



UNIVERSITÀ
DEGLI STUDI
FIRENZE

Me and my research on Milky Way's satellites

Astrobigné – 2nd December 2025

Elisa Torrigiani Malaspina



Bachelor degree

Sept 2018 – Sept 2022

University of Florence
(Alessandro Marconi)

My background

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November 2025-
University of Florence
(Stefania Salvadori,
**Nature and evolution of dark
and luminous satellites**)



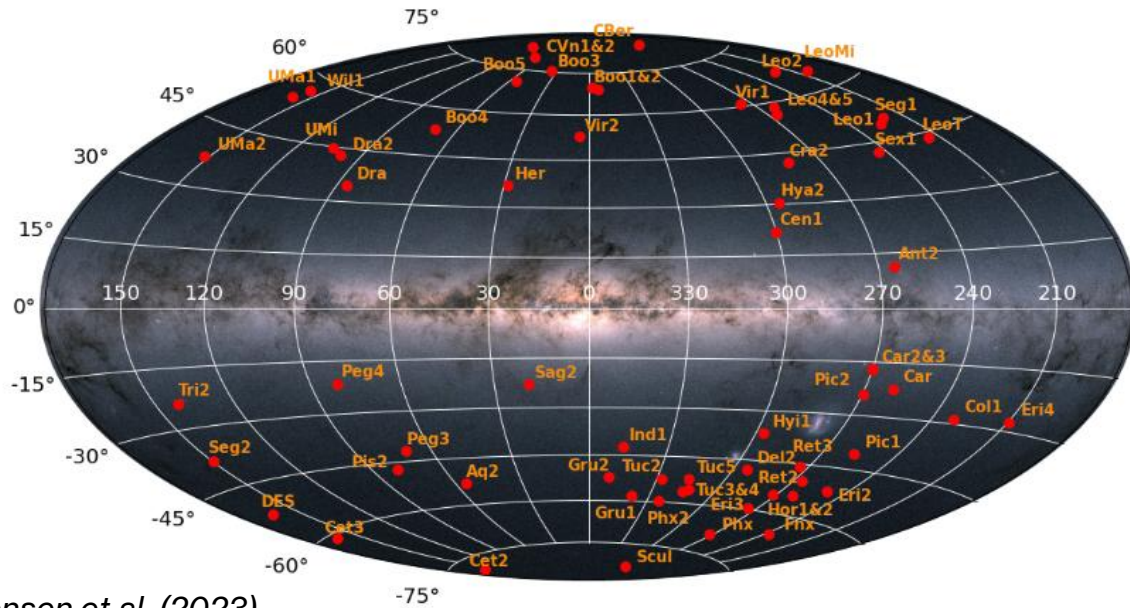
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Monthly Free Shop
distribution

Present-day satellites of the Milky Way

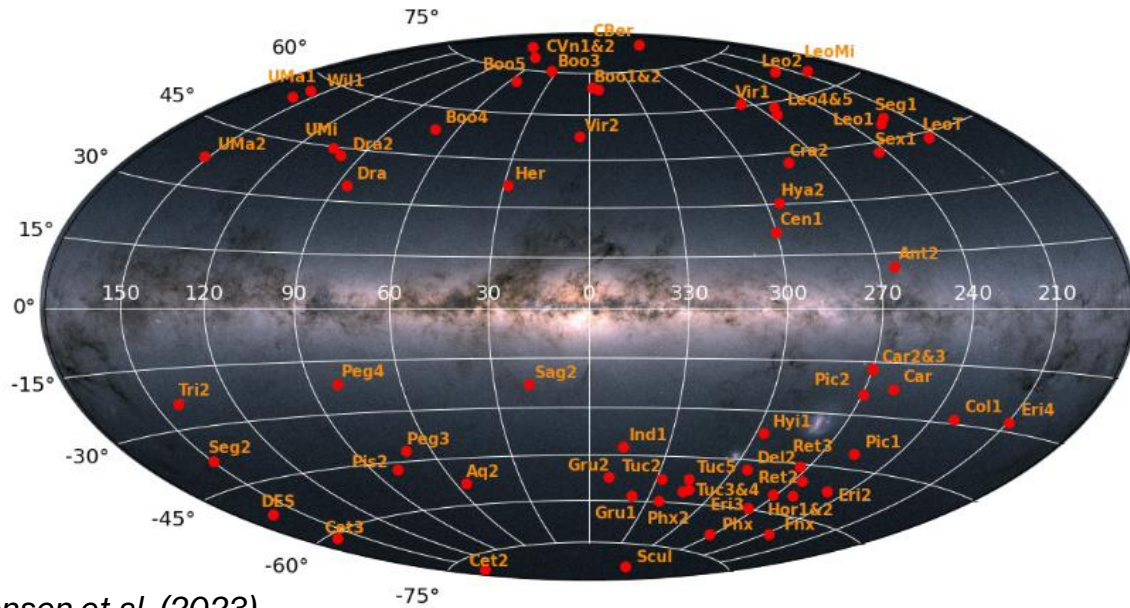
Observations ~ 60 satellite galaxies



Jensen et al. (2023)

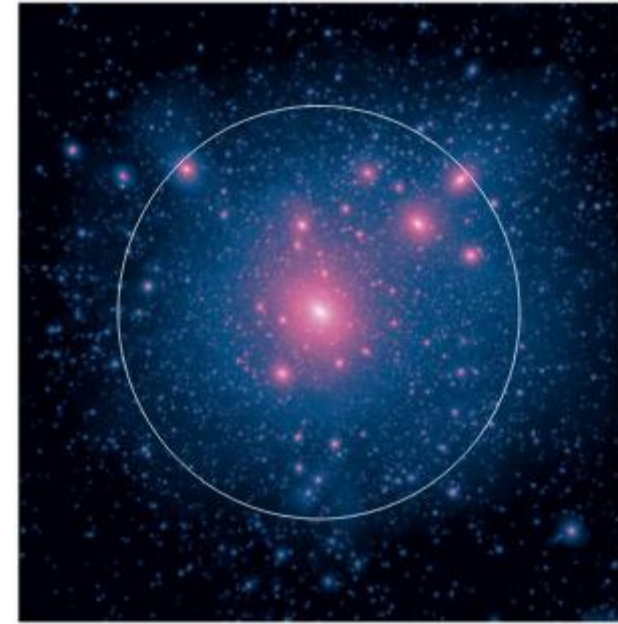
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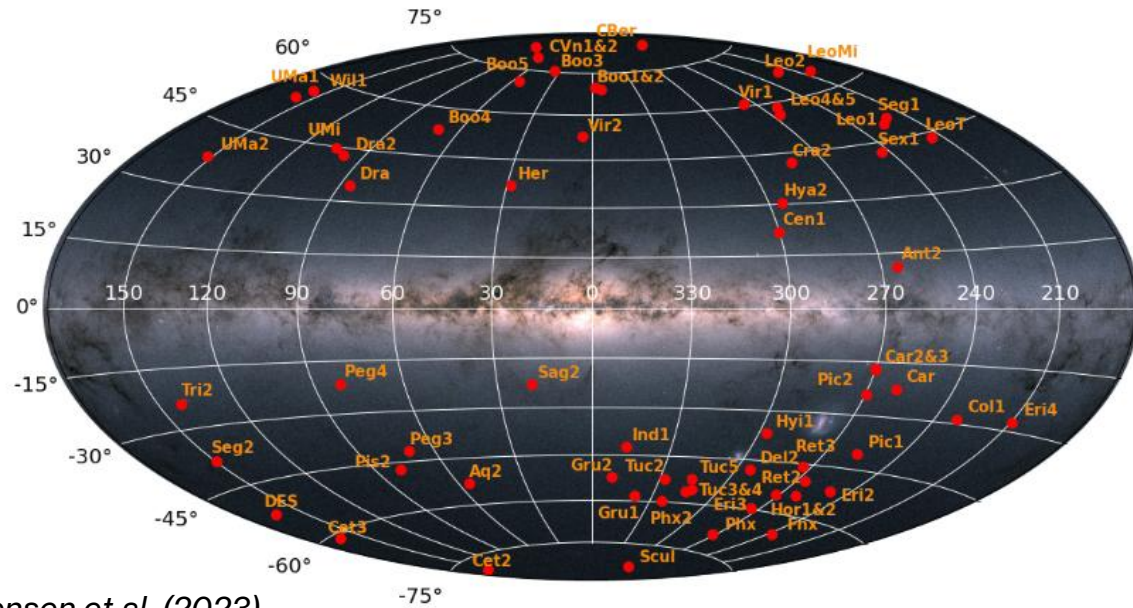
Simulations $\sim 10^4$ satellite DM halos



