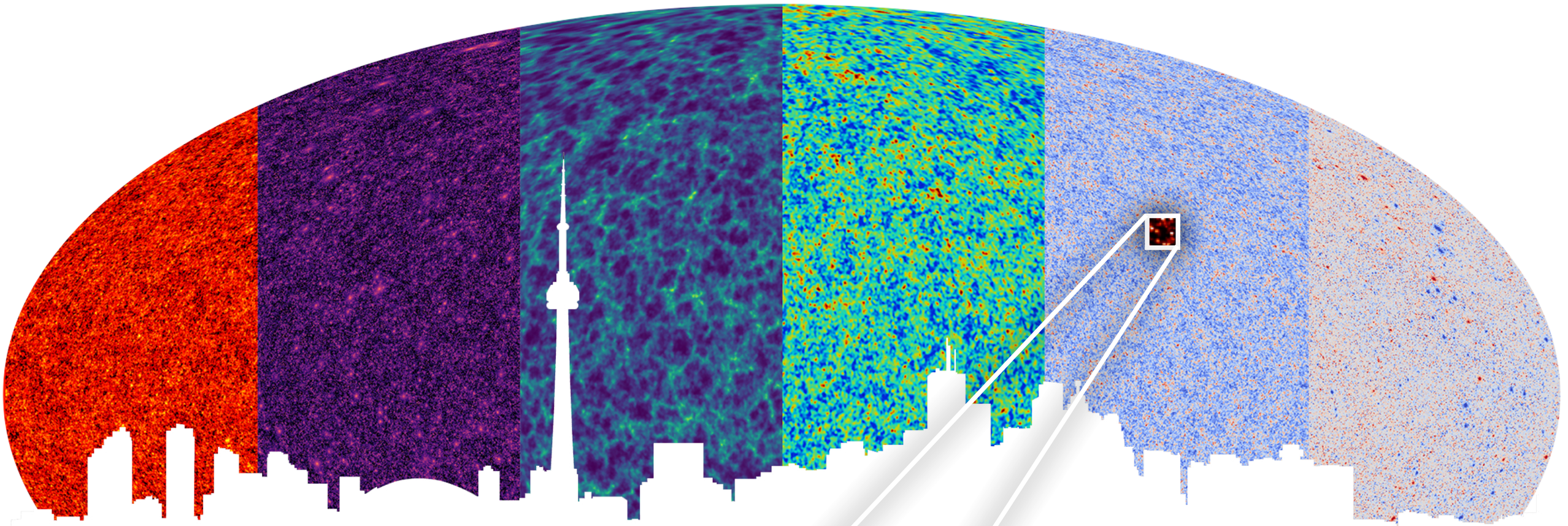
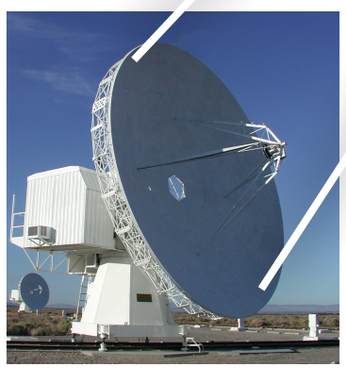
