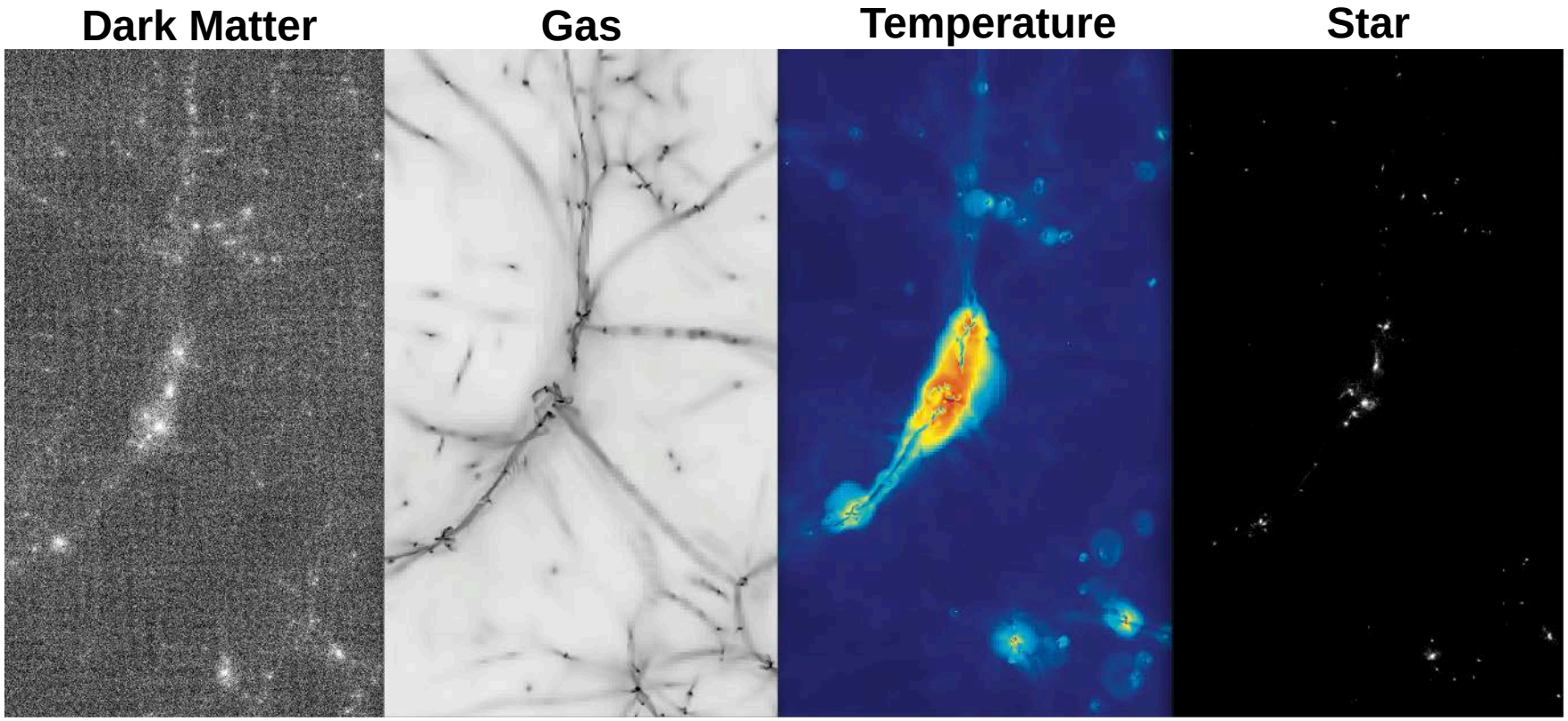


Horizon Run 5 – IV. Light-cone Space and Science

Jaehyun Lee (KIAS)