Griffen et al. (2016)

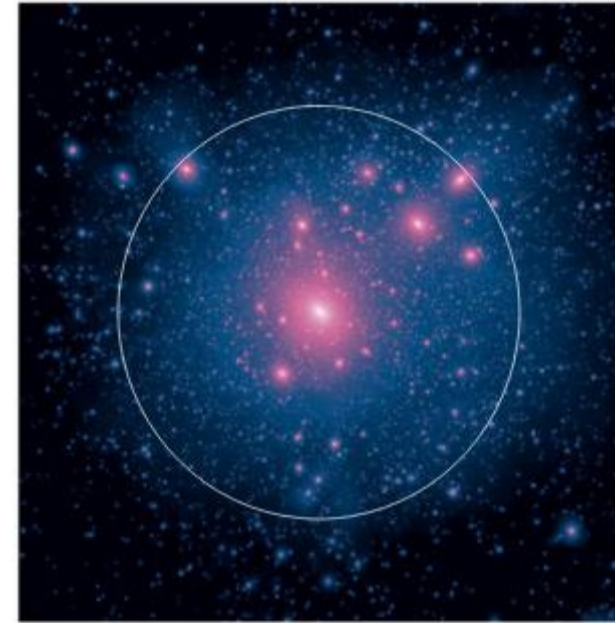
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Missing Satellites Problem

a challenge of the Λ CDM model

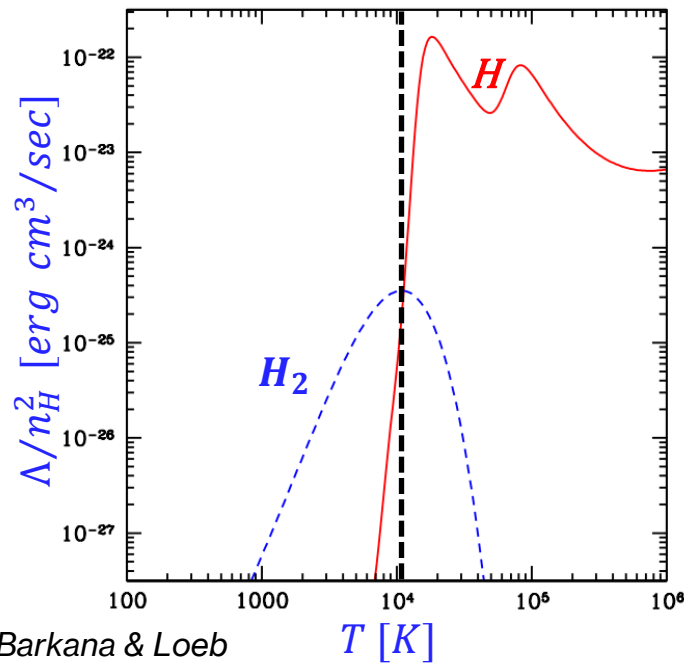
Missing Satellites Problem: a possible solution

Not all DM halos host stars

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Minihalos: $T < 10^4 K$

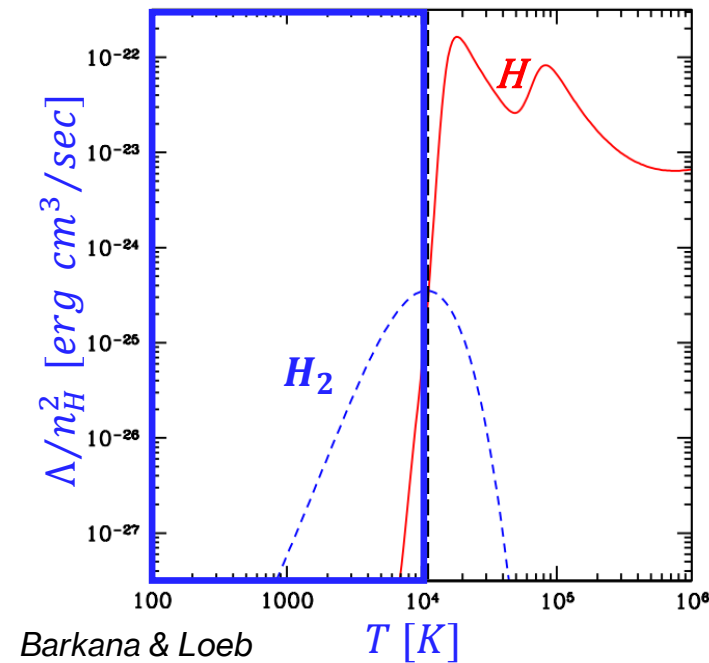


Barkana & Loeb
(2001)

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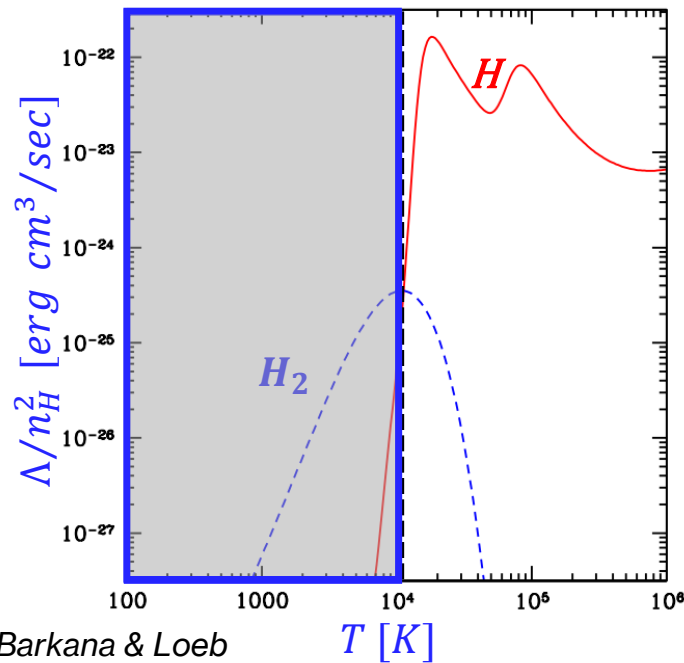


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Negative feedback:

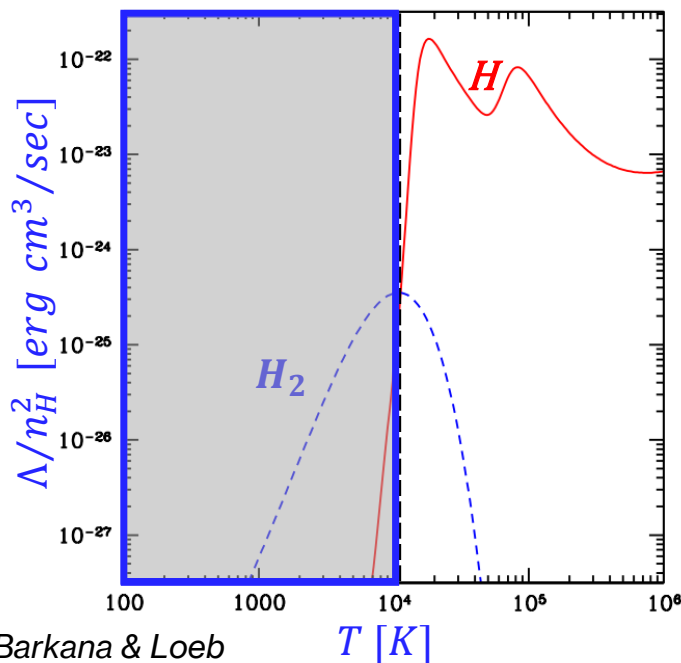
- H_2 photo-dissociating photons
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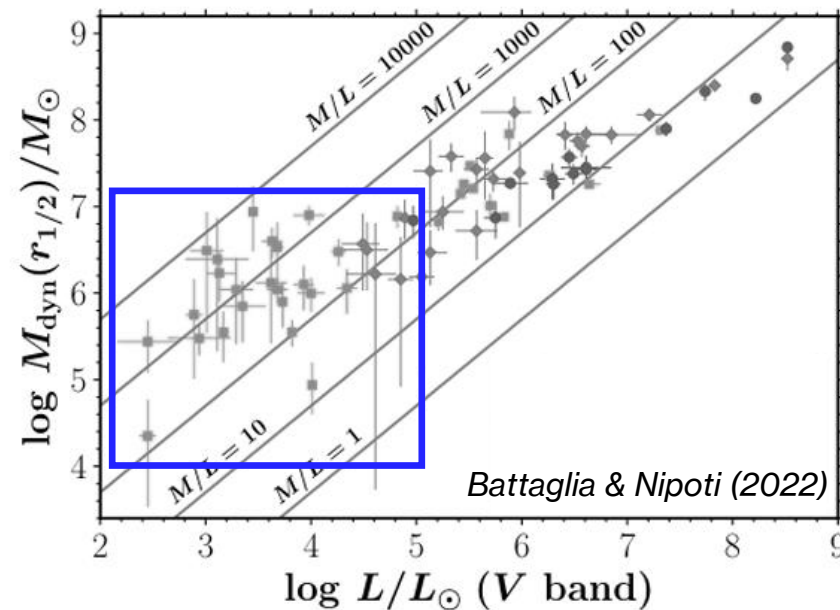


