Astro- and Particle Physics

Innsbruck Physics

Ass.-Prof. Francine Marleau

- Observational extragalactic astronomer
- Recently moved from the University of Toronto
- Space mission scientist at NASA/JPL/Caltech for:
  the Spitzer Space Telescope (infrared wavelengths)
  the Planck Space Observatory (radio to infrared wavelengths)

Main Research Interests

The formation and evolution of galaxies into the structures we see today, i.e. in the nearby Universe, via:
- Looking at the fossil evidence with the detailed study of the internal 2D structure, kinematic properties and stellar population of nearby galaxies
- Looking directly back in time with the study of evolution of the star formation activity, stellar masses and average chemical composition with lookback time

Galaxy Evolution: Our Current Model

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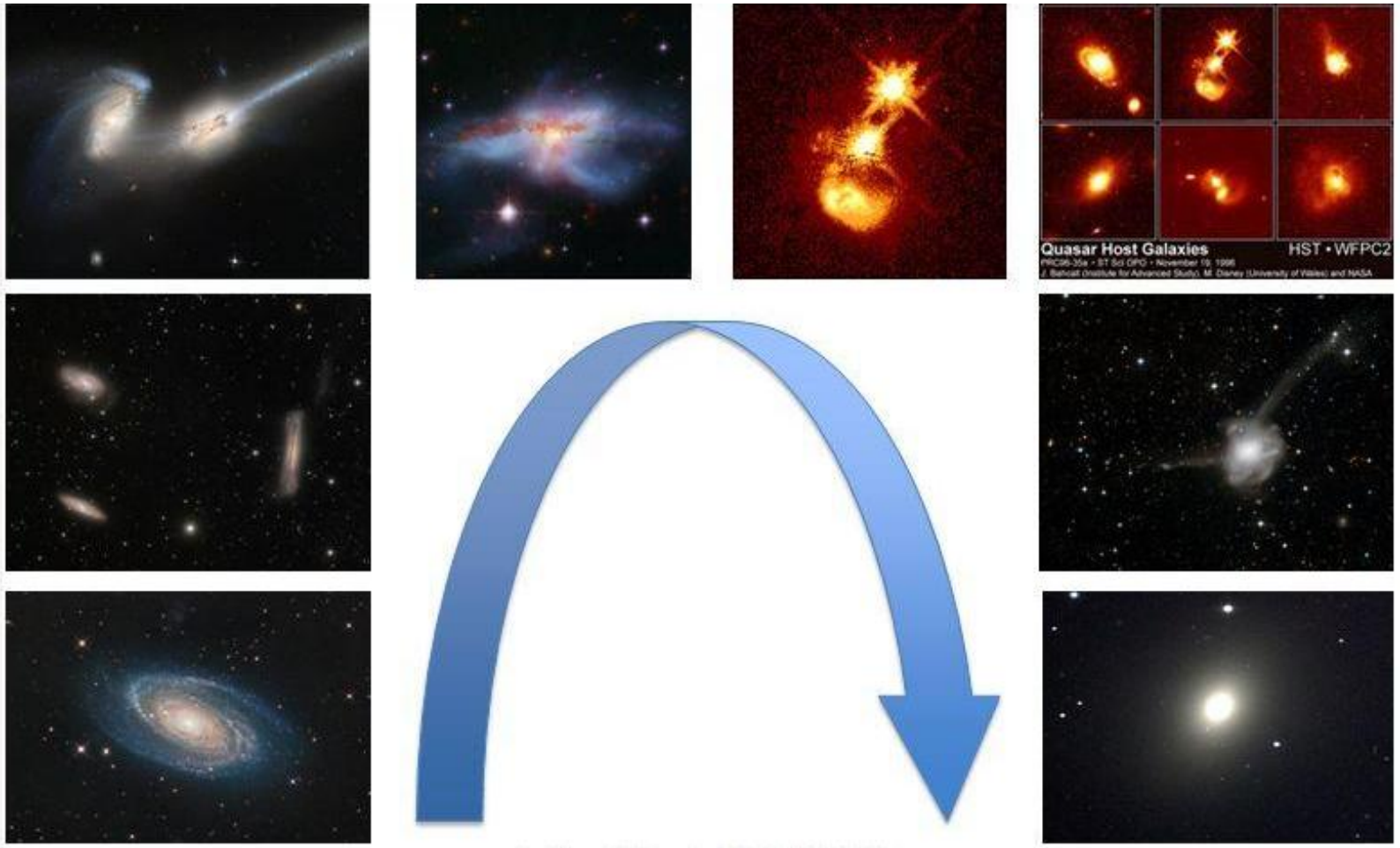
The model most widely accepted for the evolution of our Universe, and the galaxies that populate it, is that they formed from smaller galaxies which eventually coalesced to form larger systems.



