

A Dwarf Galaxy's Stellar Halo Built By Accretion: NGC 300



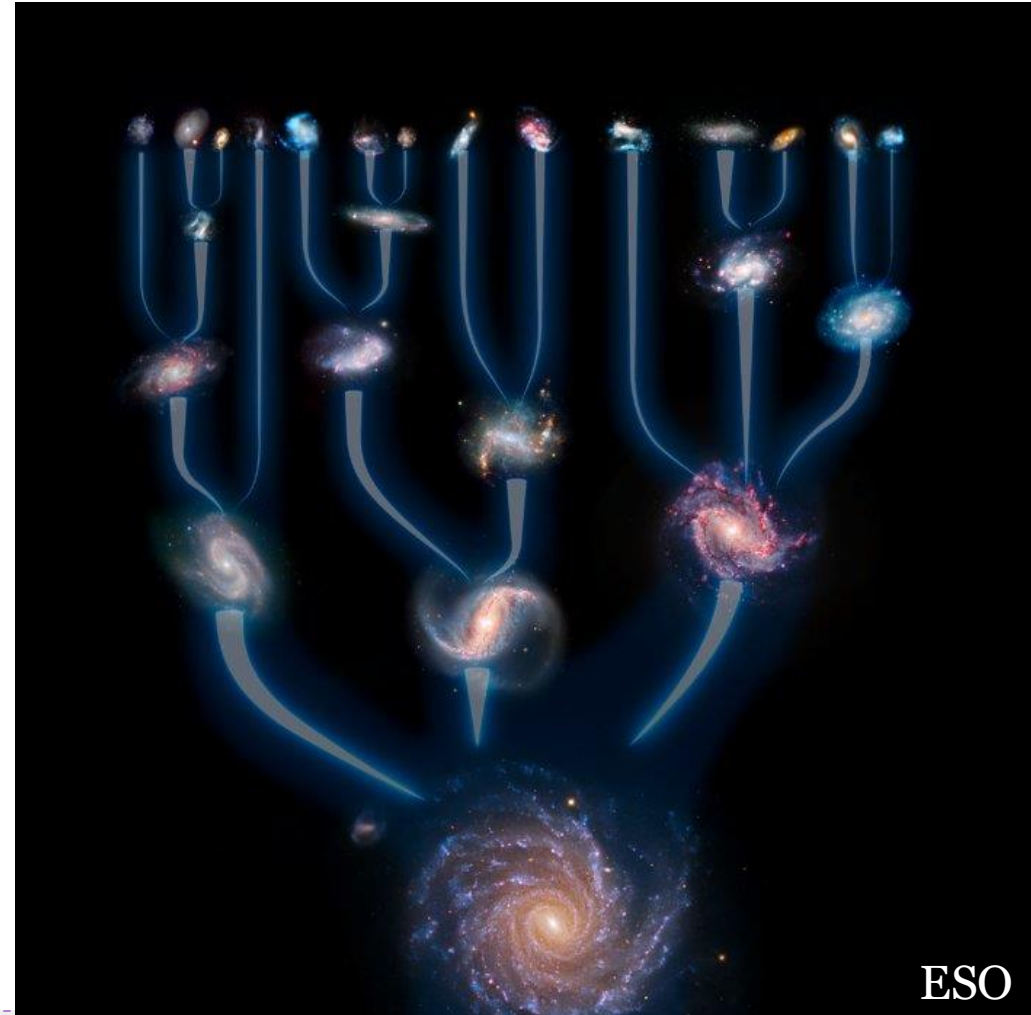
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The DELVE-DEEP collaboration, including Dave
Sand, Alex Drlica-Wagner, and many others!

Massive Galaxies Grow Hierarchically

Galaxies the size of the Milky Way and larger evolve by merging with smaller dwarf galaxies over billions of years.

