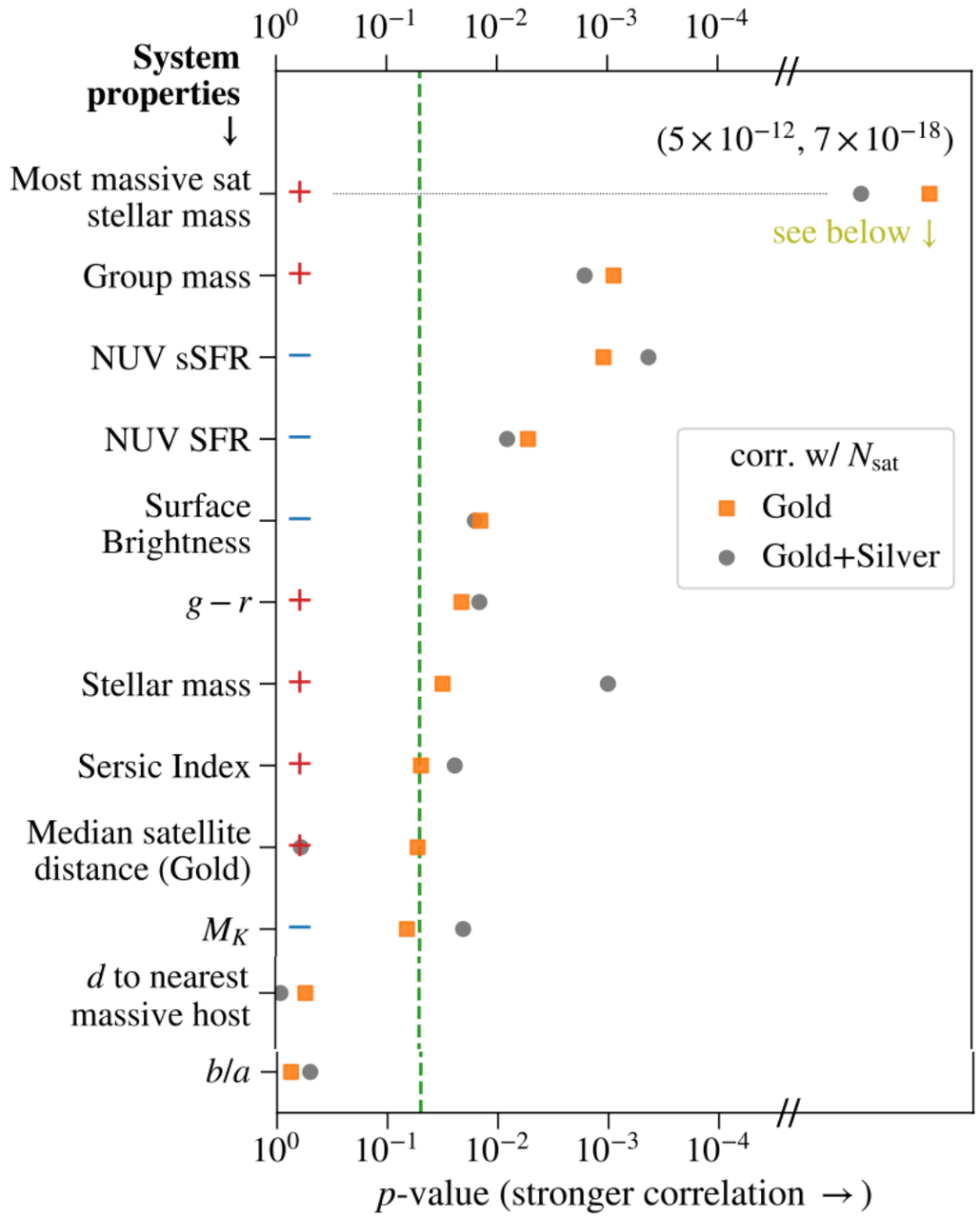
How many satellites are around a Milky Way-like halo?