Galaxy Evolution: Observations

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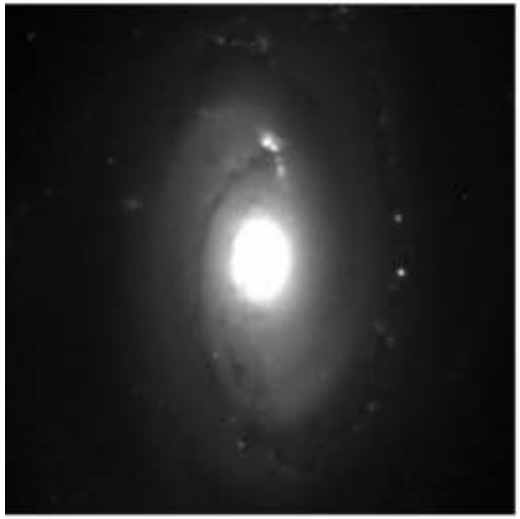
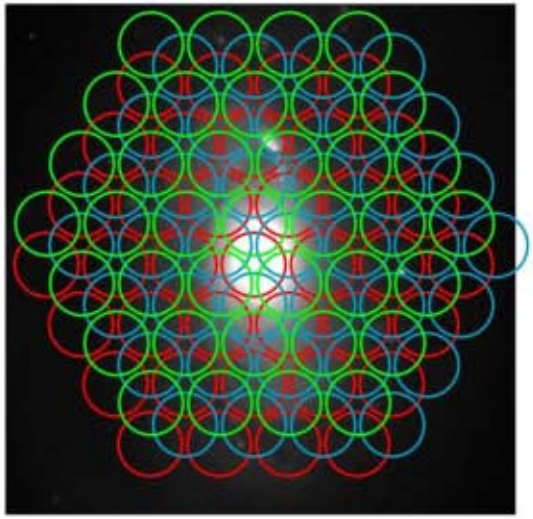
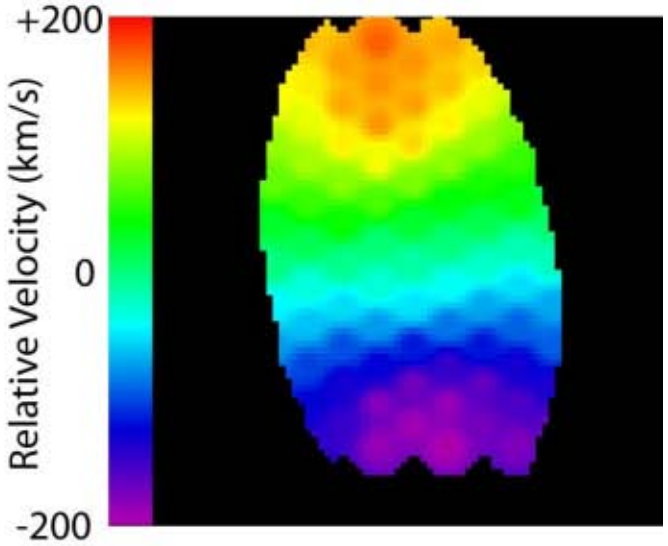
Local galaxies:



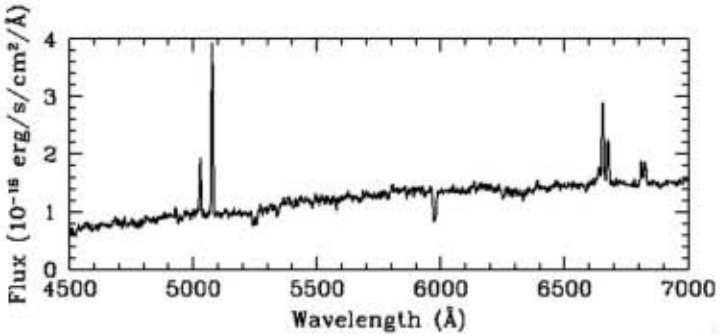
Hα image of NGC 4450



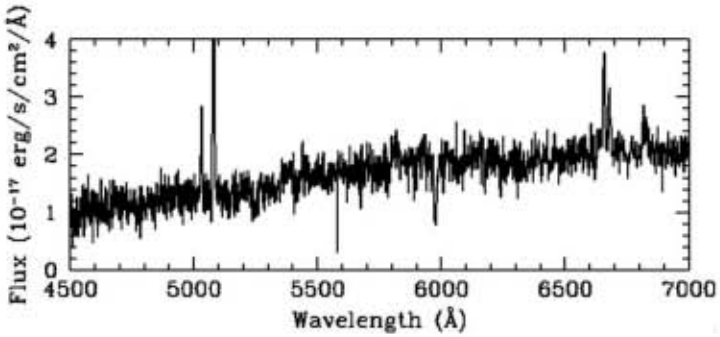
MaNGA fiber bundle
(with 3 dither positions)



Recovered velocity map



Simulated spectrum (central fiber)



Simulated spectrum (edge fiber)

Galaxy Evolution: Observations

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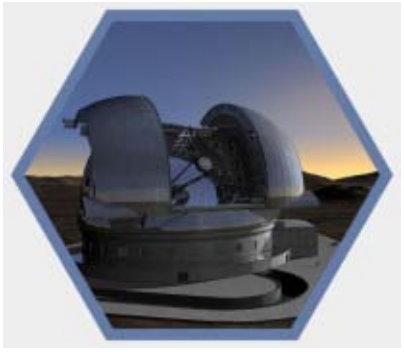
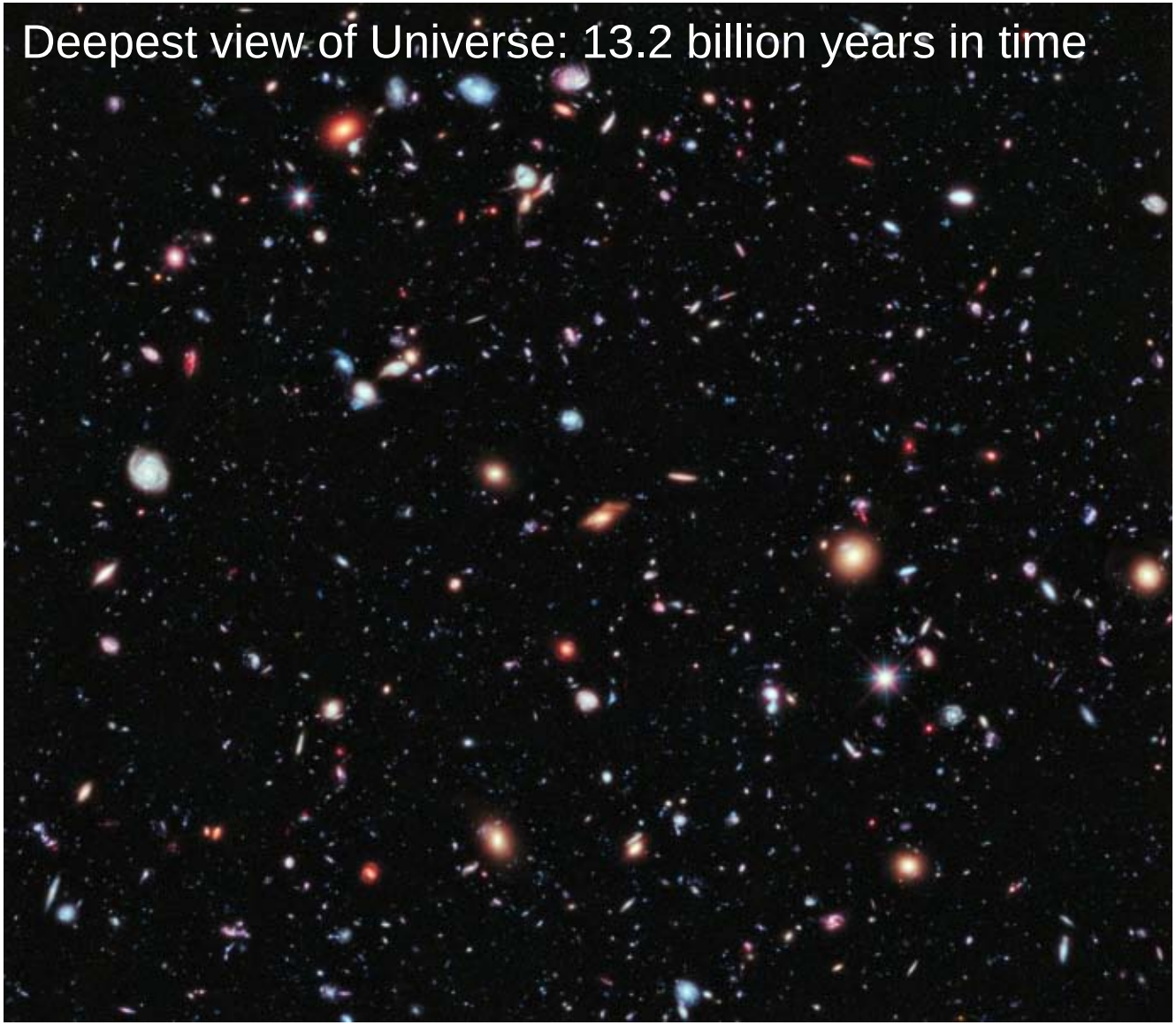
This image:

The future:





Galaxy Evolution: Simulations

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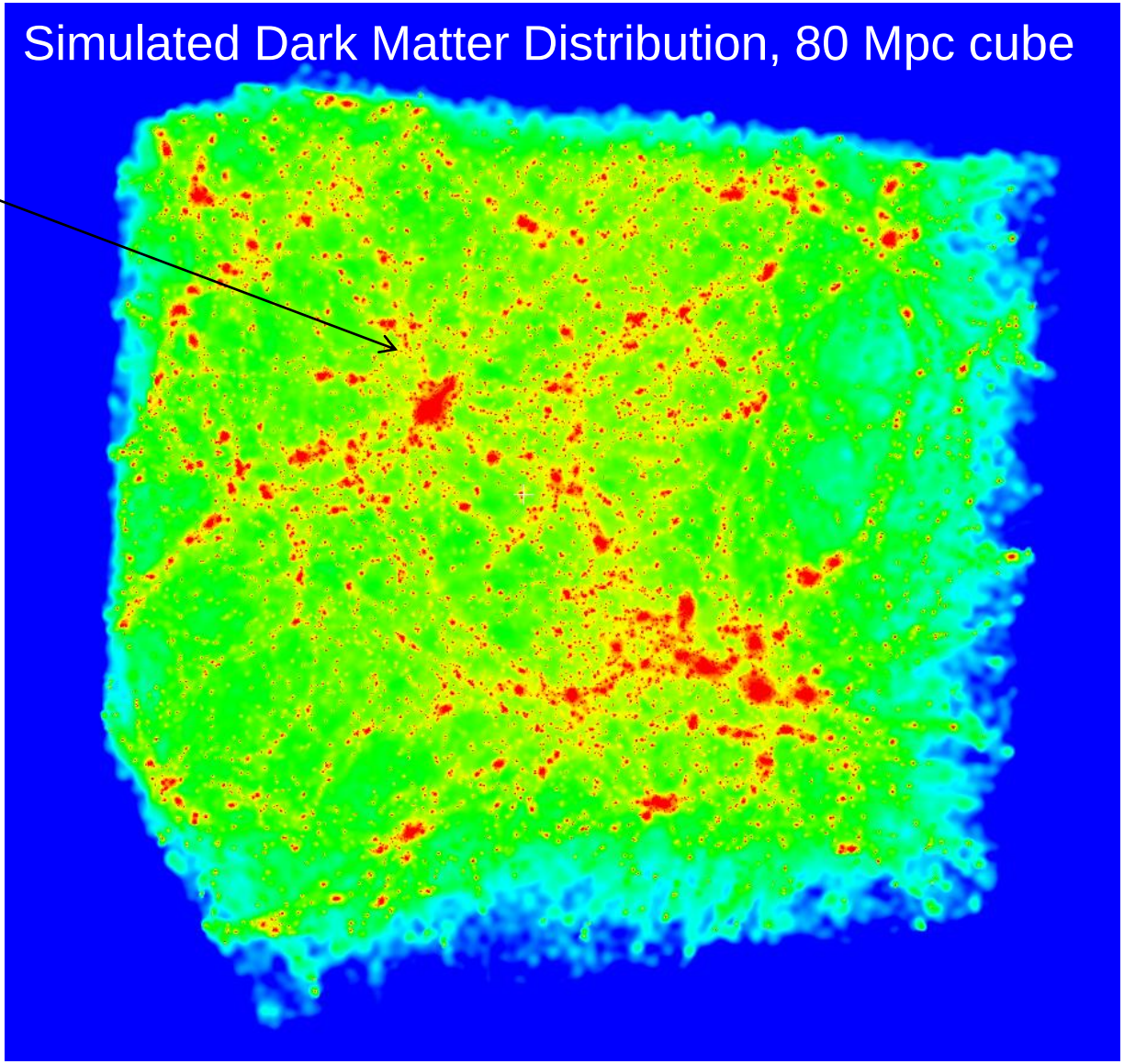
Full simulation, final image projection of the structure in the local Universe.