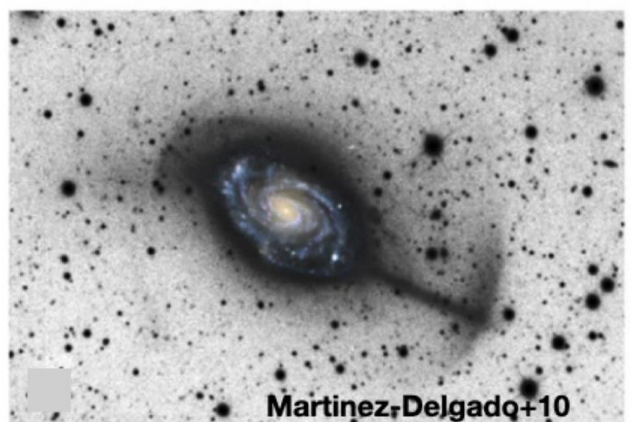
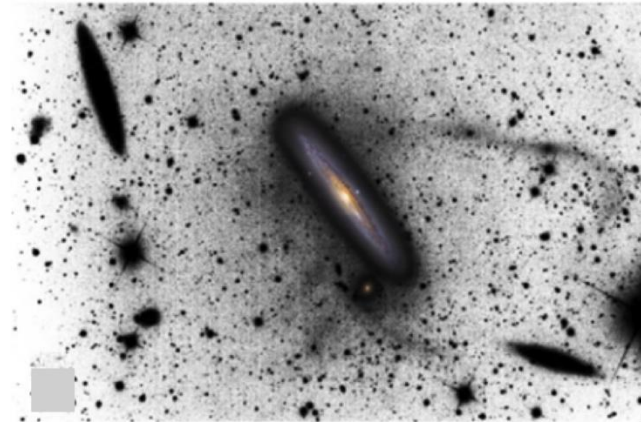
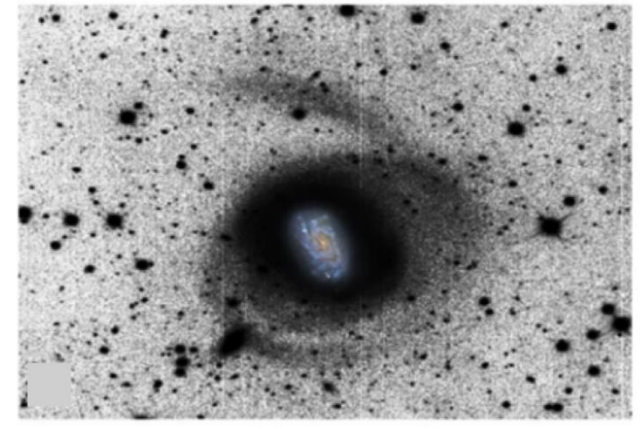
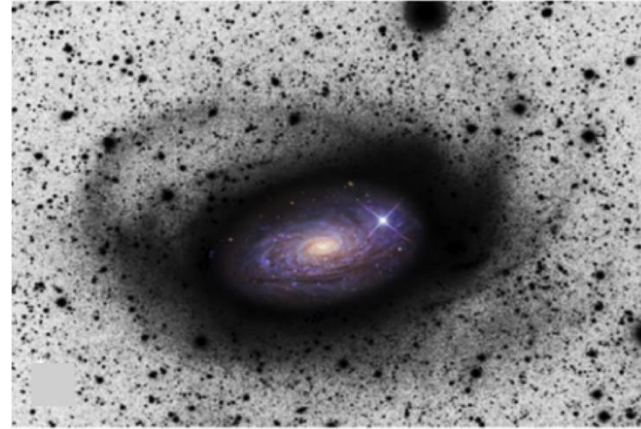
Astronomers refer to this process as hierarchical assembly.



Stellar Halos

This merging process leaves behind structures we call **streams and shells**, which are remnants of the swallowed-up galaxies

From this process a **stellar halo** emerges.