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+HR5 collaboration

Overview

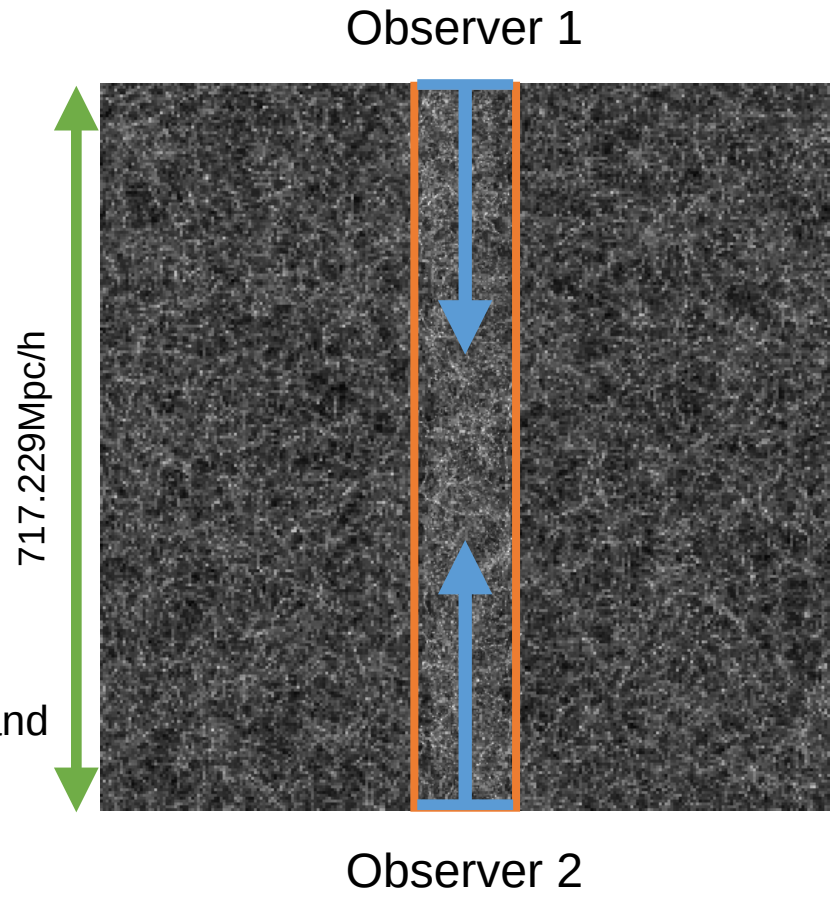
Redshift range : z<162

Zoomed region only (Level ≧13)

Observers on the two periodic planes

Data

- Particles : dark matter and stars
  - Position, velocity, formation epoch (star), metallicity (star)
- Cells : gas properties
  - Position, velocity, density, thermal pressure, metallicity, H, He, O, Fe, and potential
- Sink particles : SMBH candidates
  - Position, velocity, Bondi and Eddington accretion rates, formation epoch