Mao+24: Sect 5.2

How many satellites are around a Milky Way-like halo?

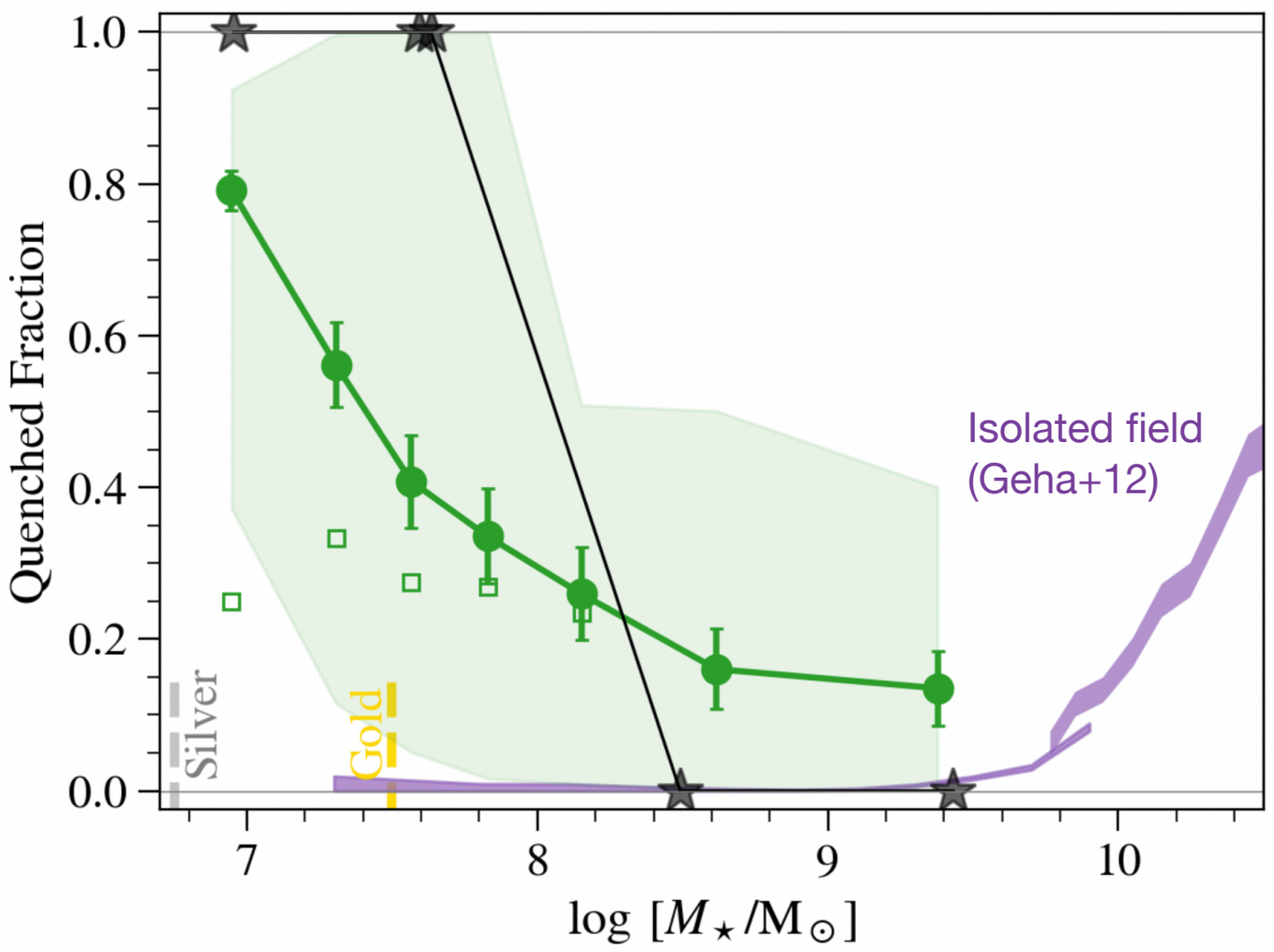




Number of satellites correlates most strongly with brightest satellite magnitude.