Observed Milky Way-mass galaxies

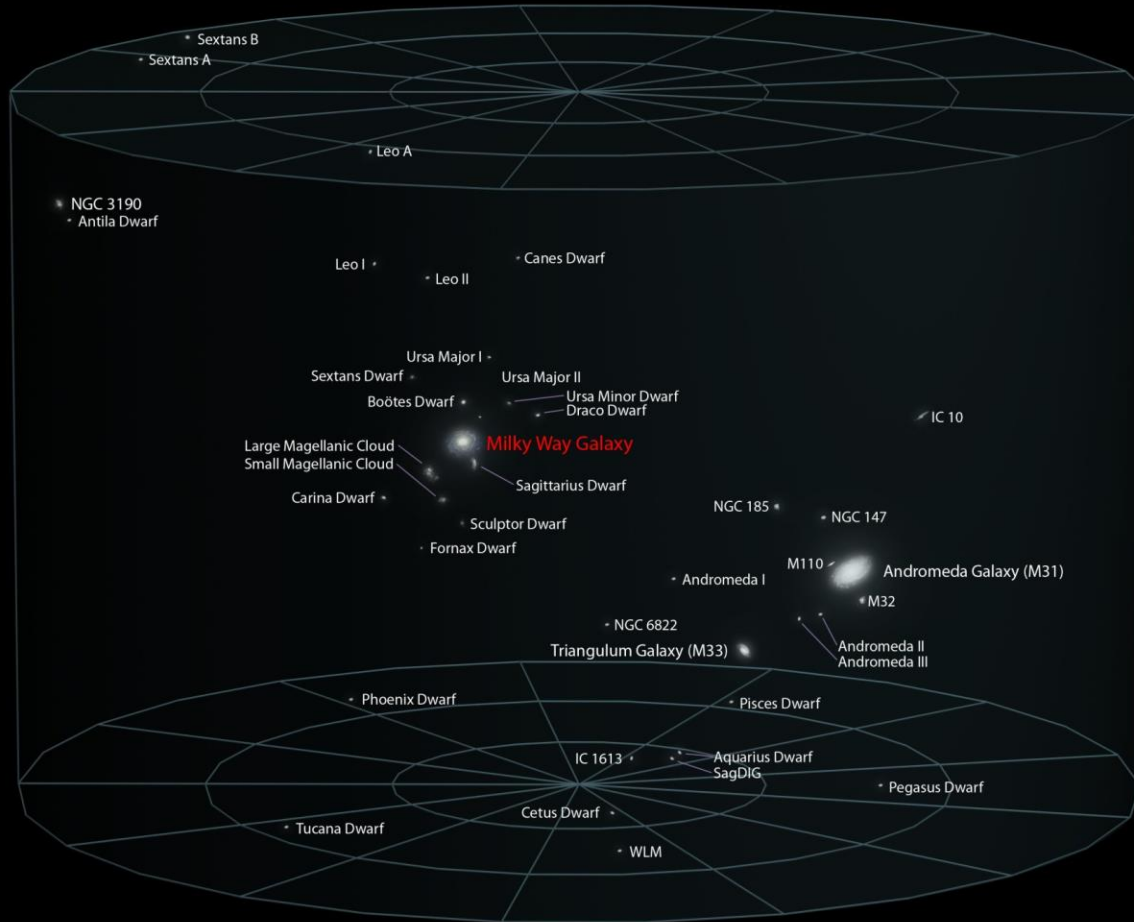
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What About Dwarf Galaxies?

- ♦ Dwarf galaxies have much fewer opportunities to assimilate low-mass systems
- ♦ Understanding how dwarfs grow remains an open question:
 - ♦ Do they contain stellar halos?
 - ♦ How do these stellar halos form?

The Large Magellanic Cloud

Local Galactic Group



We need
isolated dwarf-
mass galaxies.