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Ultra-faint dwarfs (UFDs)

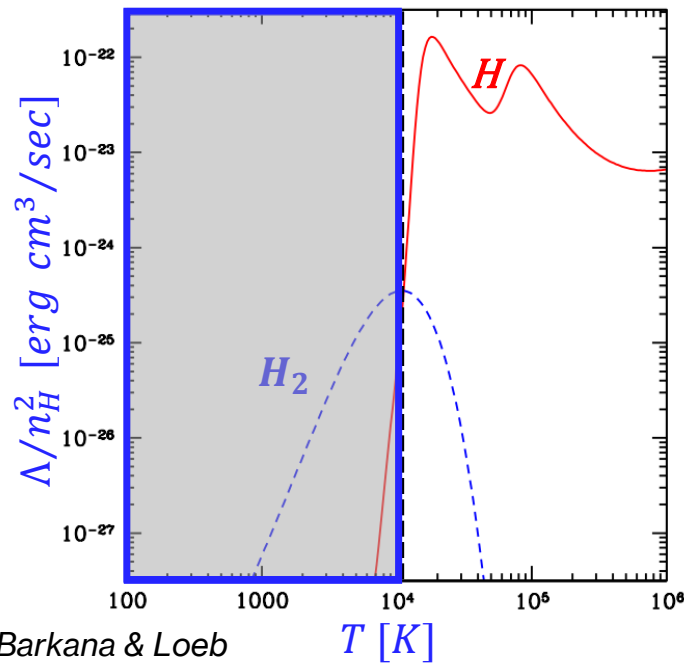


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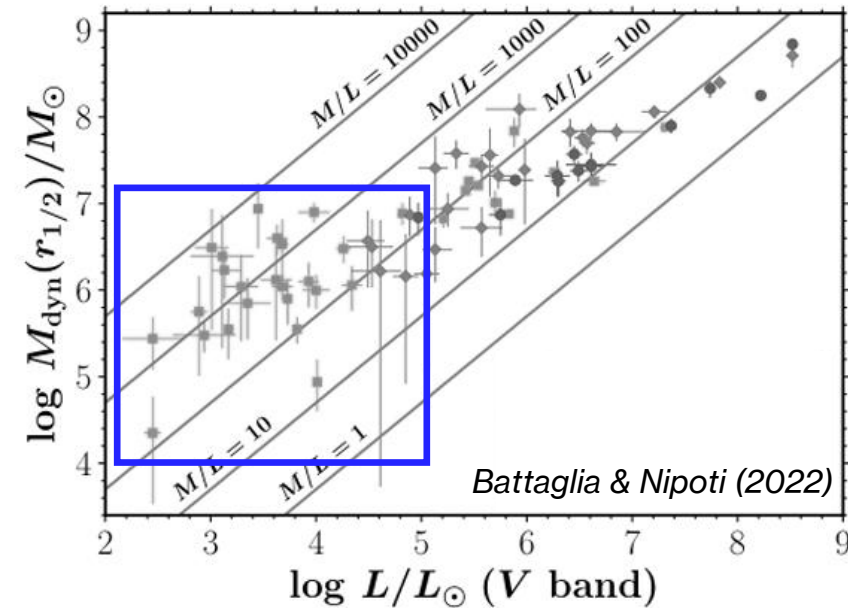
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Fossil relics of minihalos $\longleftrightarrow$ UFDs

e.g., Salvadori & Ferrara (2009), Bovill & Ricotti (2009),
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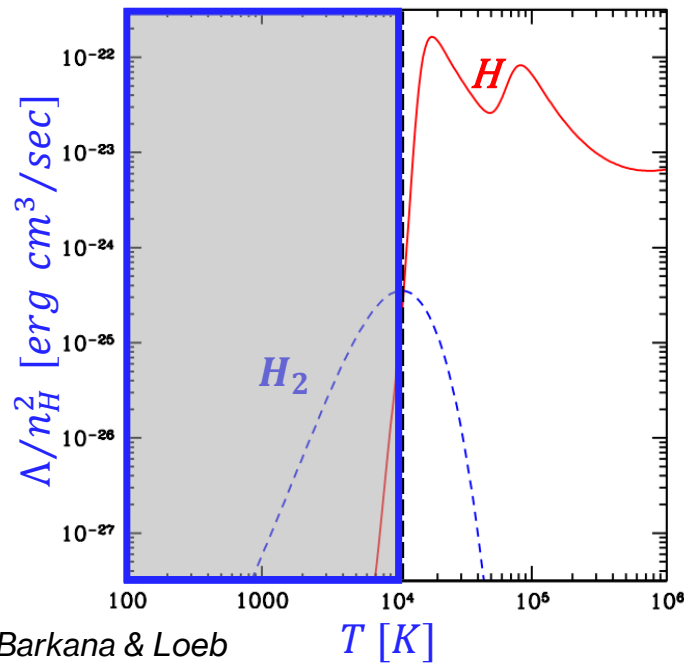


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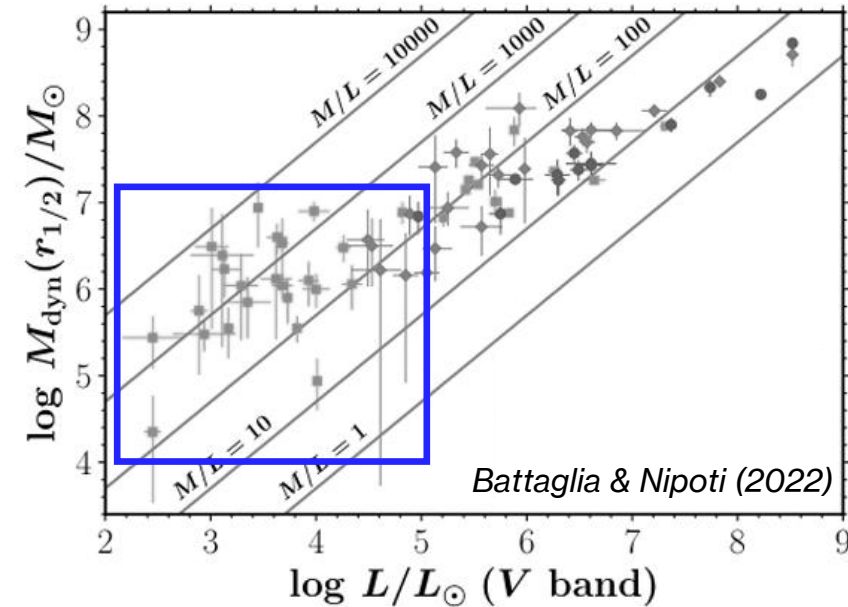
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Do all minihalos form stars?
Is the Missing Satellites Problem solved?