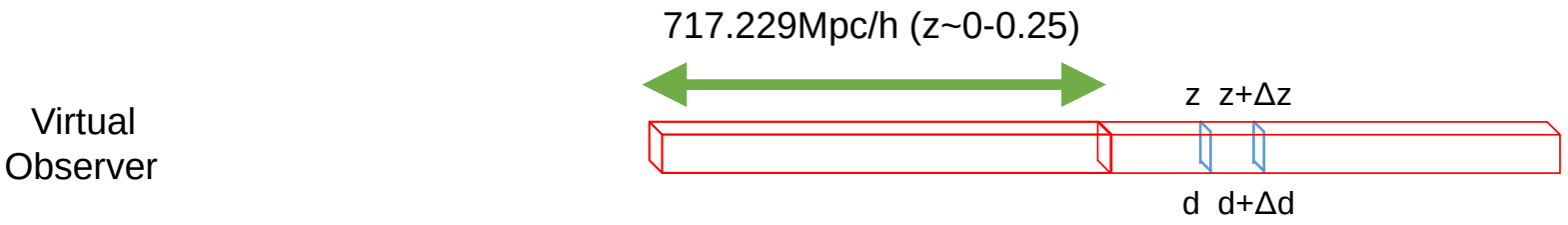


Constructing Light Cone in HR5

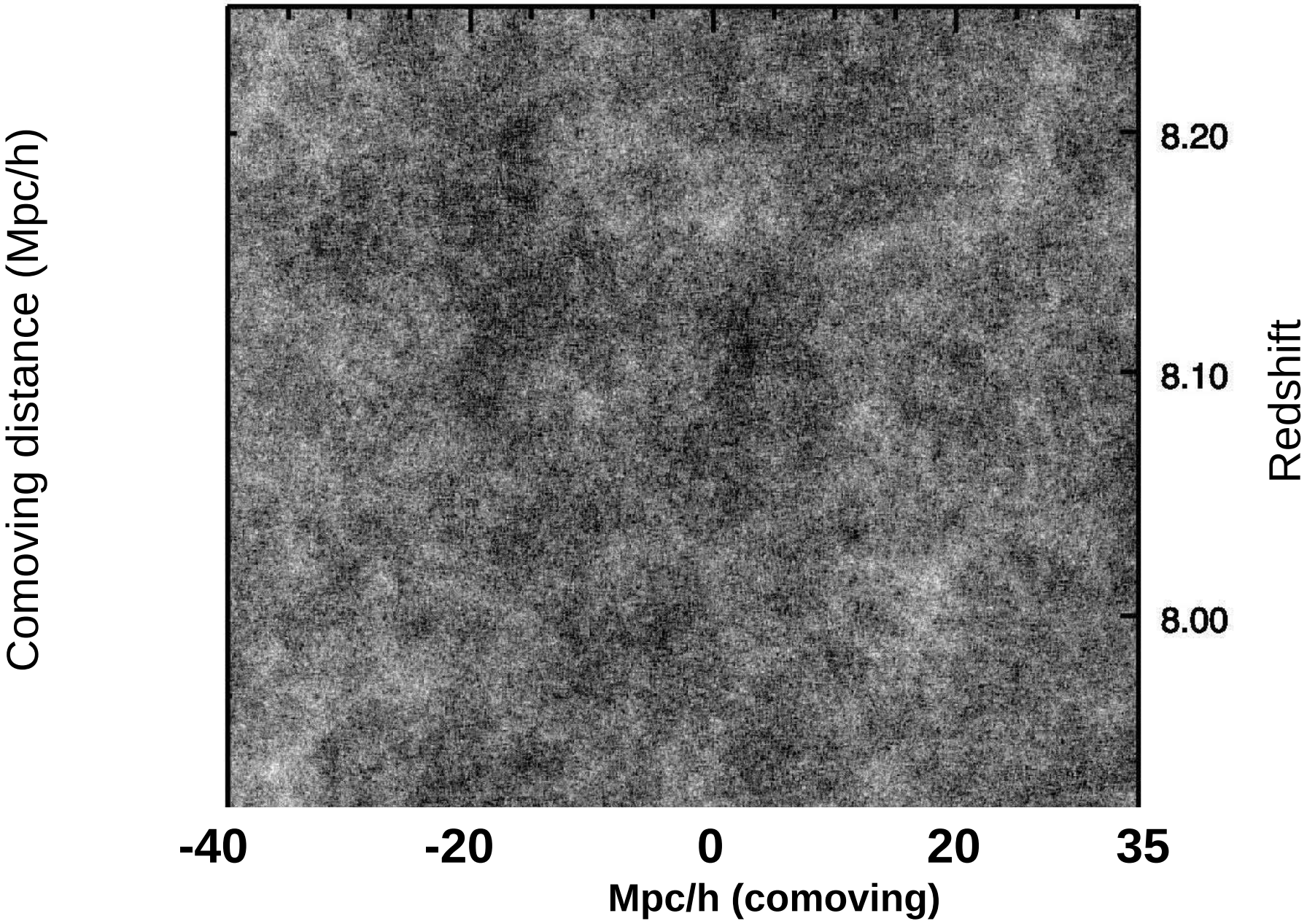
Light cone is constructed on-the-fly in HR5

