A Halo Merger Tree Generation and Evaluation Framework

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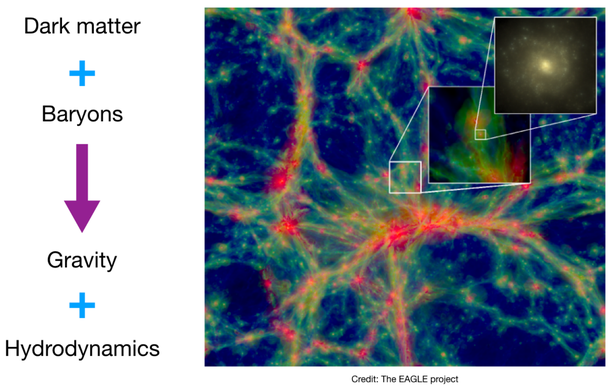
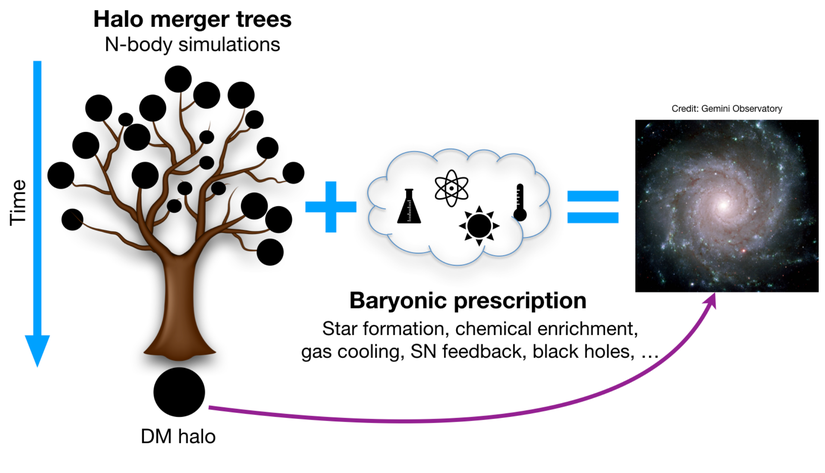
Introduction

- Galaxy formation and evolution, a complex non-linear problem.
- Two approaches to tackle this problem:
  - Large scale hydrodynamical simulations.



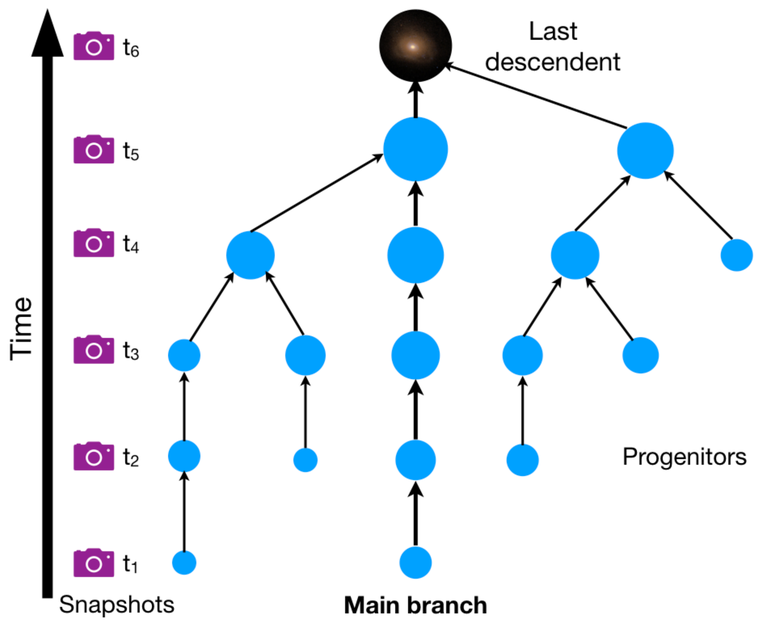
  - Semy-analytic models (SAMs), require less CPU time.



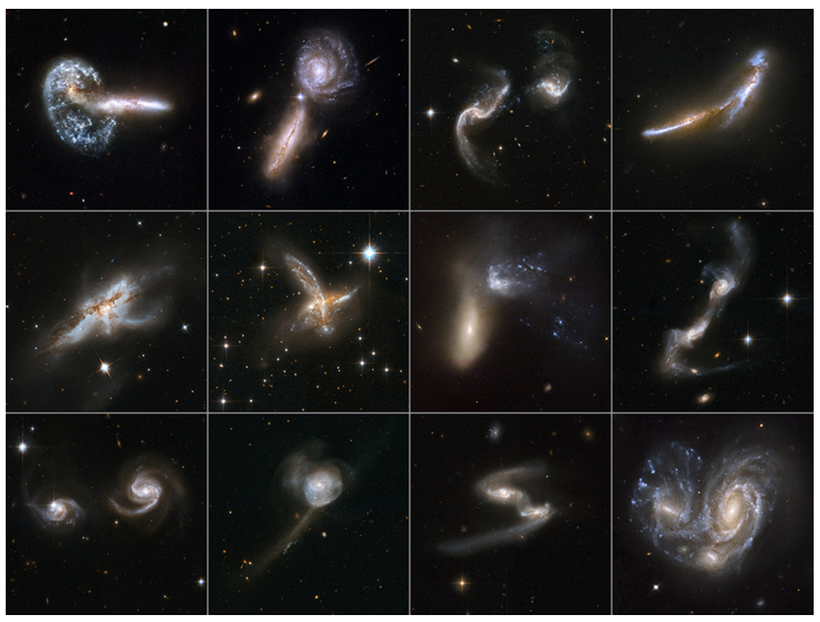
- SAMs are best suited to compare galaxy formation and evolution theories with observations.