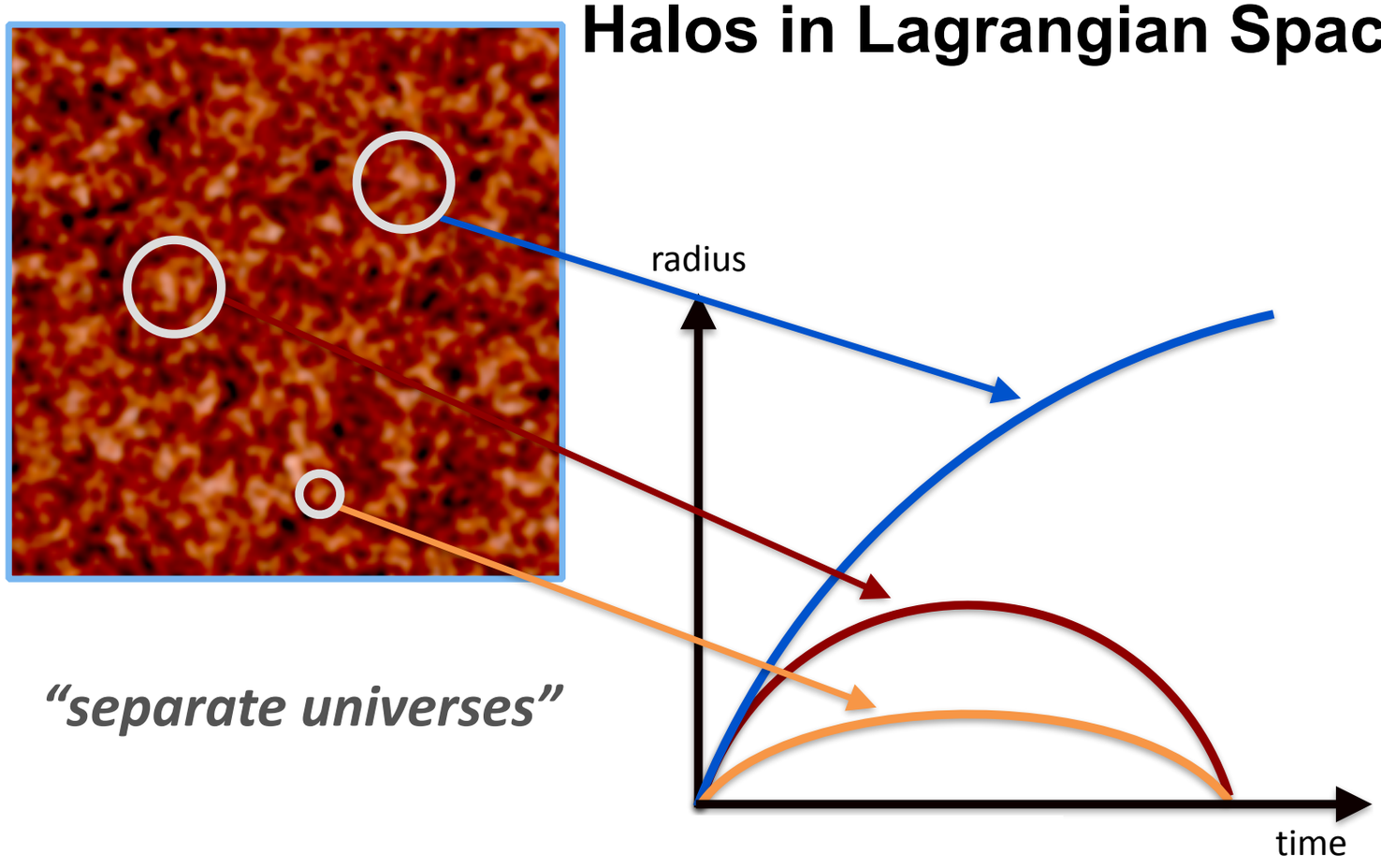
CITA group: George Stein, Dick Bond, Marcelo Alvarez