1. Computing a comoving distance at a given redshift range, z and z+Δz from virtual observers

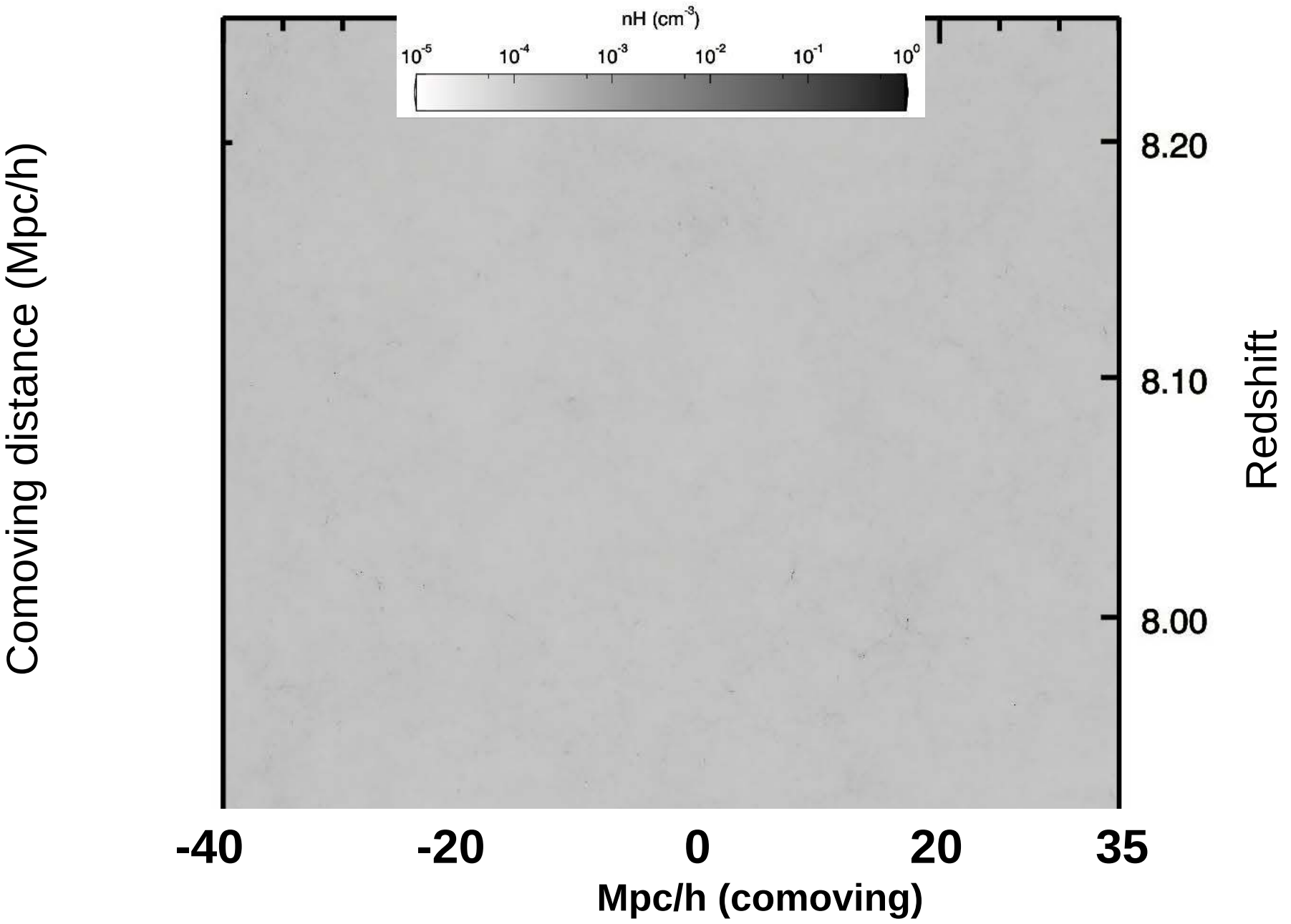
2. Finding cells and particles located in the distance range