Mao+24: Sect 5.2

SAGA Satellites: Quenched Fractions

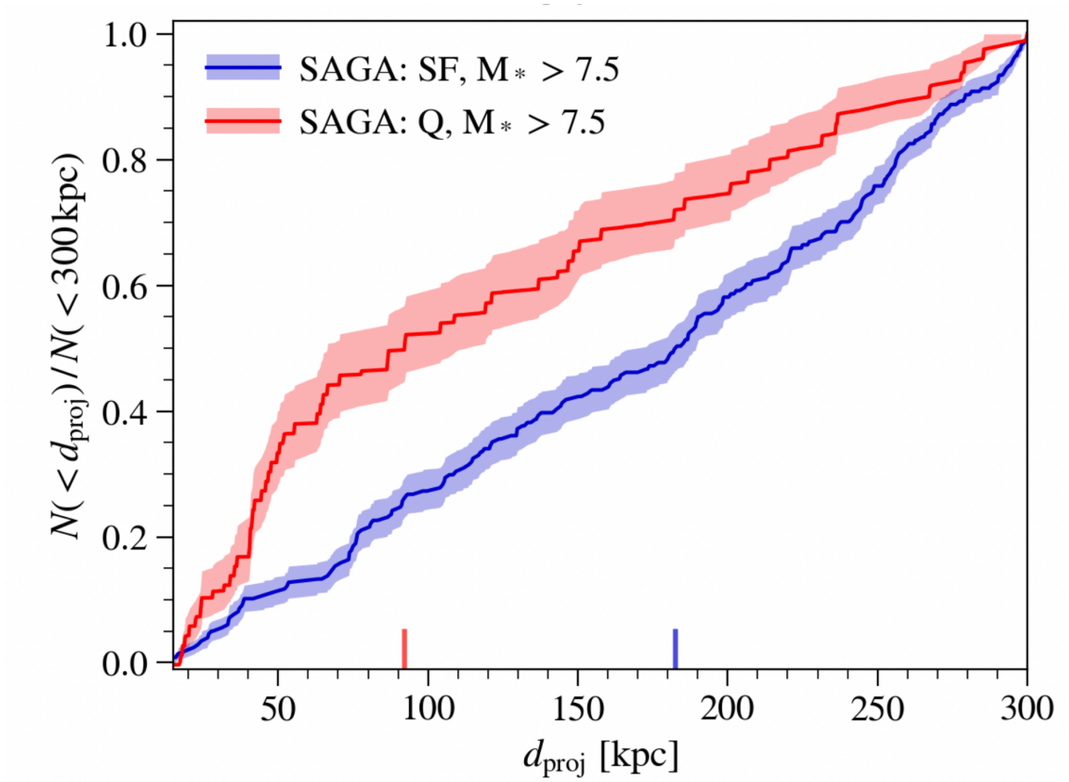


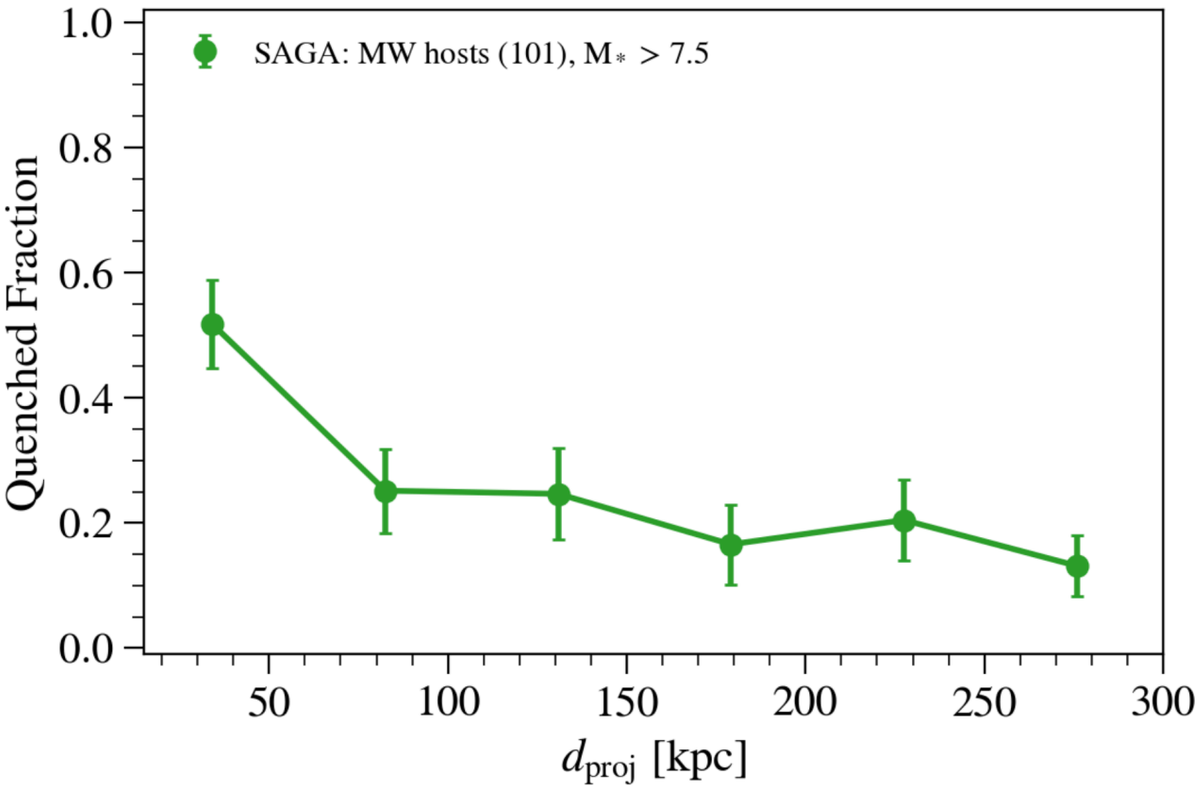