DELVE-DEEP



The DELVE (DECam Local Volume Explorer) survey is a comprehensive imaging program aimed at covering the southern sky with DECam on the 4m BLANCO telescope

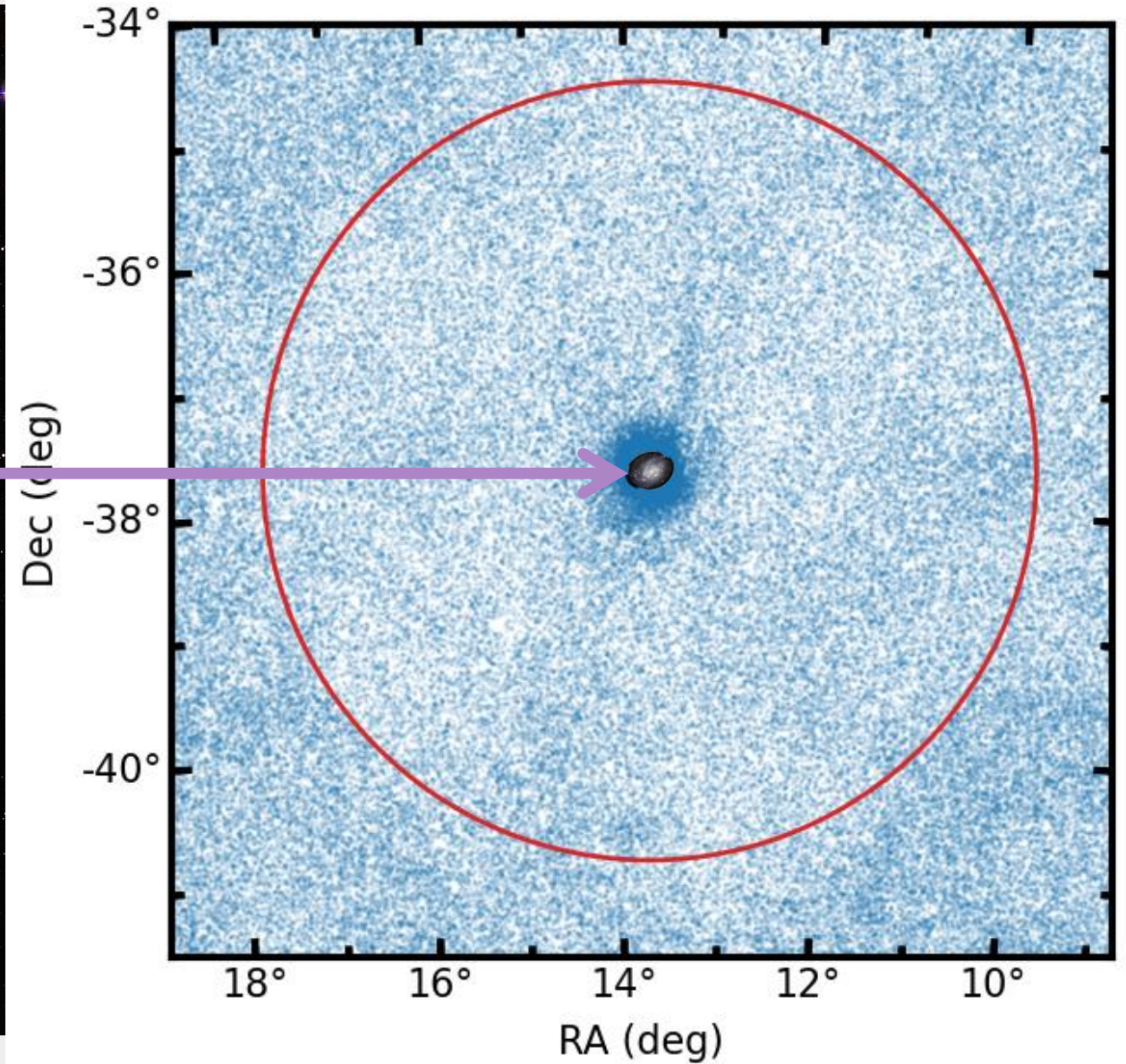


DELVE-DEEP conducted deep imaging within the area of gravitational influence of 4 nearby and isolated Magellanic Cloud-mass galaxies.