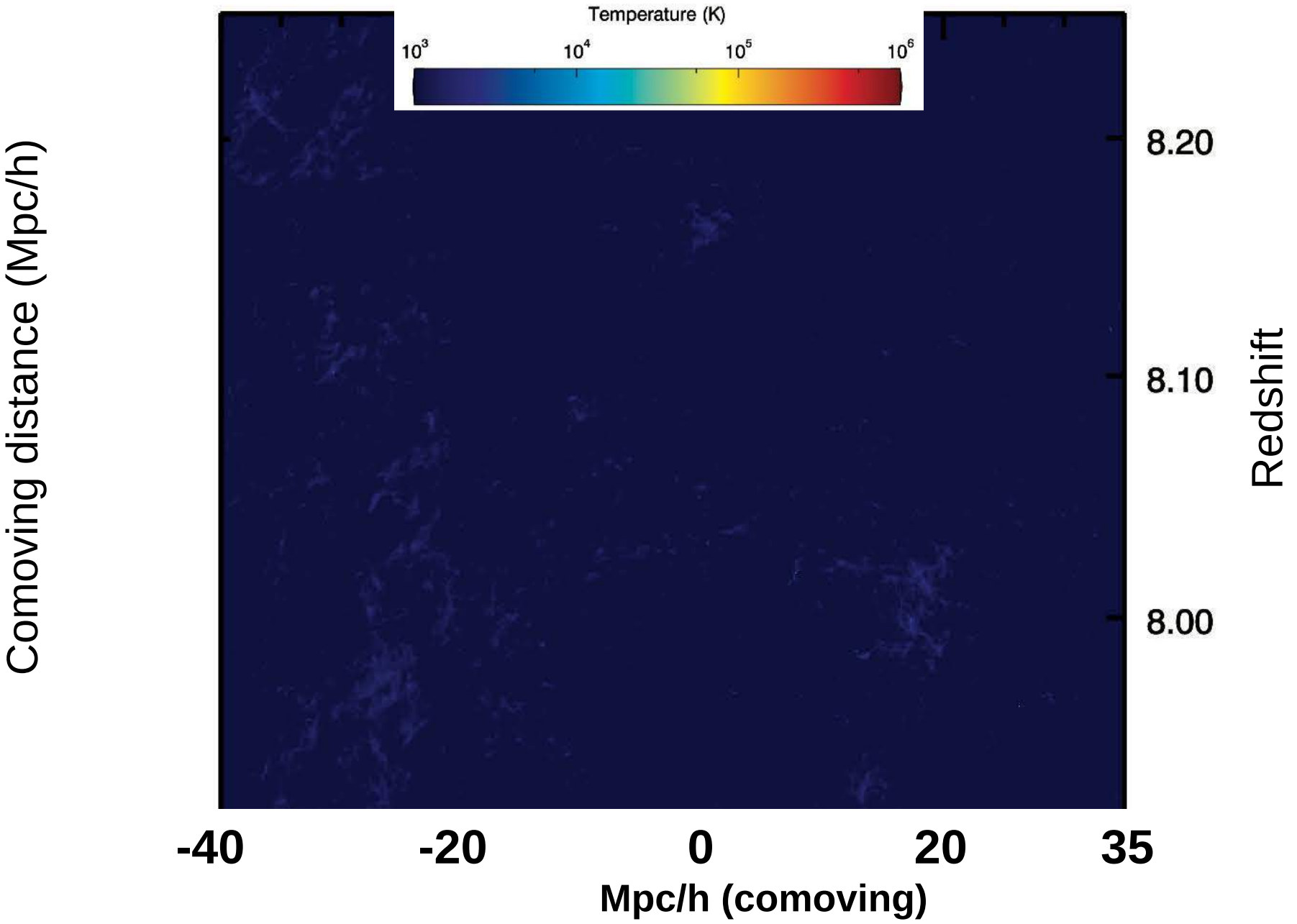
Light Cone - Dark Matter



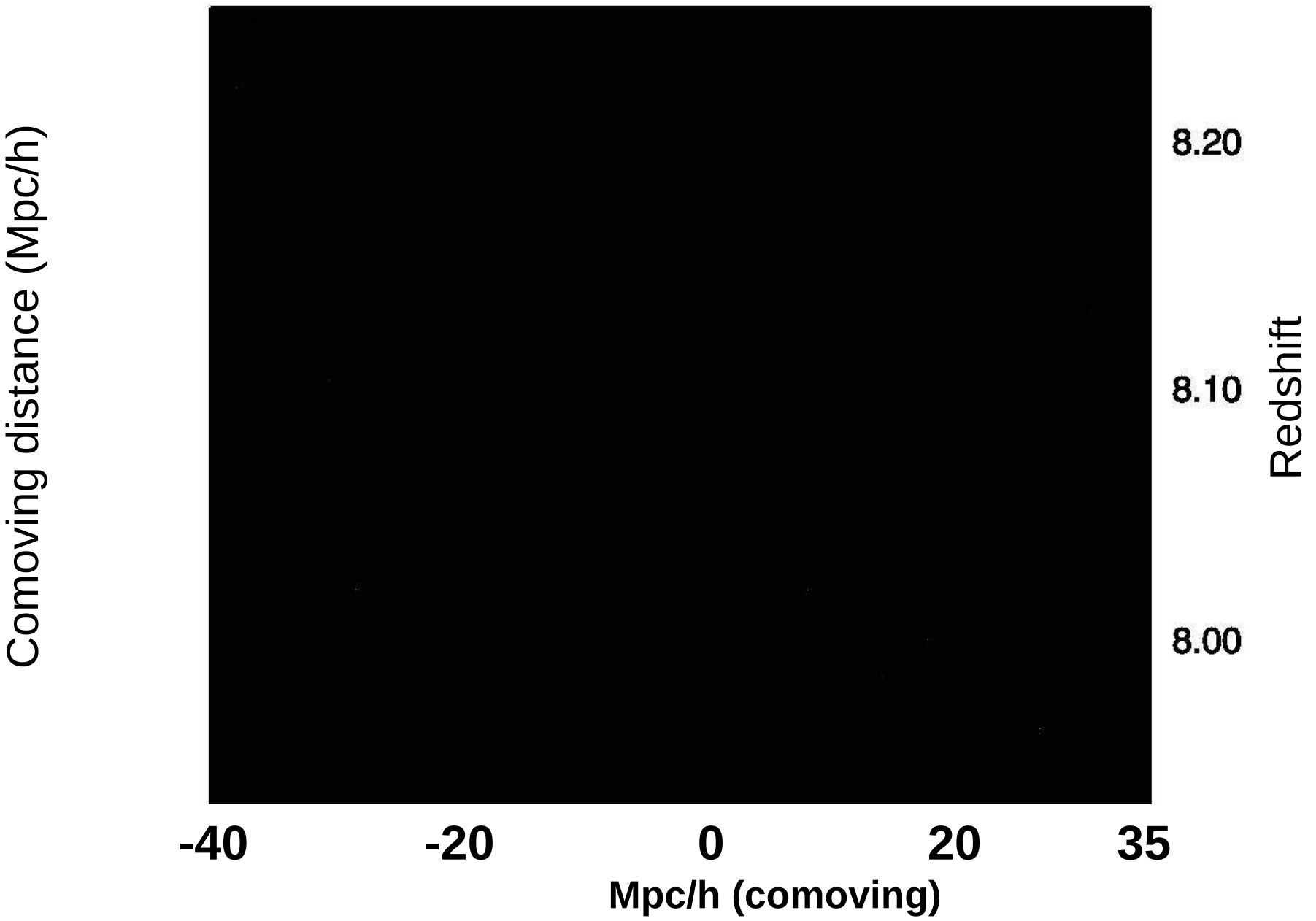
Light Cone - Gas Density



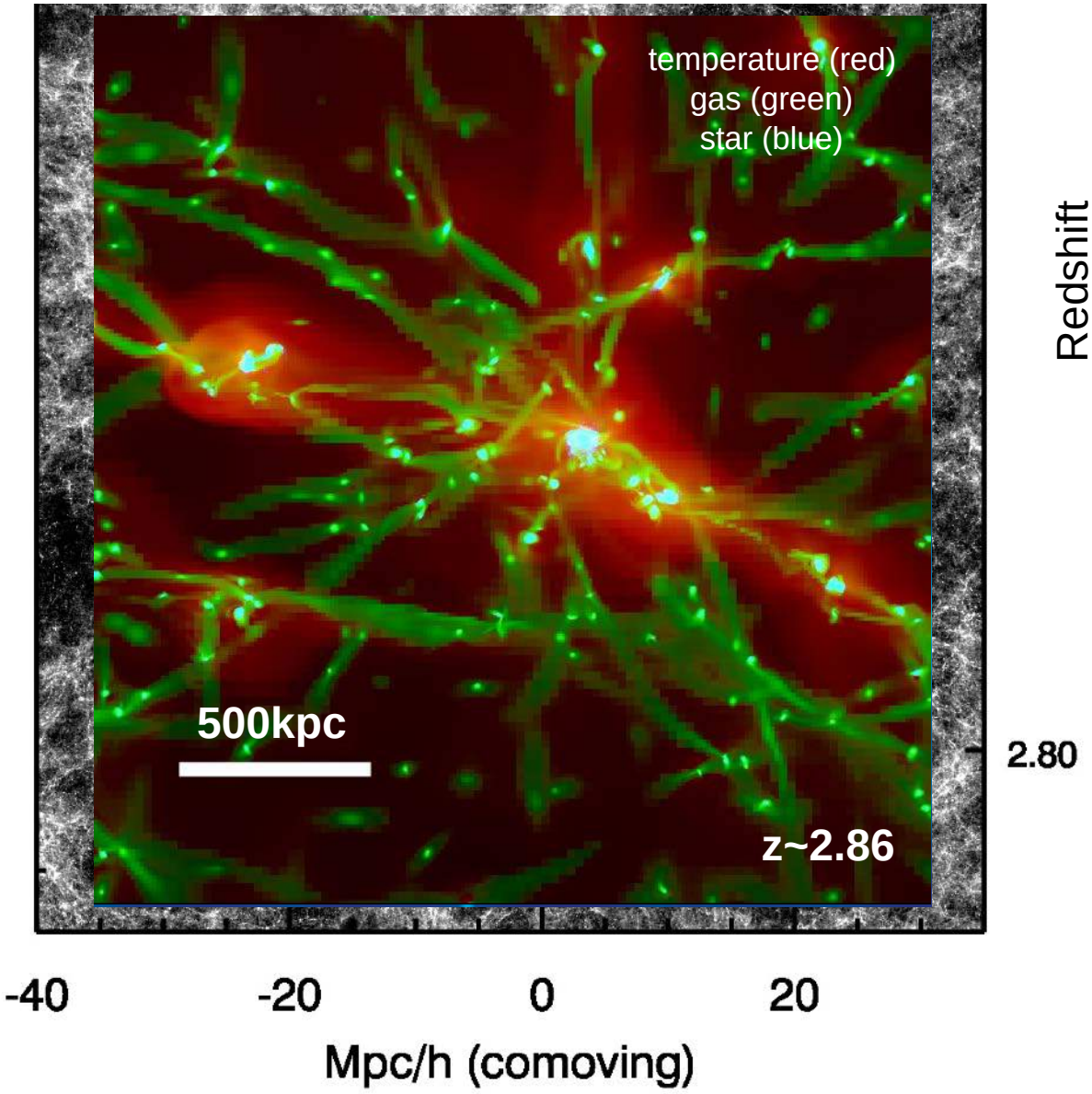
Light Cone - Gas Temperature