MW quenched fraction is one-sigma outlier.

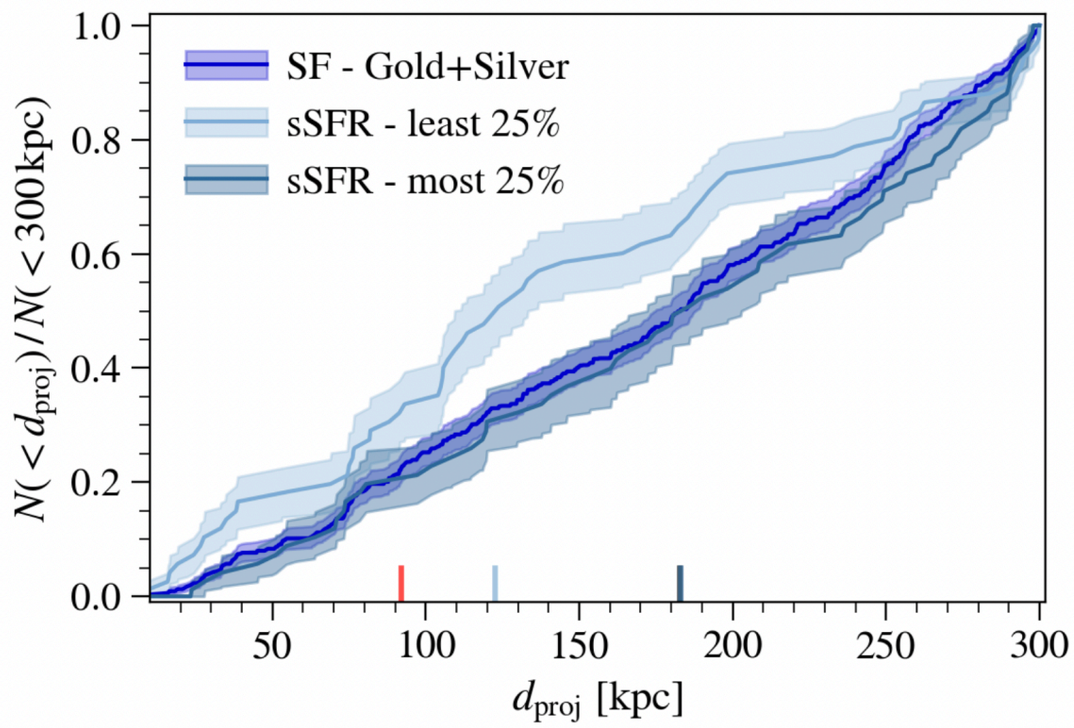
Wang+24 and poster: Quenched fractions of the FIELD predicted to increase below 10^7 M_*