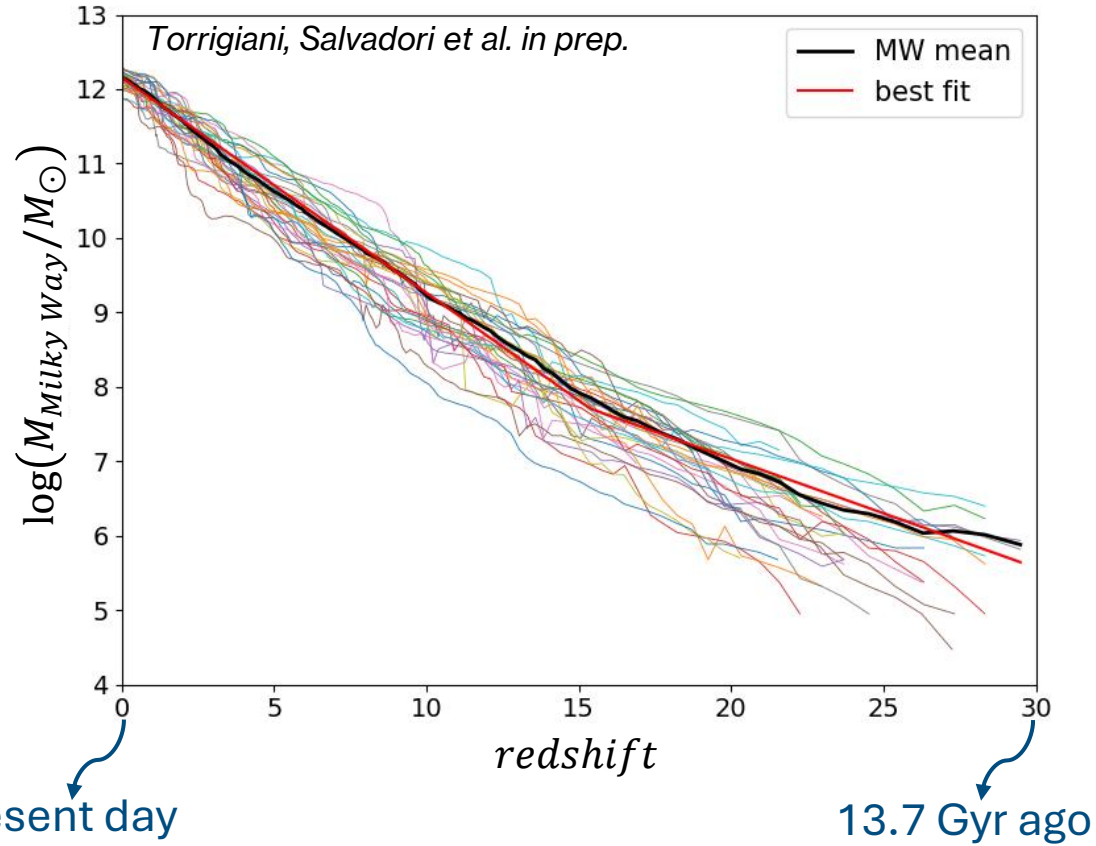
Dark matter halos: assembly history

Caterpillar Project, *Griffen et al. (2016)*

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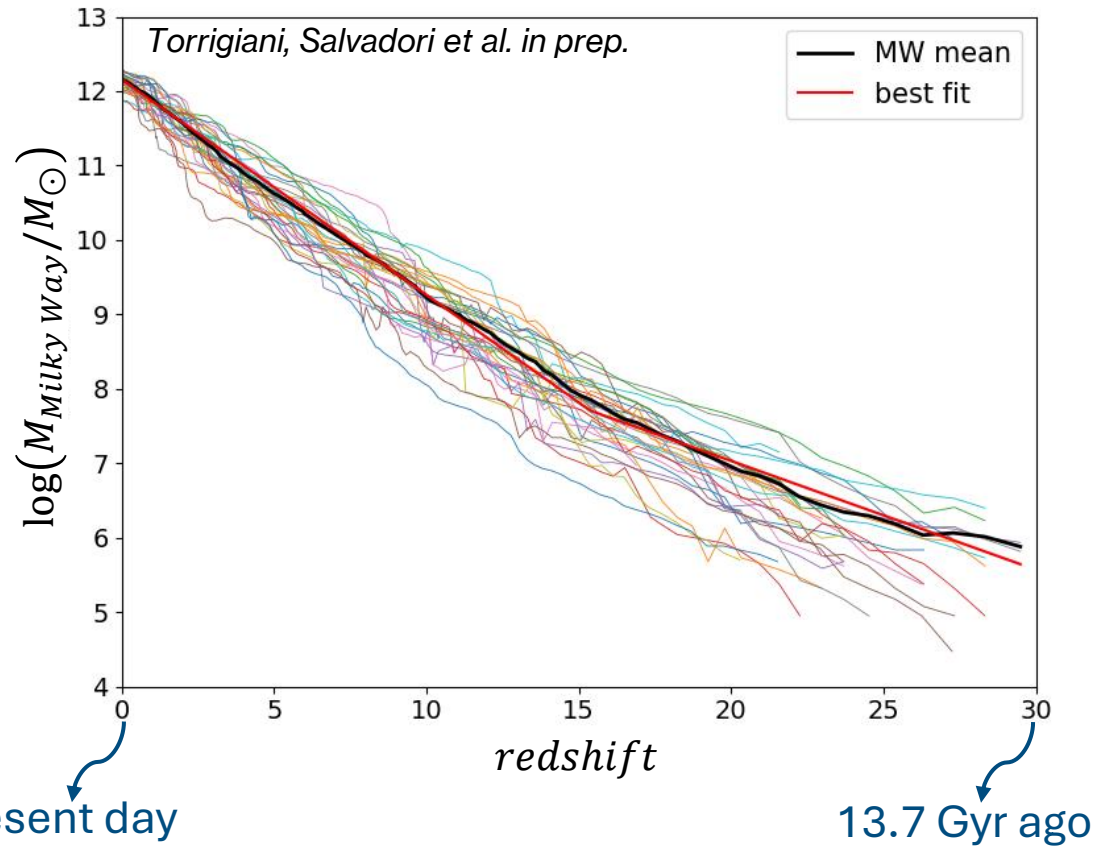
Milky Way