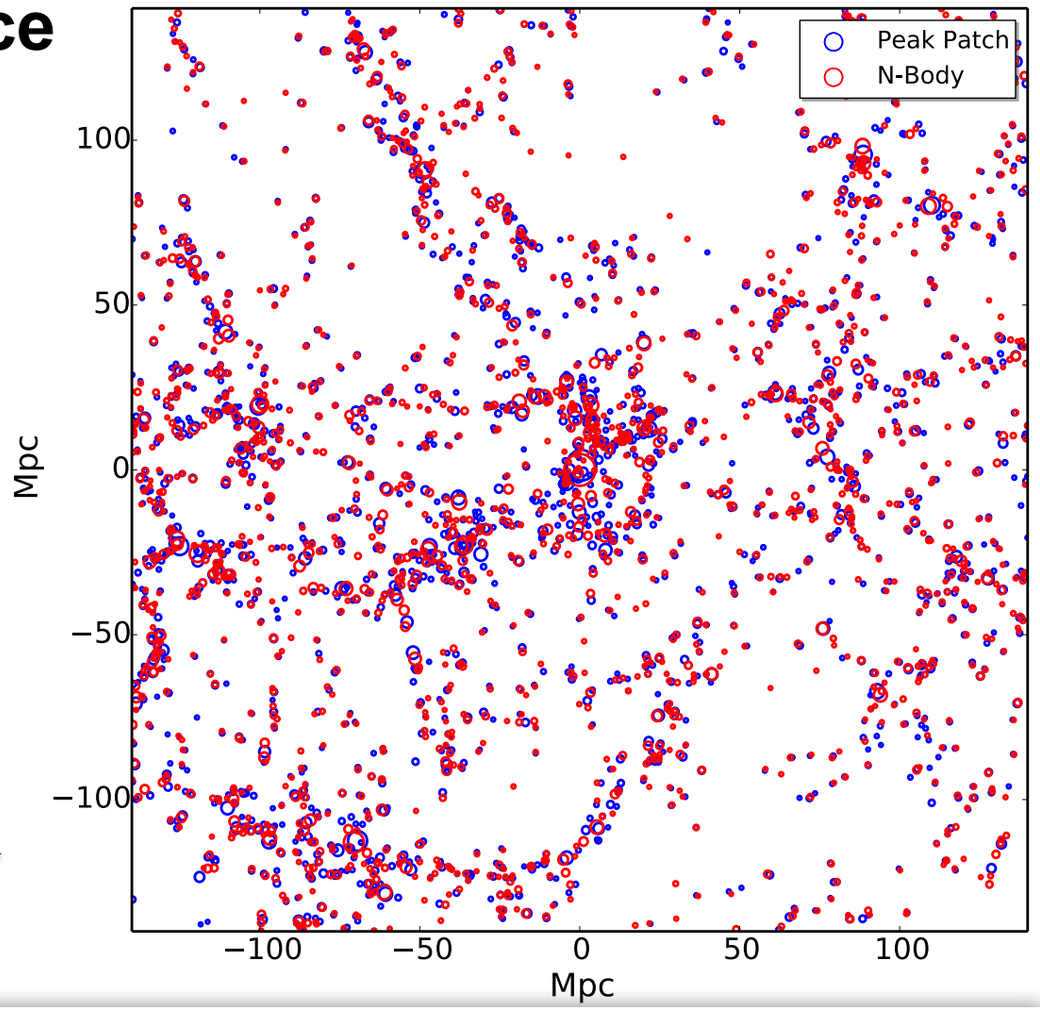
Peak Patch COMAP Simulations

1.) Ellipsoidal Collapse is Used to Find Halos in Lagrangian Space



"separate universes"