Mao+24: Sect 5.3
Geha+24: Sect 3.2

SAGA Satellites: Radial Trends







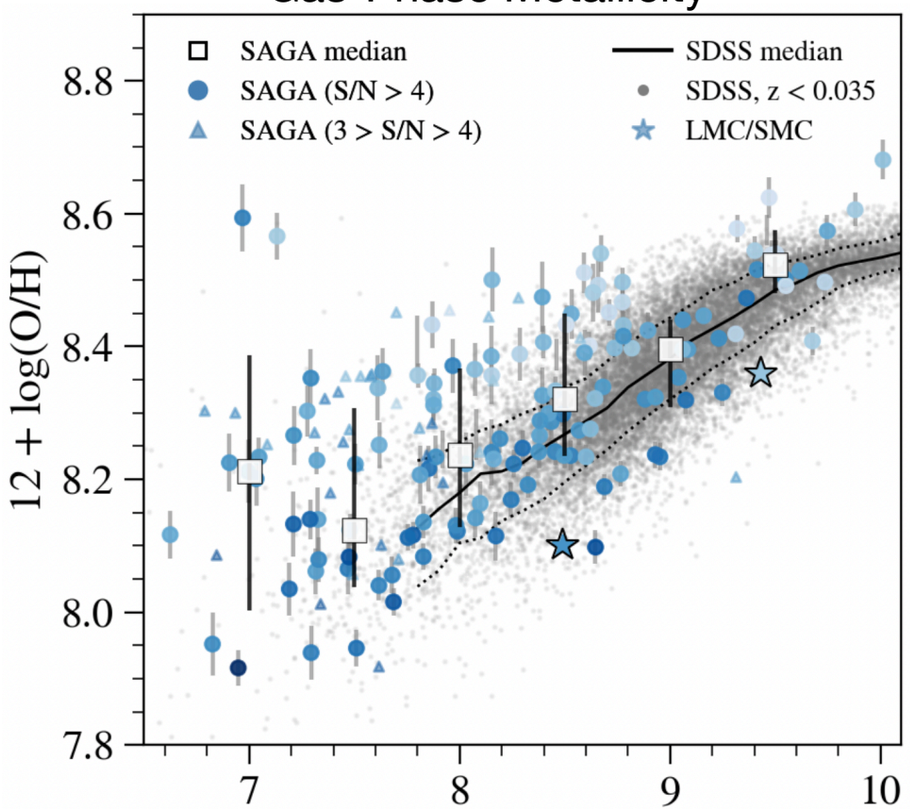
Quenched satellites are found at all radii, with transition to higher quenched fraction inside 100 kpc.