Video of the simulation shown next, zooming in the region of interest, in this case the highest peak in dark matter density.



Galaxy Evolution: Simulations

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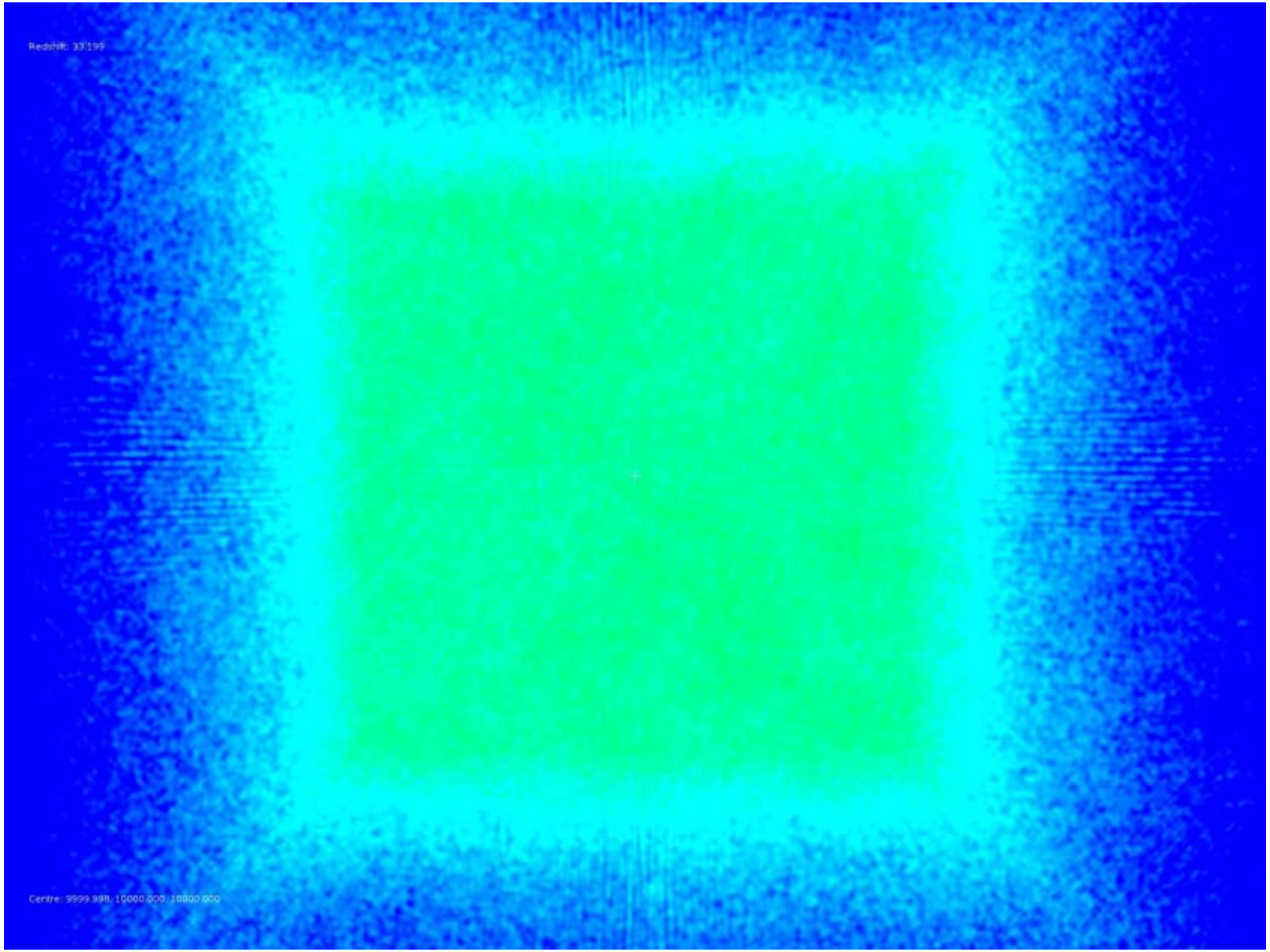