2.) 2LPT to move

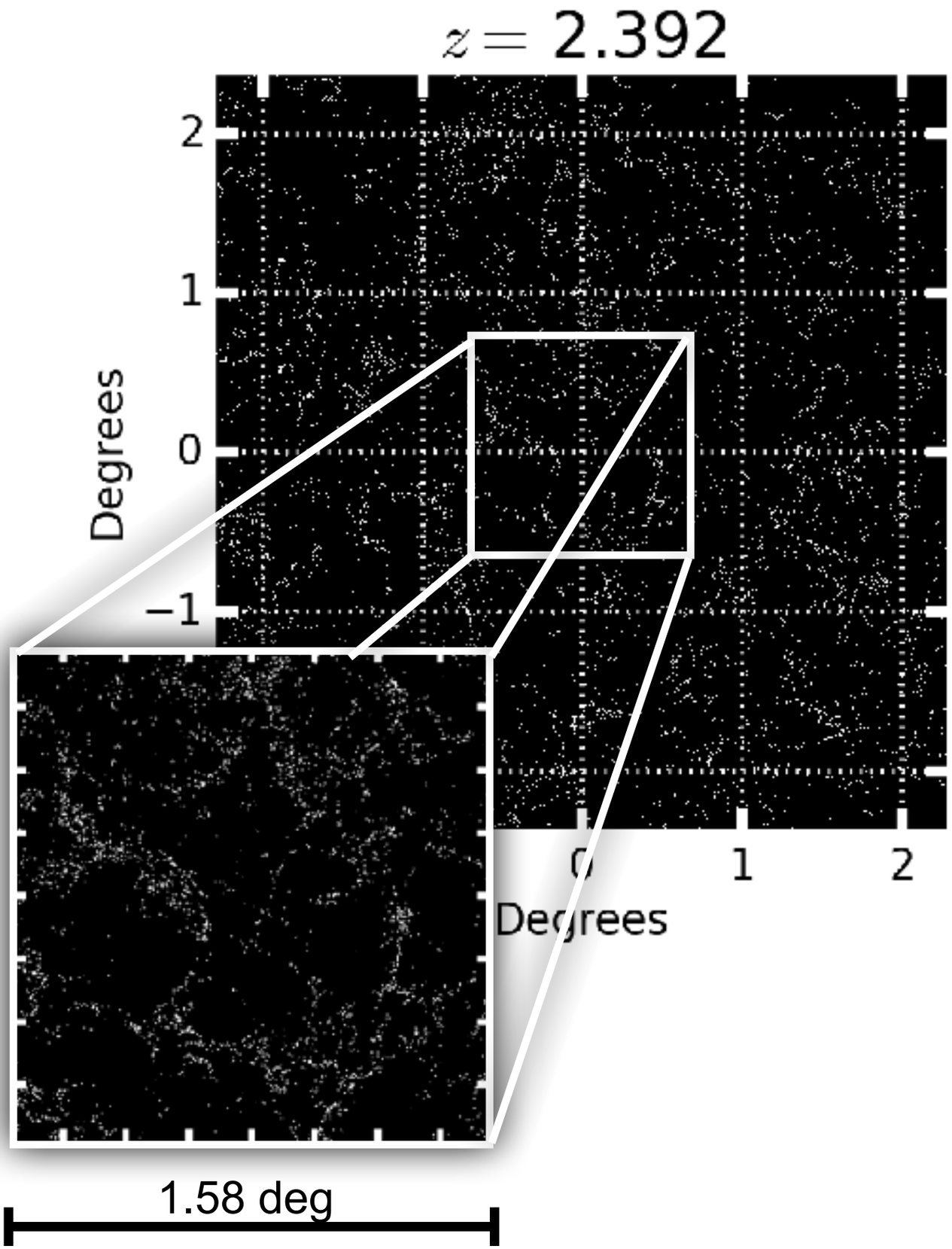


First COMAP runs: 560Mpc box gives z~2.4-2.8 (34-30GHz), $M>2.5 \times 10^{10} M_{sun}$, t_{run}~15 mins on 512 proc. 110 runs