Least SF quartile follows quenched radial distribution

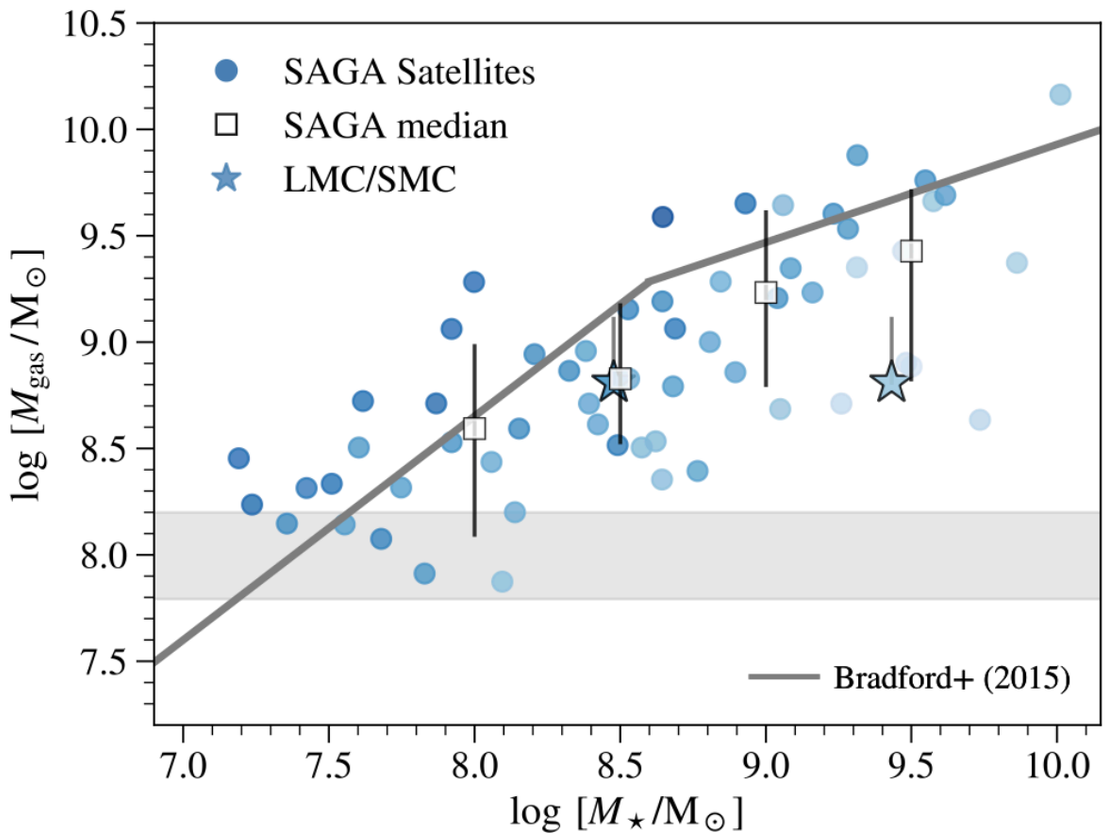
Geha+24: Sect 3.2

SAGA Satellites: Gas-Phase Metallicity + HI Gas Masses

Gas-Phase Metallicity



HI Gas Mass



SAGA metallicities are on average higher than field-ish SDSS.

Gas masses are on average lower than field sample.