Galaxy Evolution: Simulations

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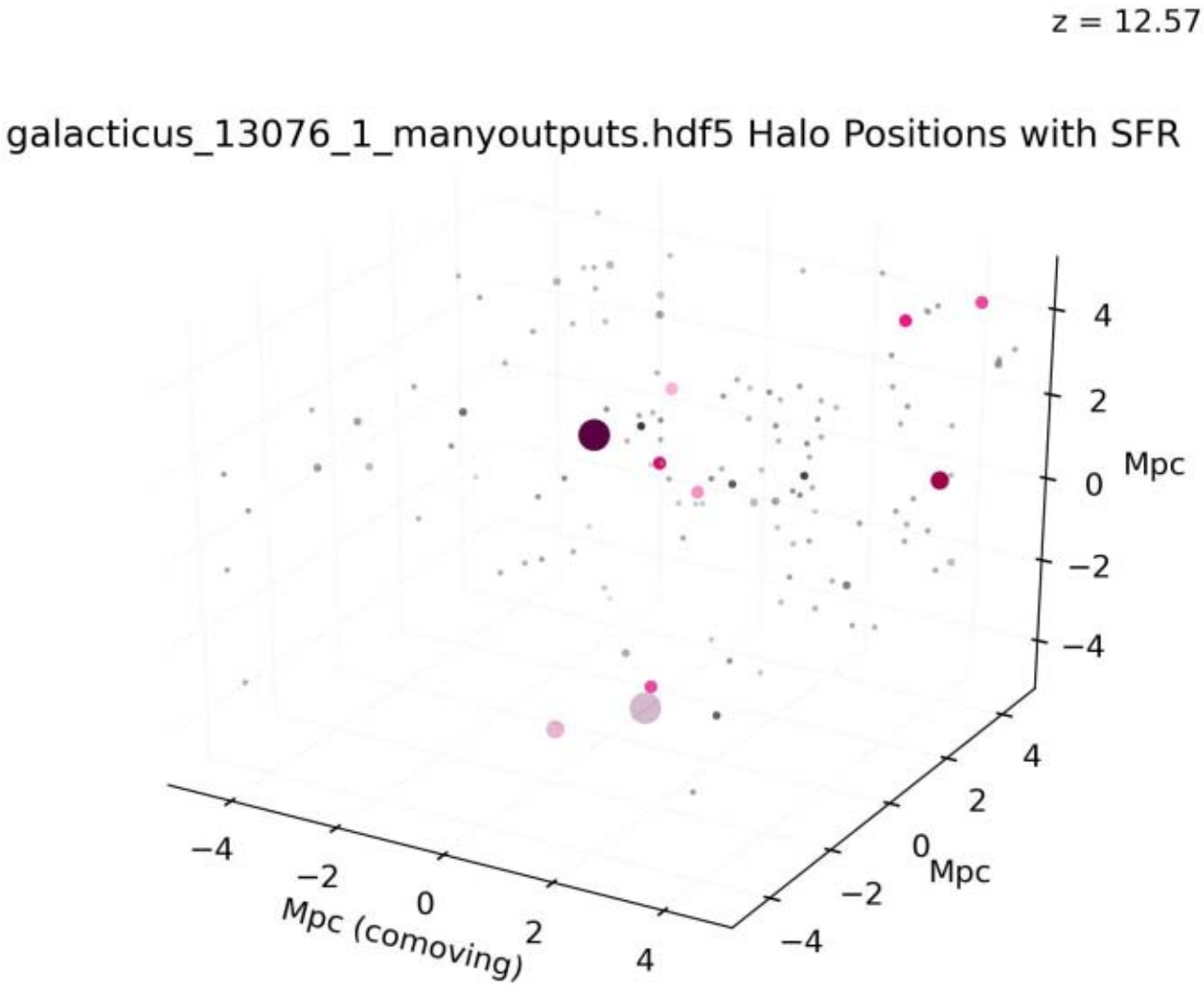