Before DELVE



After DELVE



NGC 300



NGC 300 is an LMC-mass spiral galaxy Only ~5% the mass of the Milky Way in stars!



It lies on the periphery of the Sculptor group 6.5 million light years away



NGC 300 is a well-known example of a galaxy previously thought to have a quiet evolutionary history

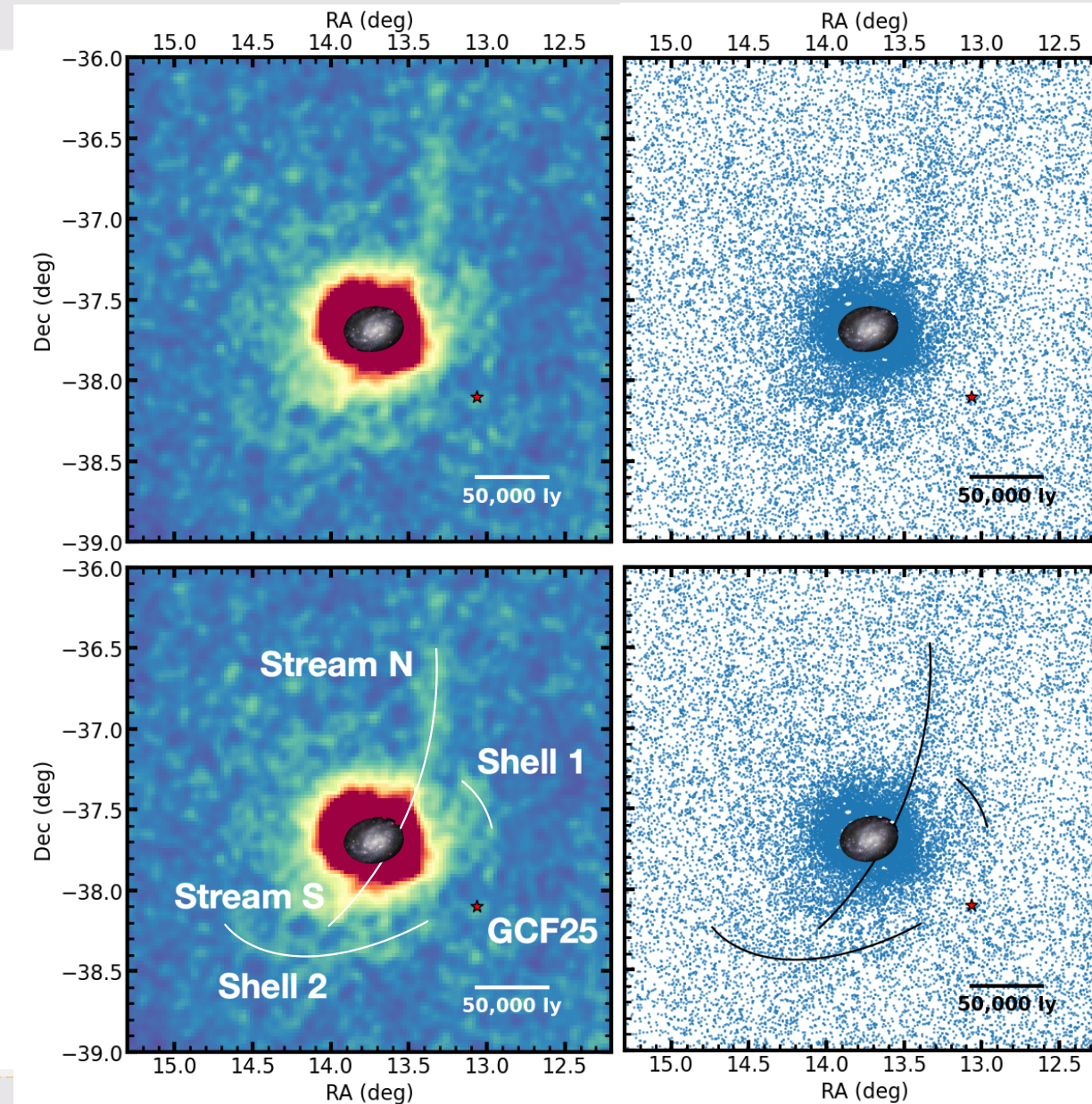


It might have a companion dwarf galaxy – see David Sand's talk

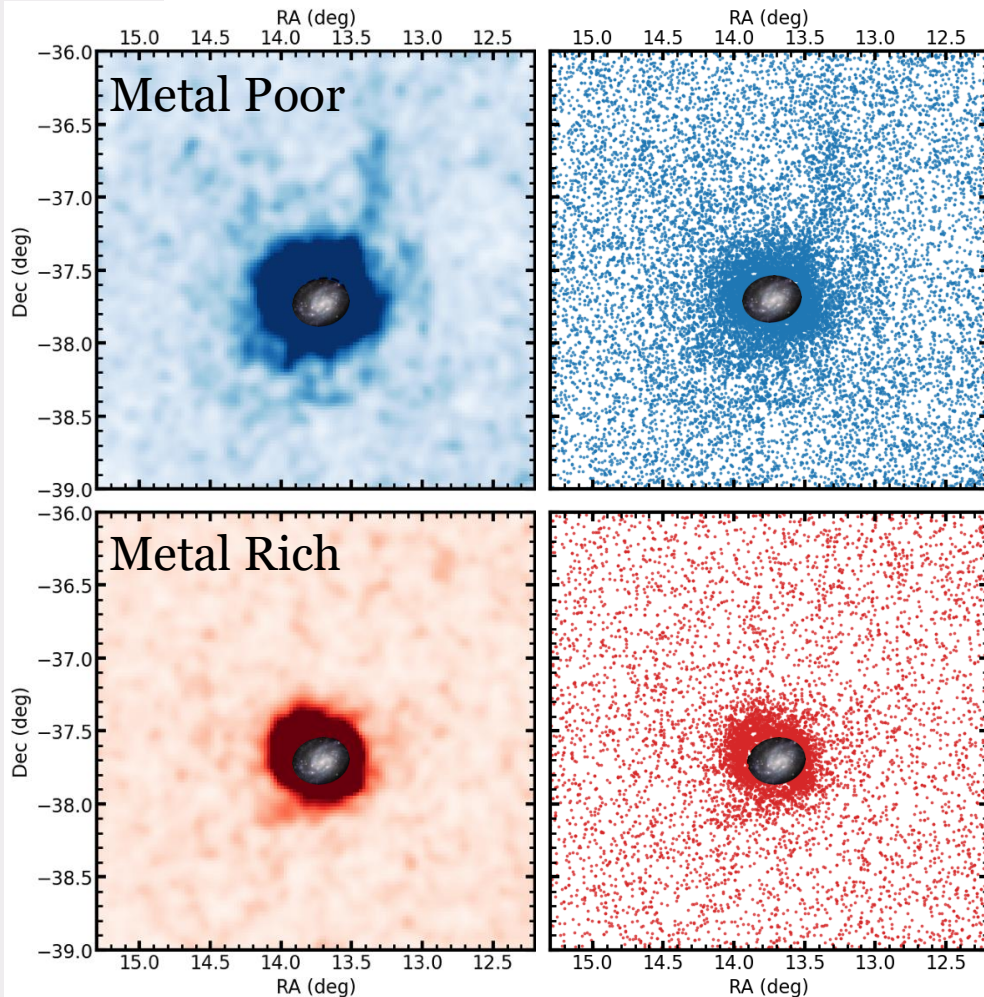


Resolved Star Maps Reveal a Wealth of Structure Around NGC 300

- Stream N extends more than 100,000 ly!
- A stream like this is unlikely to originate from the galaxy