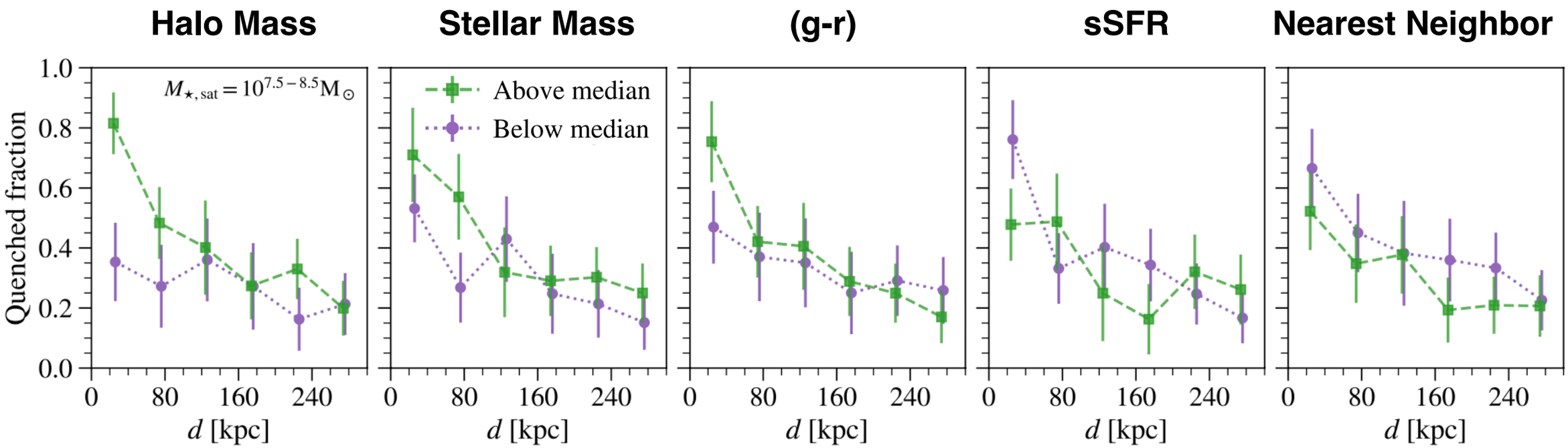
In agreement with:
Yang+23
Jones+23
...

HI measurements from Arecibo, HIPASS and FAST.

Geha+24: Sect 5

SAGA Satellites: Conformity

Split host sample in half, compare quenched fraction as function of projected radius.

