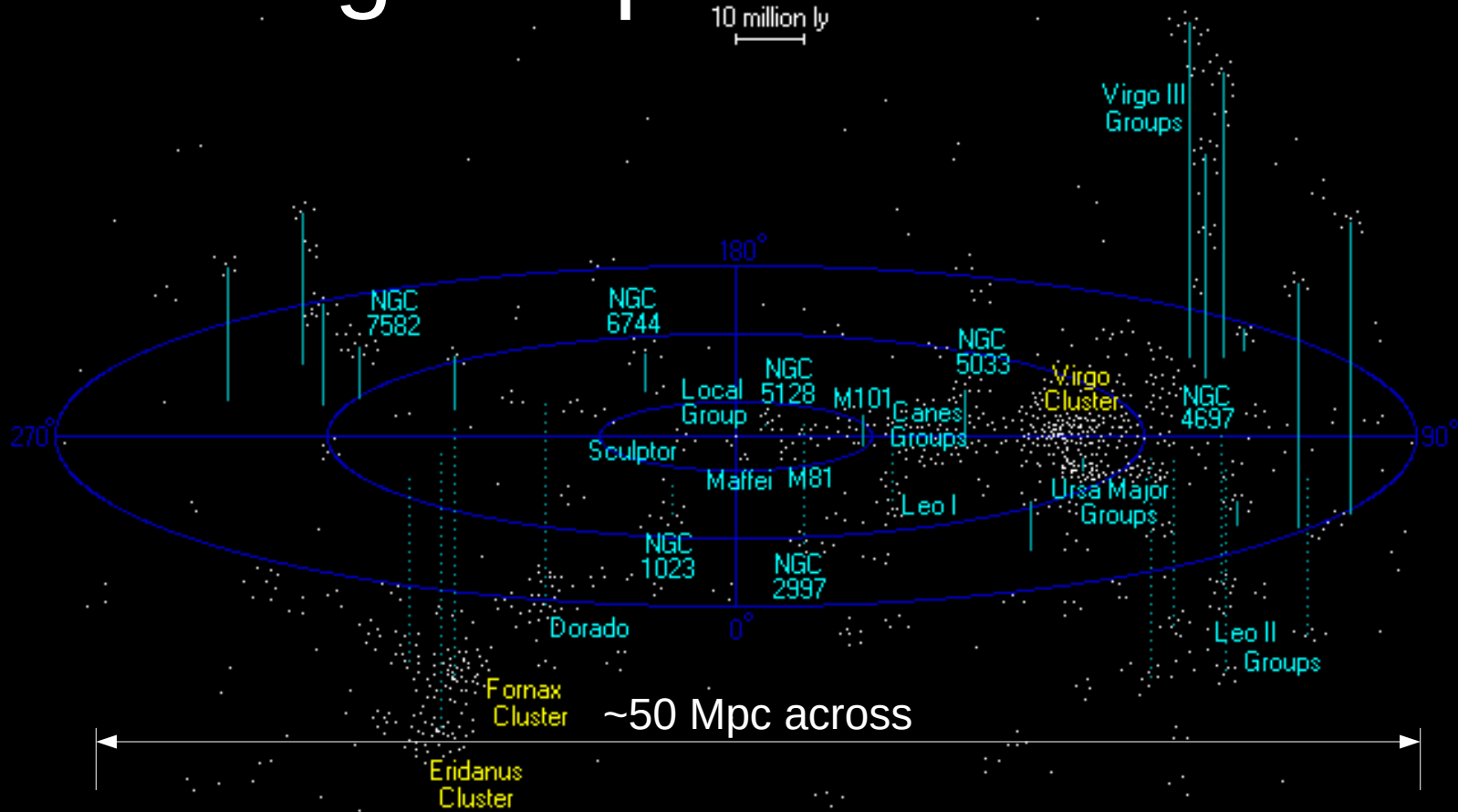


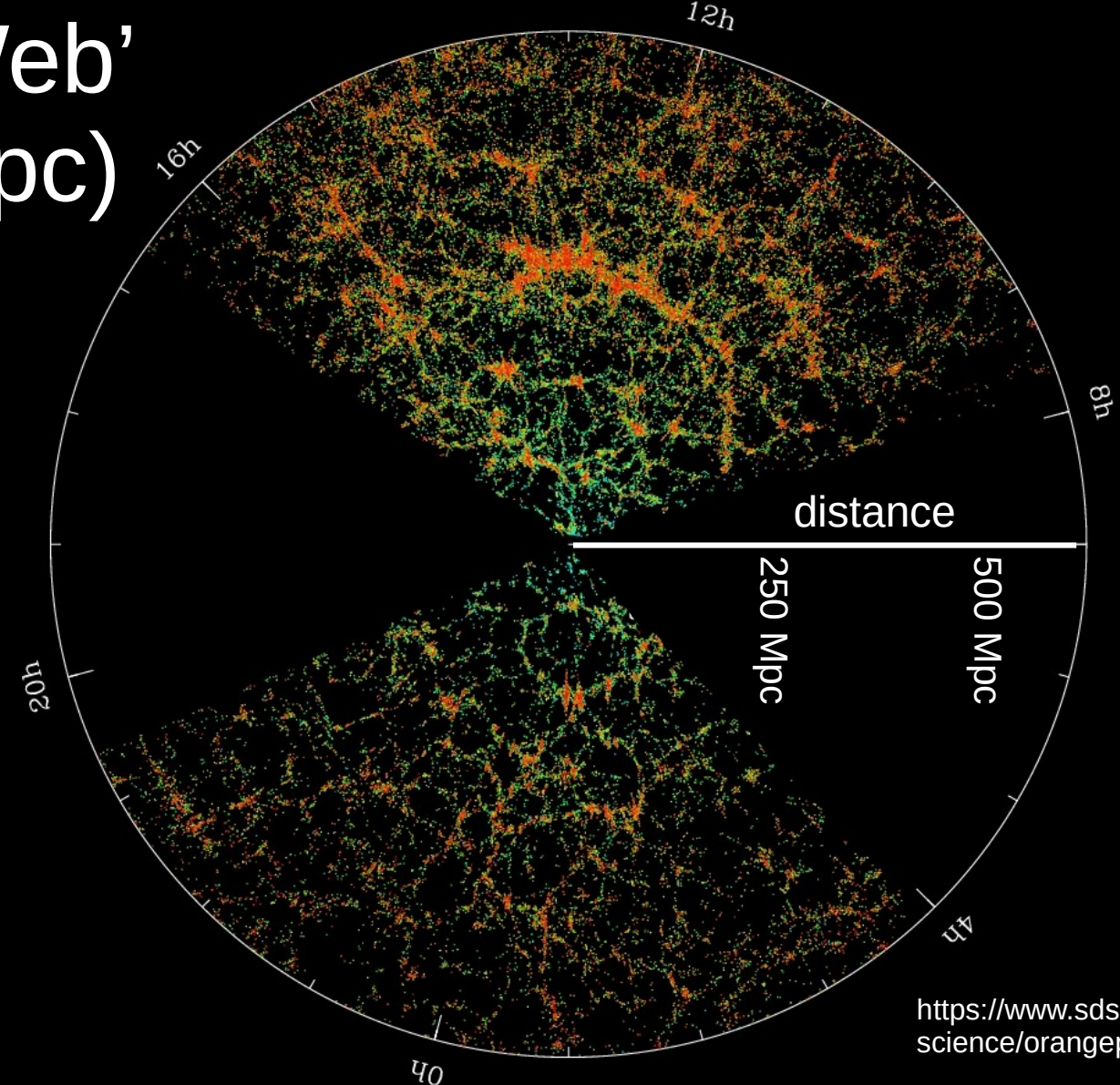
# W13L3 – Large Scale Structure

PSet #7: due Monday, April 25

# Virgo Supercluster



# The 'Cosmic Web' (out to ~600 Mpc)



<https://www.sdss.org/science/orangepie/>

# Cosmic Web Simulation: Assembly of a Galaxy

- [https://crossfield.ku.edu/A391\\_2022A/large\\_scale\\_structure.mp4](https://crossfield.ku.edu/A391_2022A/large_scale_structure.mp4)
- Zoom-out of dark-matter density from 3 Mpc to 1 Gpc.

# Cosmic Web Simulation: Dark Matter and Gas

[https://www.illustris-project.org/movies/illustris\\_movie\\_full\\_cube.mp4](https://www.illustris-project.org/movies/illustris_movie_full_cube.mp4)

- Full simulation cube showing dark matter and gas temperature at the present day. The cube has a sidelength of about 100 Mpc.

# Cosmic Web Simulation: Zoom-In

- [https://www.illustris-project.org/movies/illustris\\_movie\\_zoomin.mp4](https://www.illustris-project.org/movies/illustris_movie_zoomin.mp4)