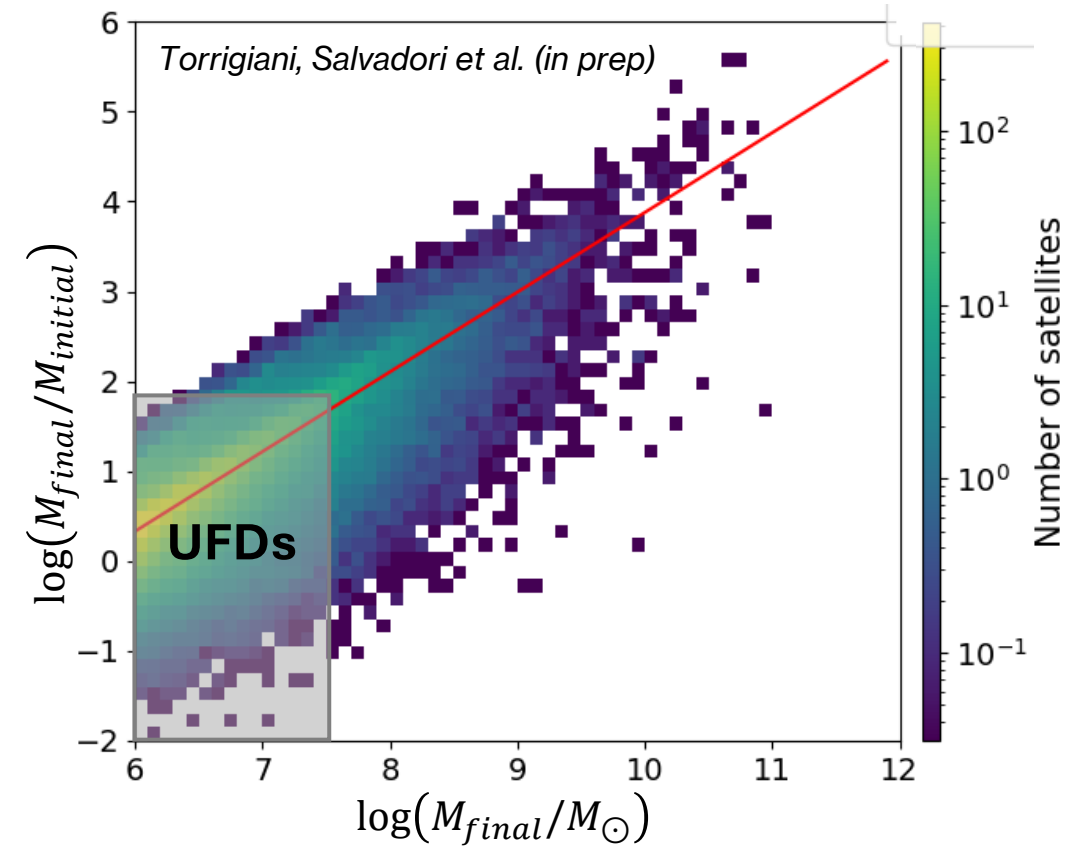
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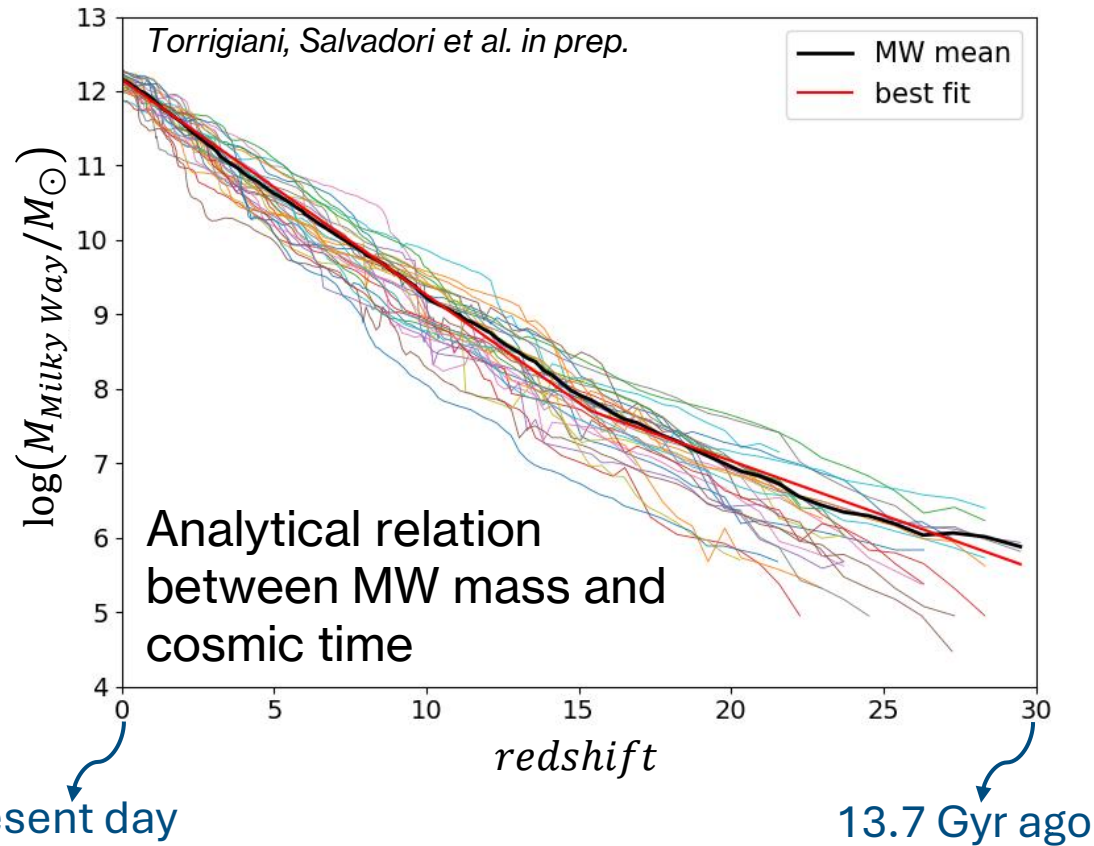
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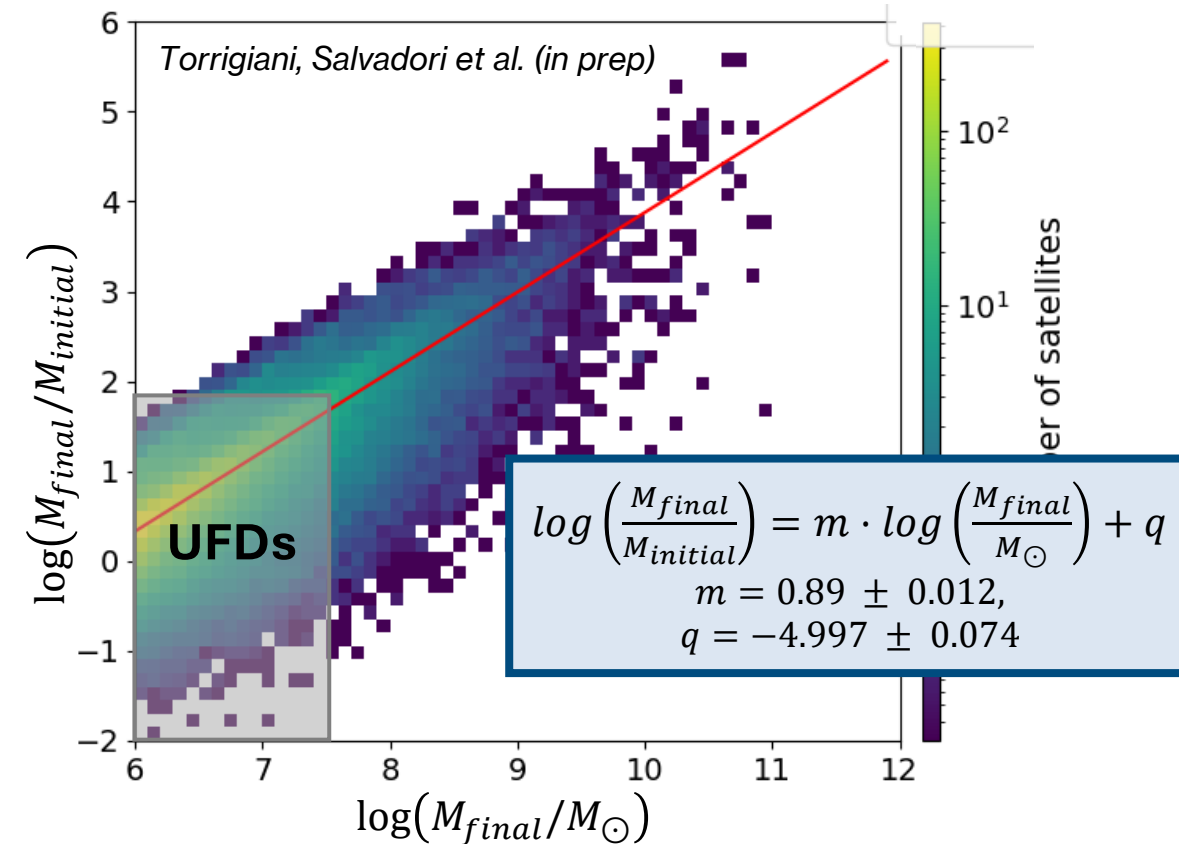
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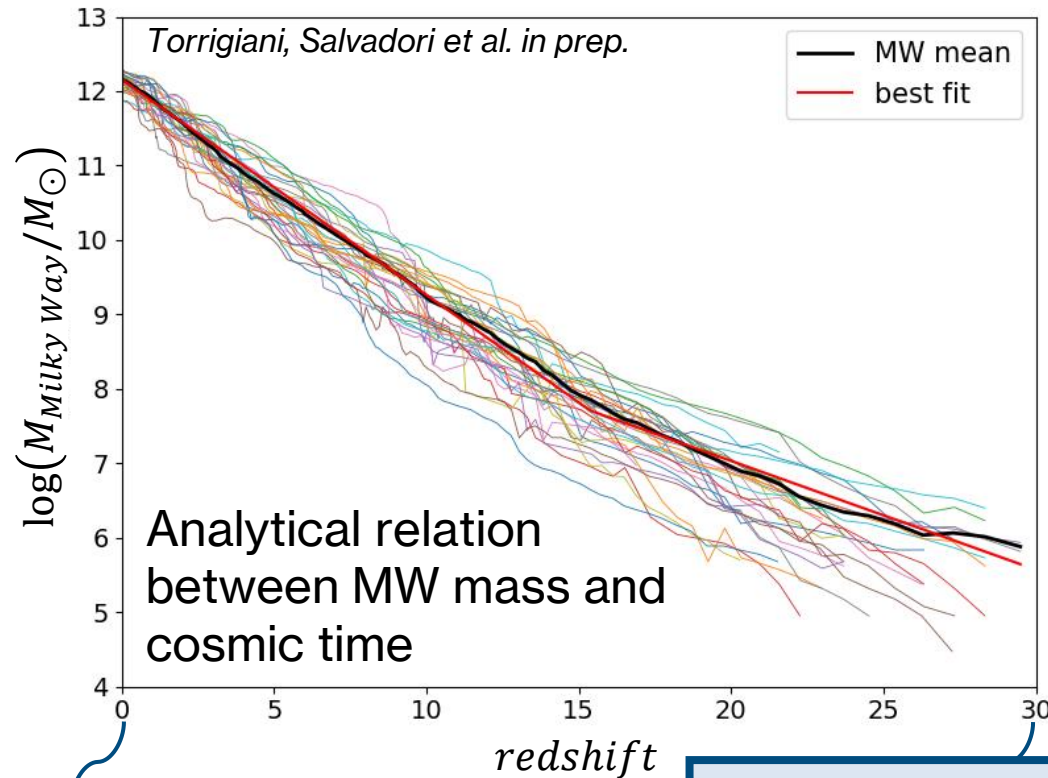
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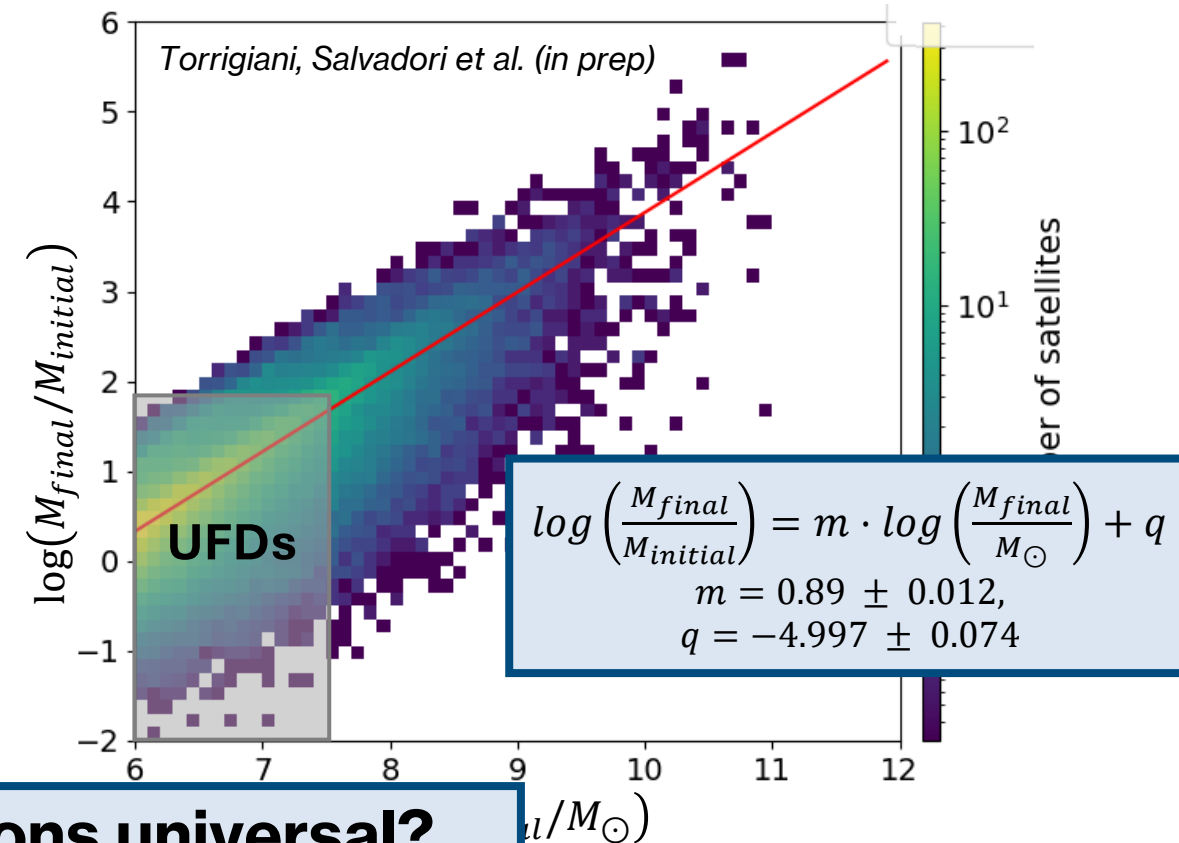
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Present day