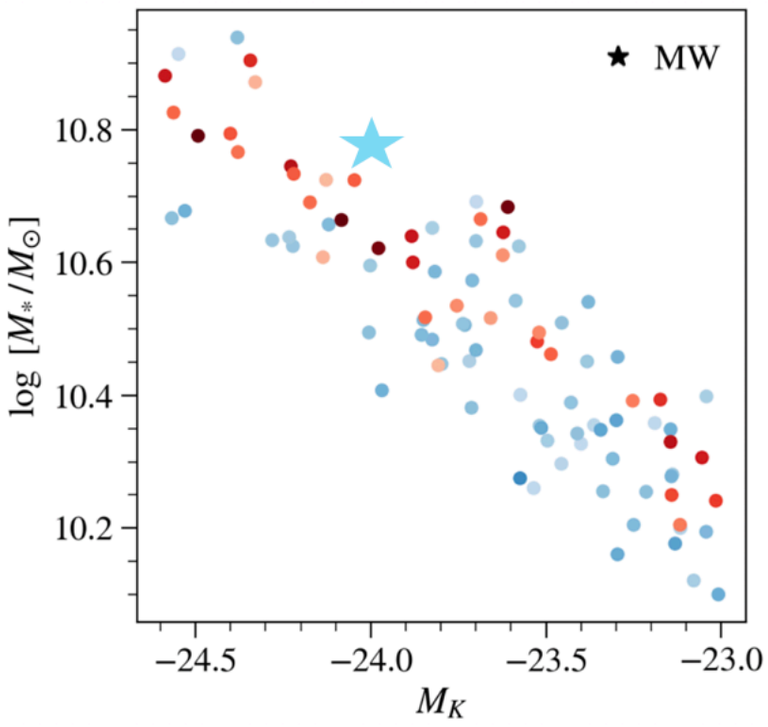


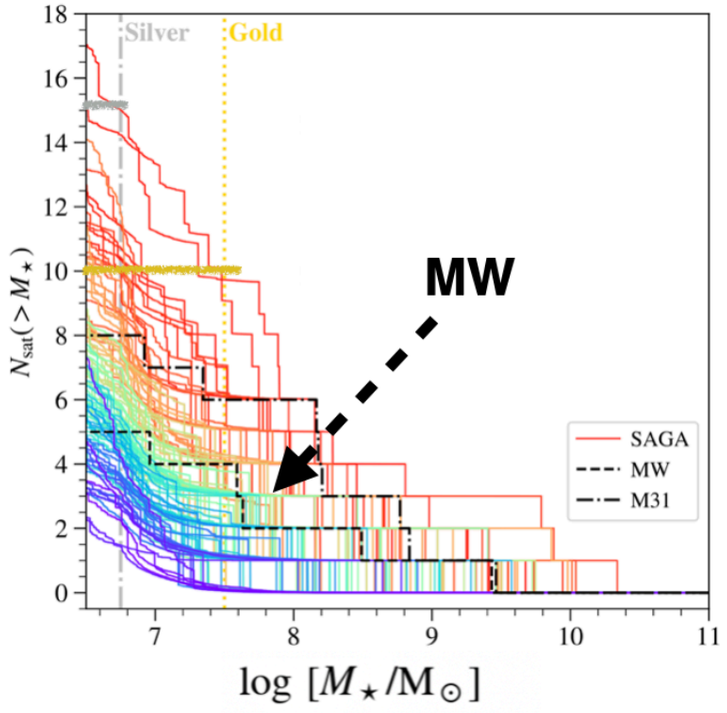
Higher quenched fractions in higher halo mass, but only in the inner 100 kpc.

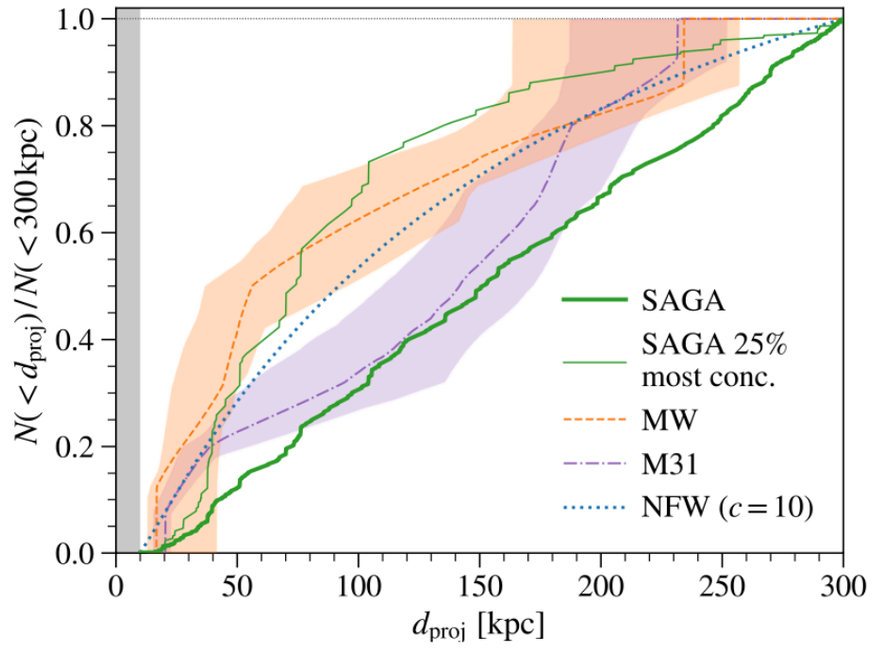
A HINT of higher quenched fractions for systems with nearby neighbor at all projected radii.

Geha+24: Sect 6

So how does the Milky Way itself compare to SAGA?







MW LF consistent with being drawn from SAGA LF.

MW radial distribution more concentrated than SAGA.

MW quenched fraction is one-sigma outlier.

The MW satellite system is composed of older, less-recently accreted satellites plus the recent arrival of the LMC/SMC system.

Mao+24: Sect 6.1

The SAGA Survey: Next Chapters?

- Measure dynamical masses of satellites.
- Comparing sizes, SFR of SAGA vs. matched isolated sample (Y. Asali)
- Proposing HI VLA and Meerkat imaging for all SAGA systems.
- Dragonfly imaging to connect satellites to streams+stellar halos.

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