- Zoom-in from the scale of the entire simulation volume ( $\sim 100$  Mpc) to the scale of an individual spiral galaxy ( $\sim 10$  kpc), highlighting the diversity of structure across spatial scale, the large dynamic range of the simulation ( $10^6$  per dimension), and the relationship between dark matter, gas, and stars.

# Cosmic Web Simulation: Assembly of the Universe

- [https://www.illustris-project.org/movies/illustris\\_movie\\_cube\\_sub\\_frame.mp4](https://www.illustris-project.org/movies/illustris_movie_cube_sub_frame.mp4)
- Time evolution, showing on the left the dark matter density field, and on the right the gas temperature (blue: cold, green: warm: white: hot). The rapid temperature fluctuations around massive haloes are due to radiative AGN feedback that is most active during quasar phases.

# Cosmic Web Simulation: Assembly of a Galaxy

- [https://www.illustris-project.org/movies/illustris\\_movie\\_elliptical\\_formation\\_1pMpc.mp4](https://www.illustris-project.org/movies/illustris_movie_elliptical_formation_1pMpc.mp4)
- Time evolution up to the present day, demonstrating the formation of a massive elliptical 'red-and-dead' galaxy as a result of multiple galaxy mergers.
- Panels show stellar light (left) and gas density (right) in a region of 1 Mpc on a side.