Dark Matter Satellites

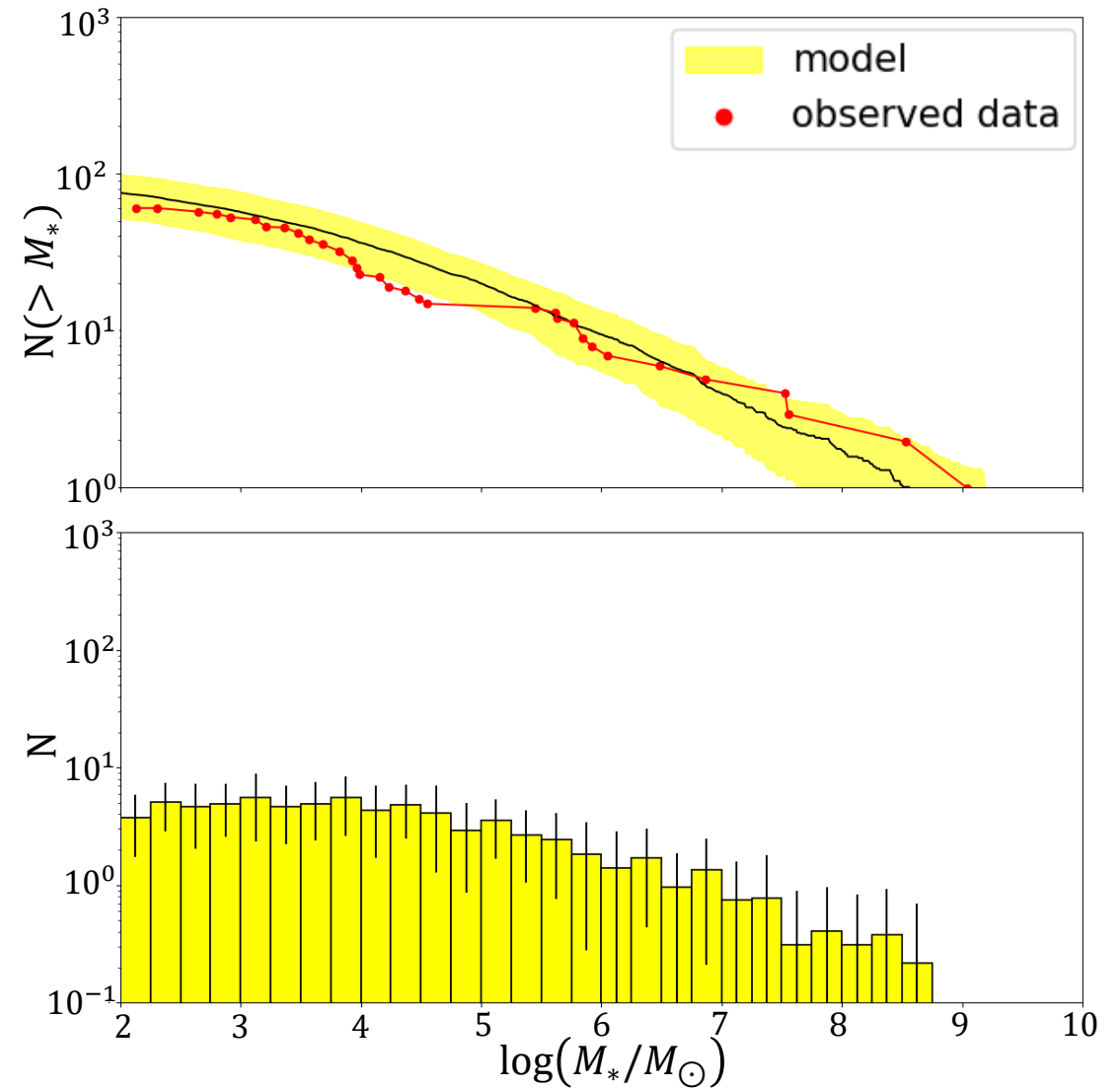


Are these relations universal?