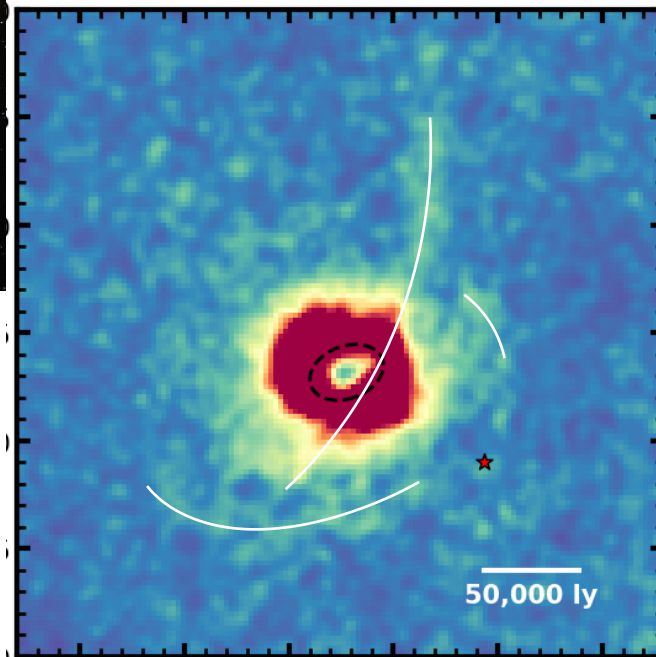
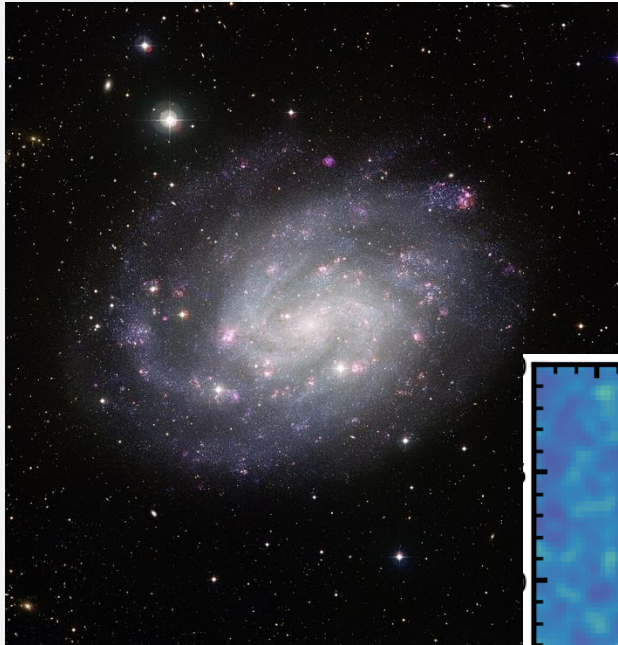


These Features are Metal Poor



- ♦ **Metallicity** measures the amount of heavy elements
 - ♦ Higher metallicity: more generations of stars have enriched the gas
 - ♦ Lower metallicity: older/less processed material
- ♦ The smallest galaxies are the most metal poor
- ♦ These structures likely originated from a tiny galaxy that was pulled apart by NGC 300

The Stellar Halo of NGC 300: Built by Accretion



- We have now found the **richest** structure ever seen in a dwarf galaxy the mass of the LMC
- Even dwarf galaxies can build stellar halos through the accretion of smaller galaxies, echoing the growth patterns seen in larger galaxies
- NGC 300 now stands as one of the most striking examples of accretion-driven stellar halo assembly in a dwarf galaxy of its kind, shedding light on how galaxies grow and evolve across the universe