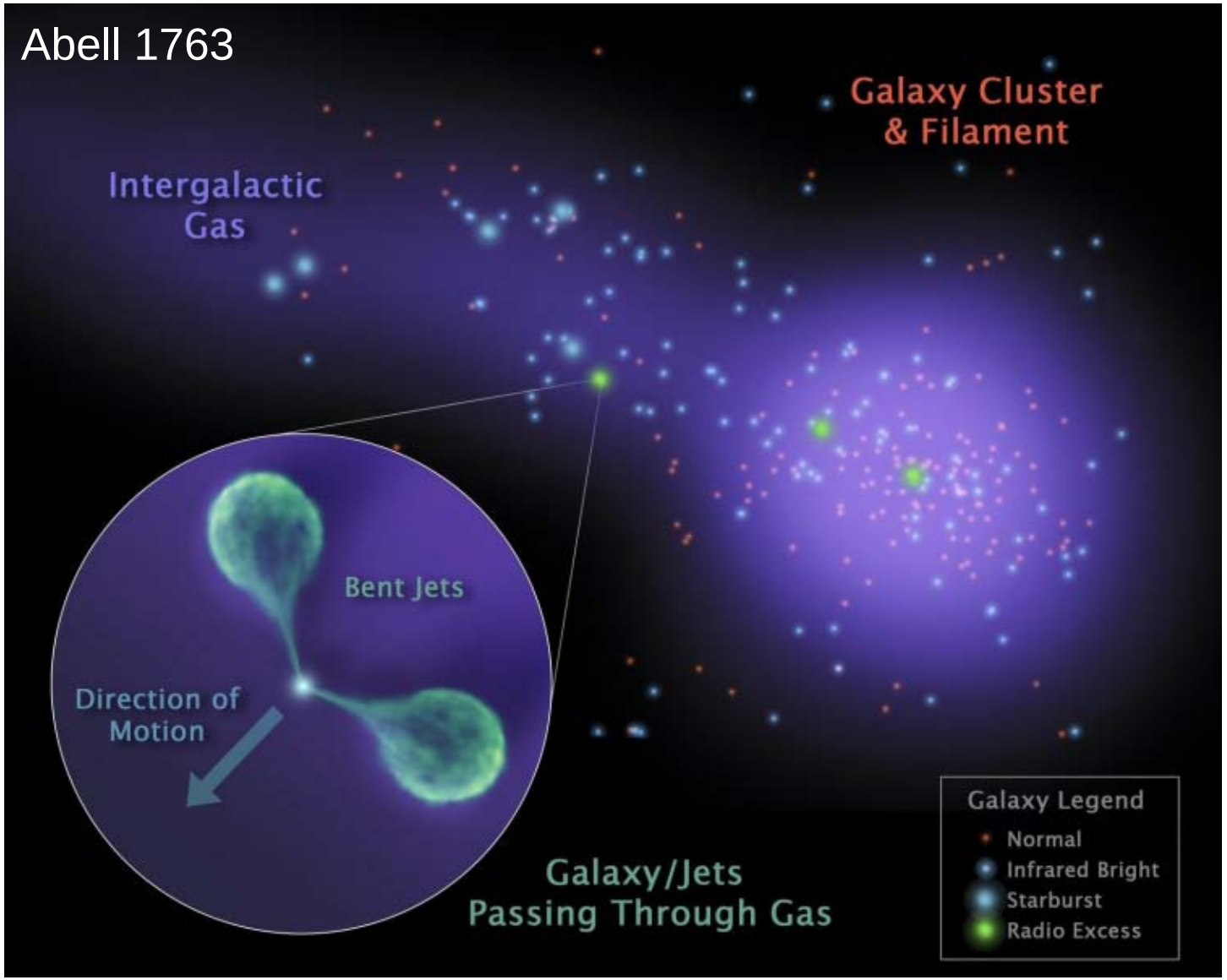


Galaxy Evolution: Comparison



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