e.g., IllustrisTNG project, *Pillepich et al. (2018)*

Luminous satellites: a *minimal* model

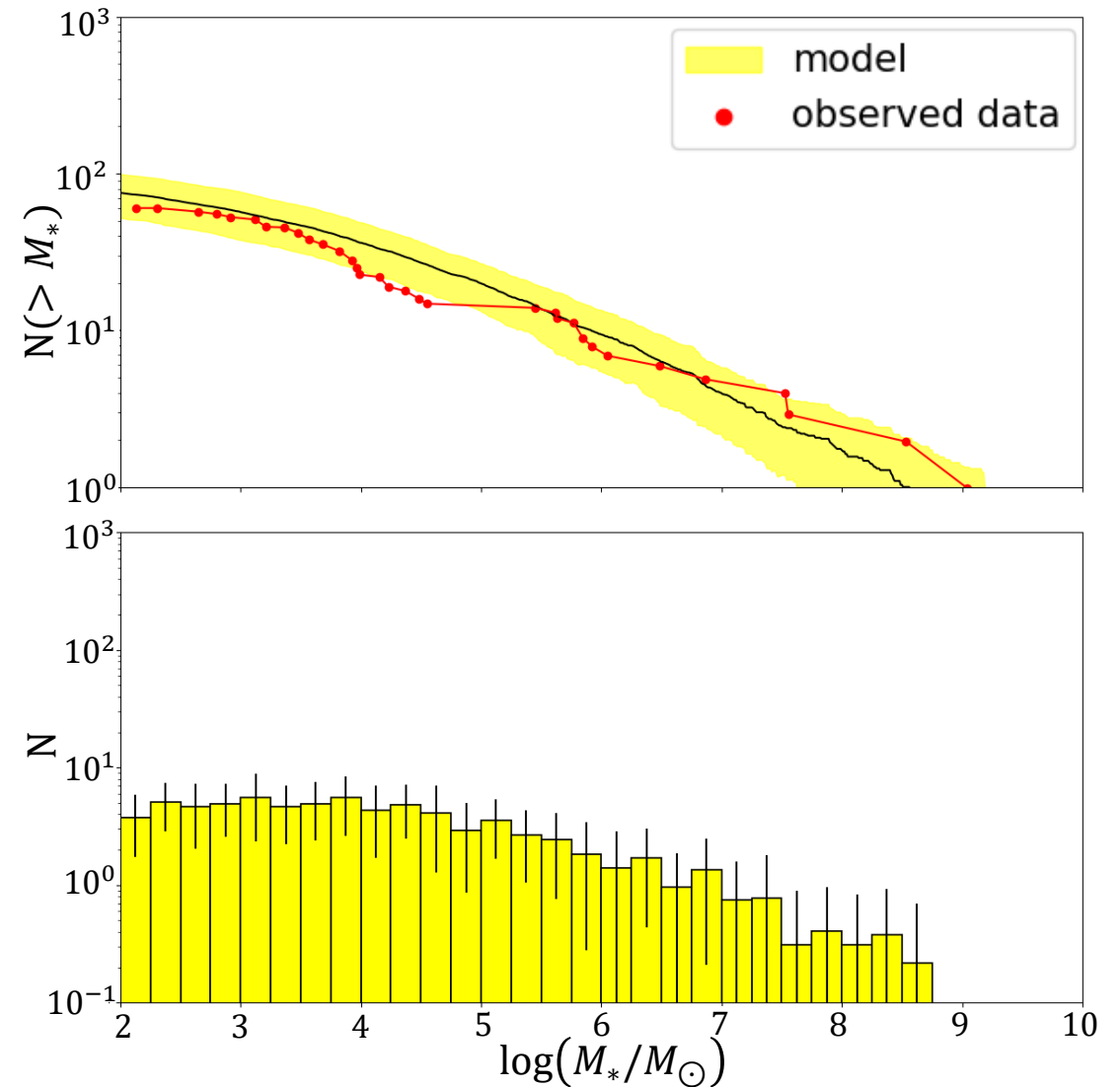
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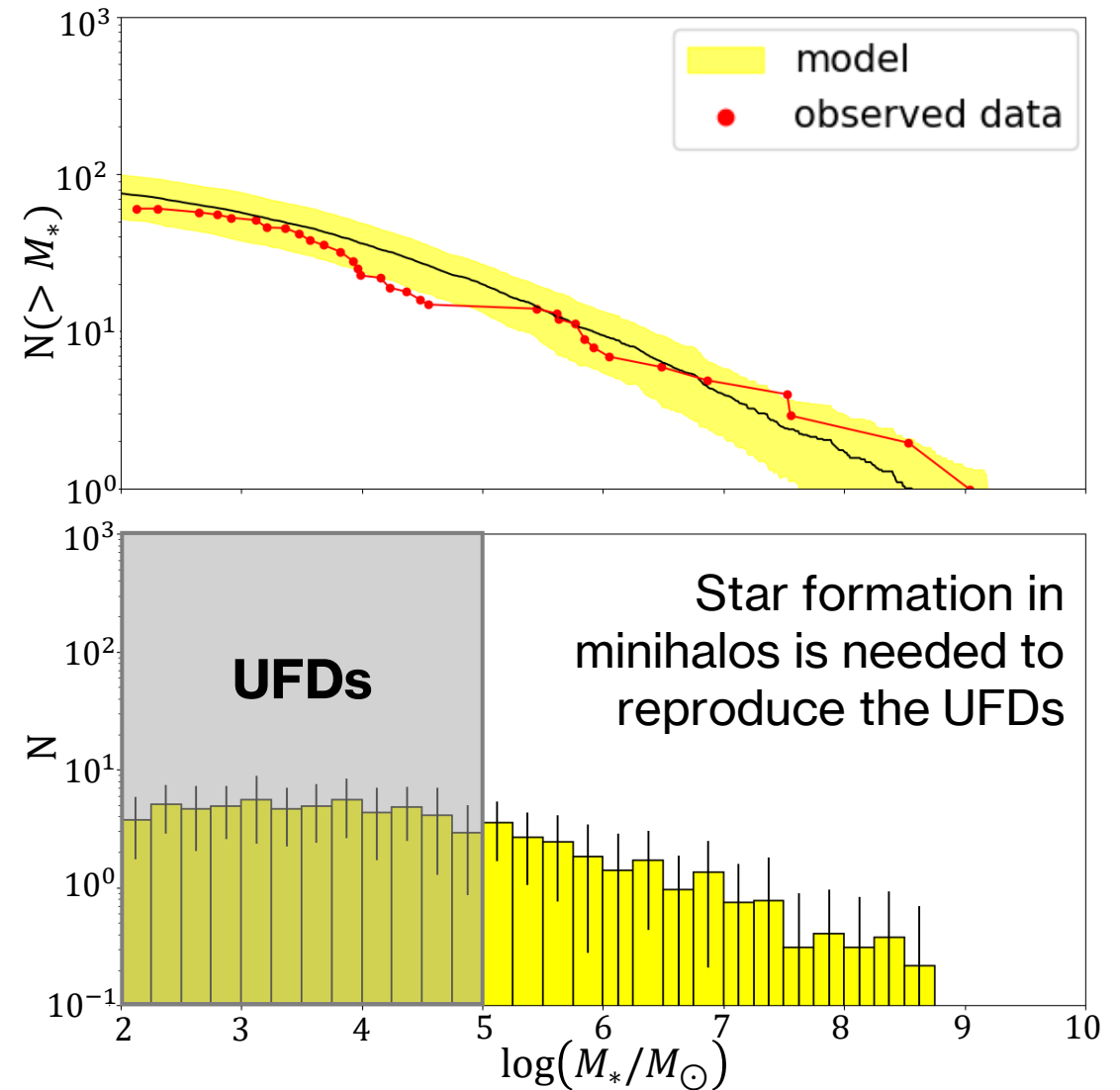
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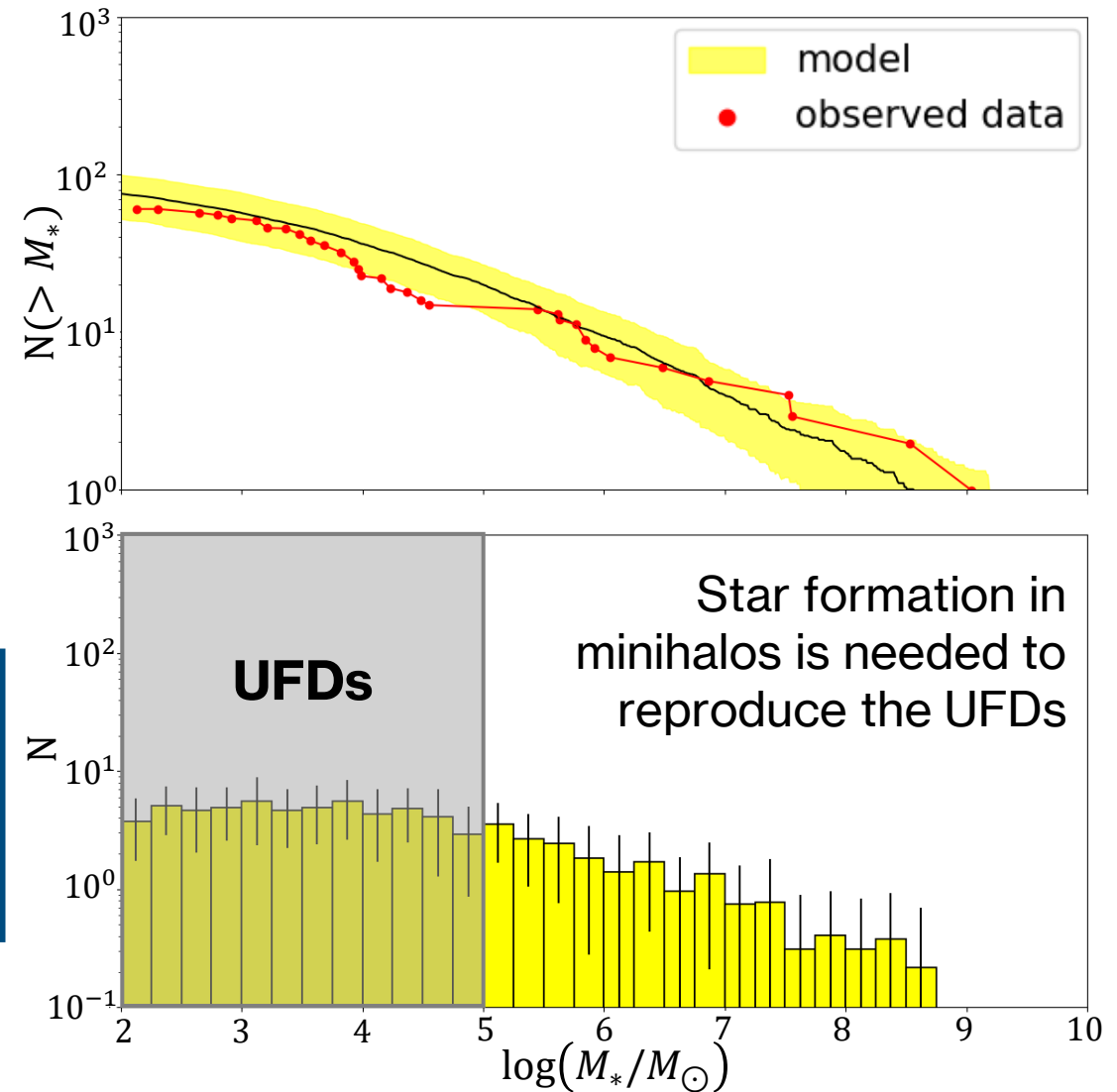