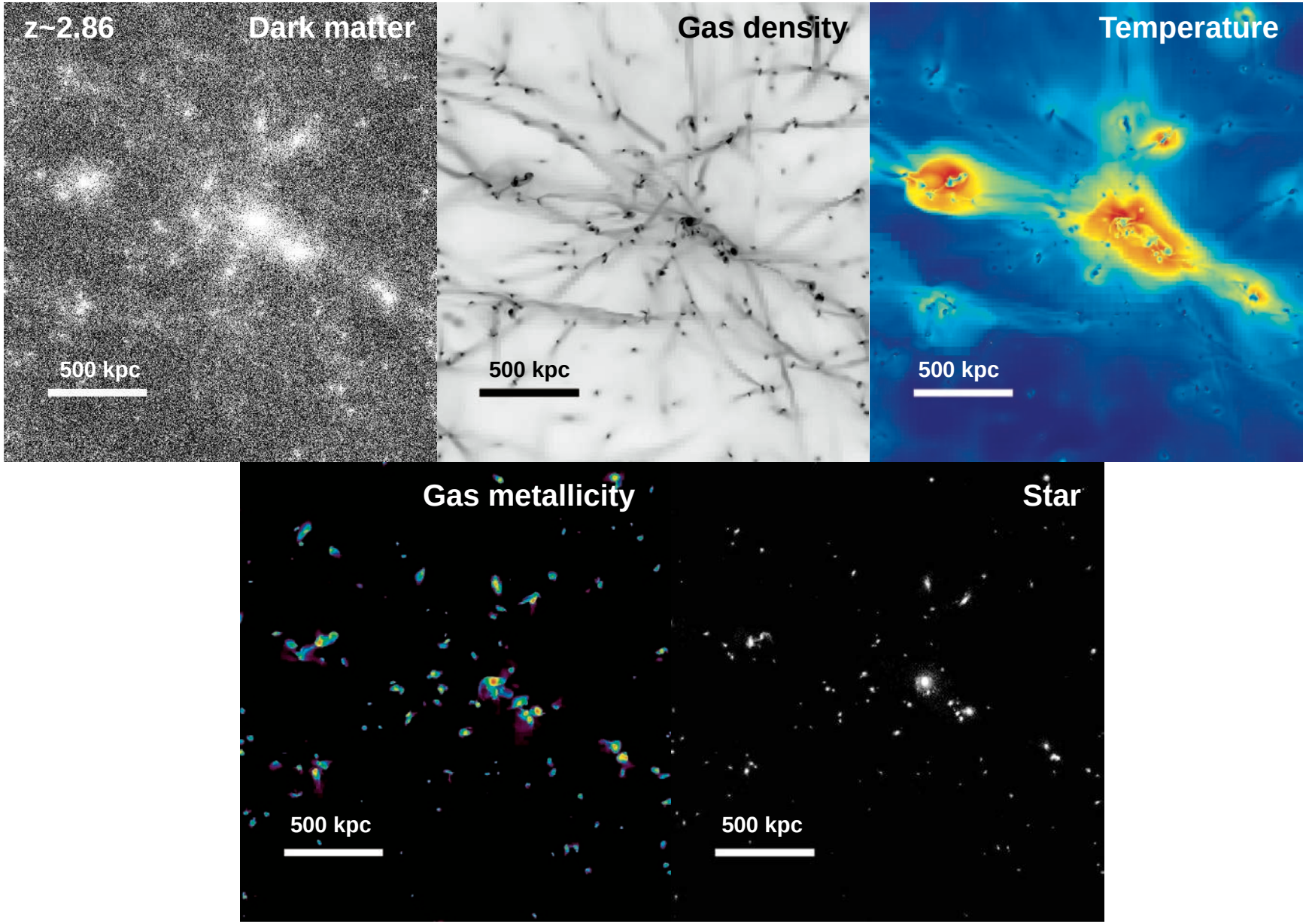
Light Cone - Stars



Galaxies in the Light Cone



Galaxies in the Light Cone



Sciences based on the Light Cone

Deep field catalogue

Lensed galaxies at high redshifts

Protocluster galaxy formation

Reionization bubble size and abundance

Quasars at high z

Summary

HR5 light cone data is available now down to z~2.7 with full resolution

The following information is contained in the HR5 light cone.

- DM and stellar particles - mass, metallicity (star), age (star)
- Gas cells - density, temperature, metallicity, H, O, Fe, and potential
- Sink particles (SMBH) - age, accretion rates

Science - What else?