Halo merger trees

- Encapsulate assembly history of halos.



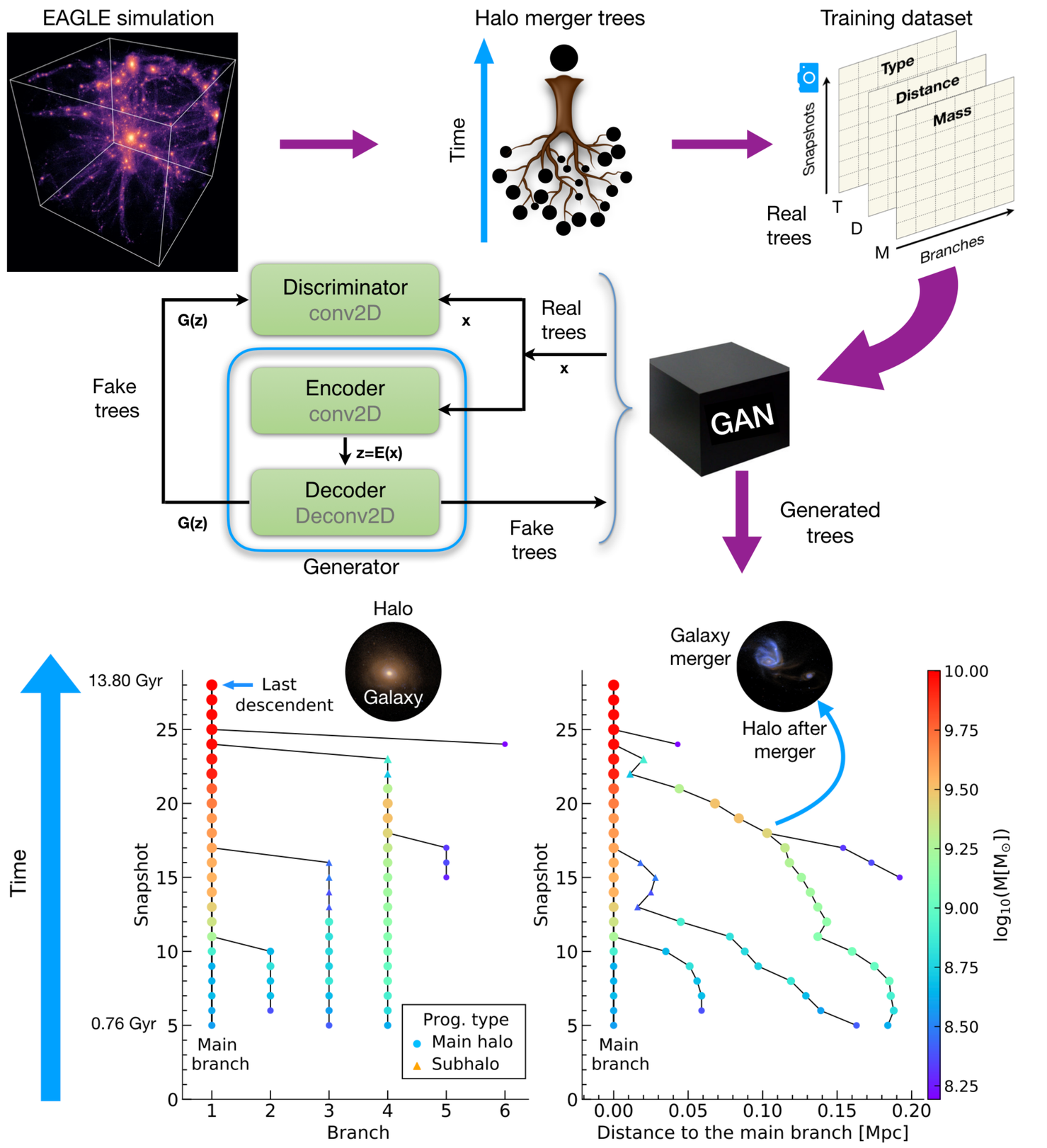
- Eventually lead to galaxy mergers.



Credit: NASA, ESA, the Hubble Heritage.

- Standard method based on DM only *N*-body simulations.

Halo merger tree generation



Evaluation and Results

Kolmogorov Smirnov Test	1 Variable (M)	2 Variables (M, D)	3 Variables (M, D, T)
Mass	0.43	0.57	0.21
Main halo (MH) mass	—	—	0.14
Subhalo (SH) mass	—	—	0.05
Distance	—	0.05	0.06
N. snapshots as subhalo	—	—	0.04

- Merger trees generated with 3 variables yield the best results.