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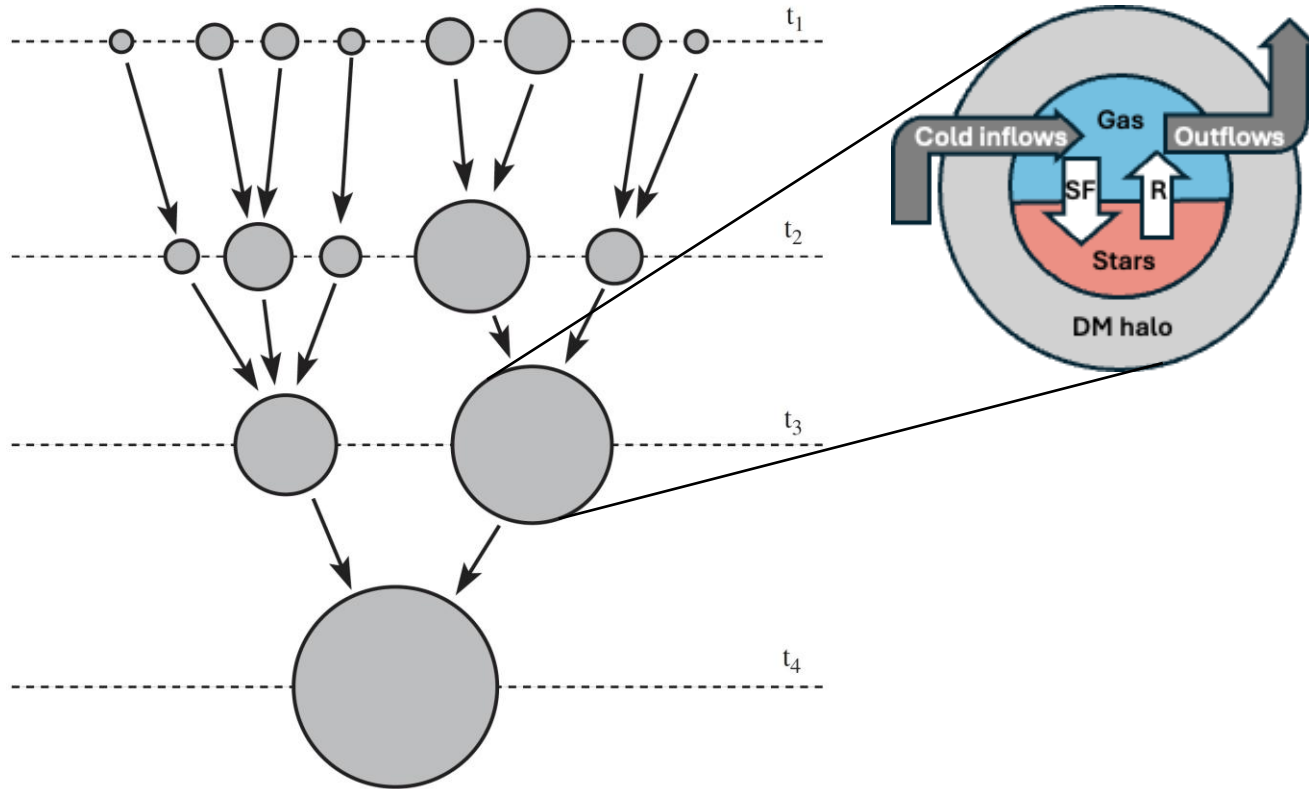
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Which are the key physical processes shaping galaxy evolution?



A global semi-analytical model

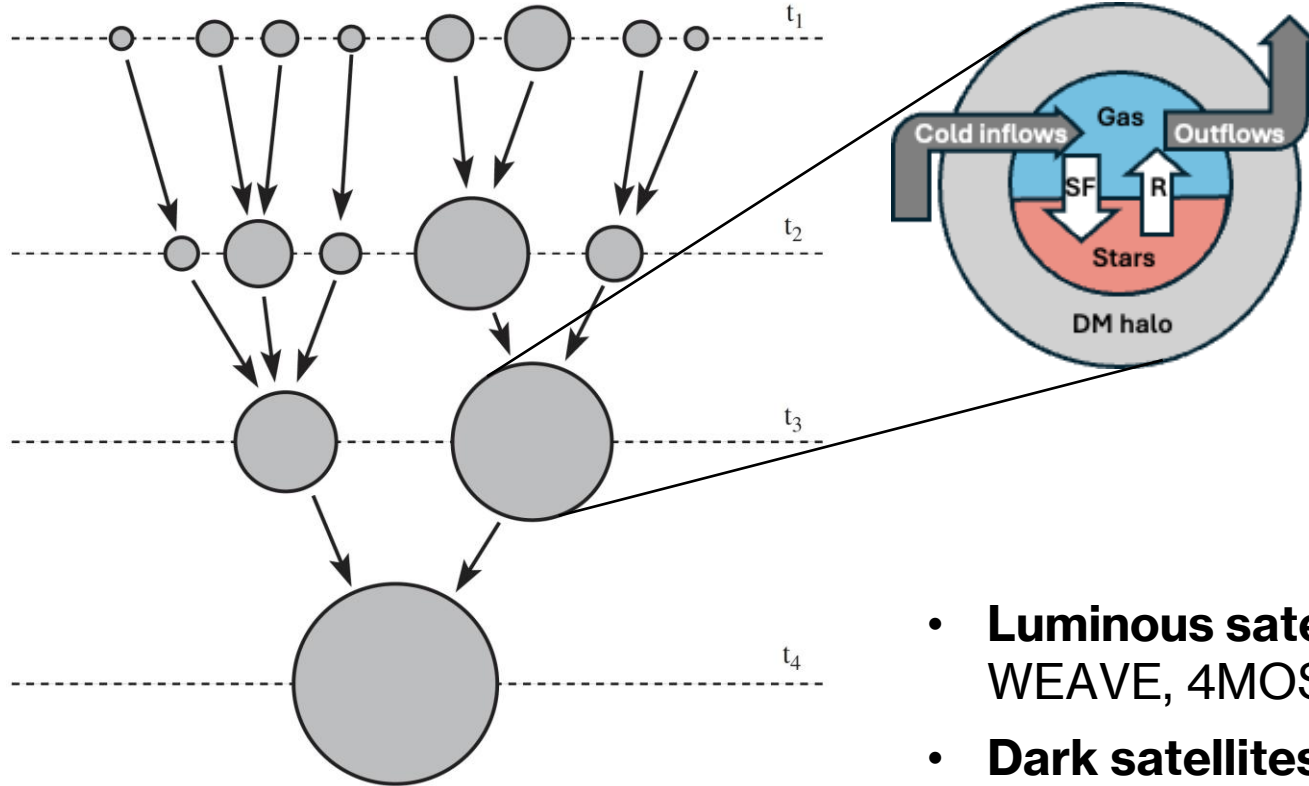
NEFERTITI, *Koutsouridou, Salvadori et al. (2023)*



Reproducing the **number** of dwarf galaxies and the **stellar properties** of the Milky Way and its satellites

A global semi-analytical model

NEFERTITI, *Koutsouridou, Salvadori et al. (2023)*



Reproducing the **number** of dwarf galaxies and the **stellar properties** of the Milky Way and its satellites

- **Luminous satellites:** ongoing/upcoming stellar surveys, e.g., DESI, WEAVE, 4MOST, 4DWARFS (2026, PI: Skúladóttir)
- **Dark satellites:** radio telescopes (SKA 2030)



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Thank you for your attention