Take t_{proc} of our cluster runs ~ few x 10^3 cubes

Halos

CO Model



Halos

CO

$z = 2.392$

$\nu = 33.980$ GHz

Degrees

Degrees

Degrees

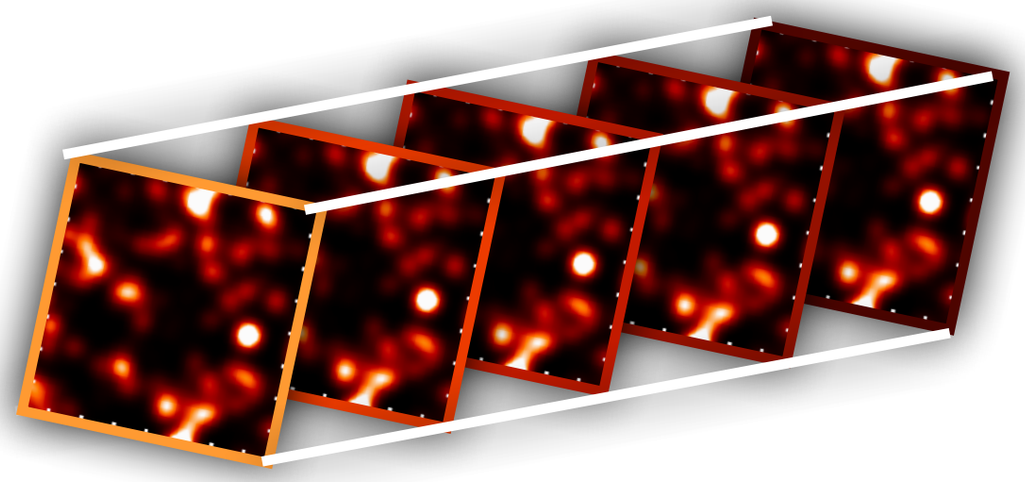
$T_b\ [\mu K]$

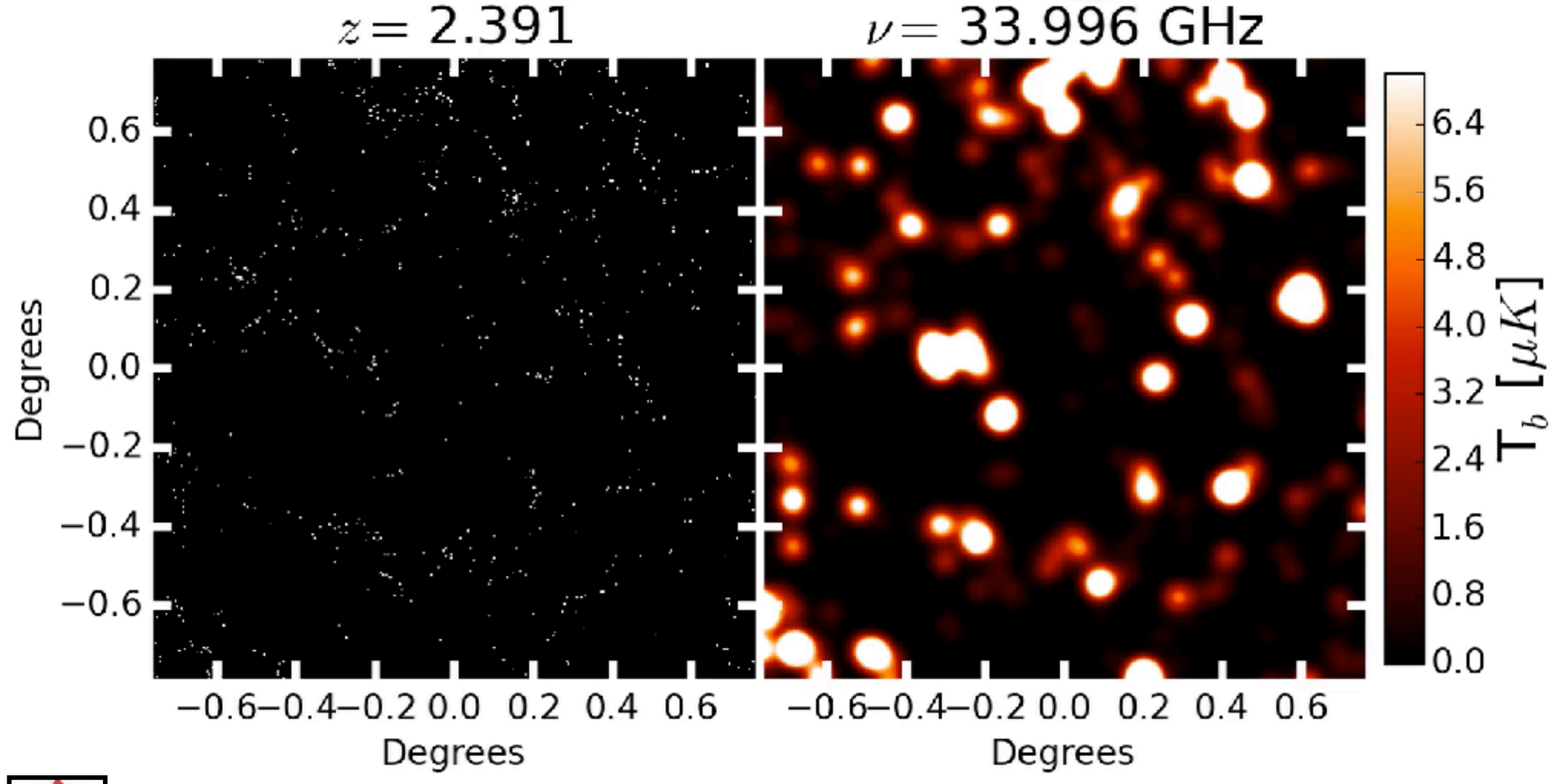
6.4
5.6
4.8
4.0
3.2
2.4
1.6
0.8
0.0

1.58 deg

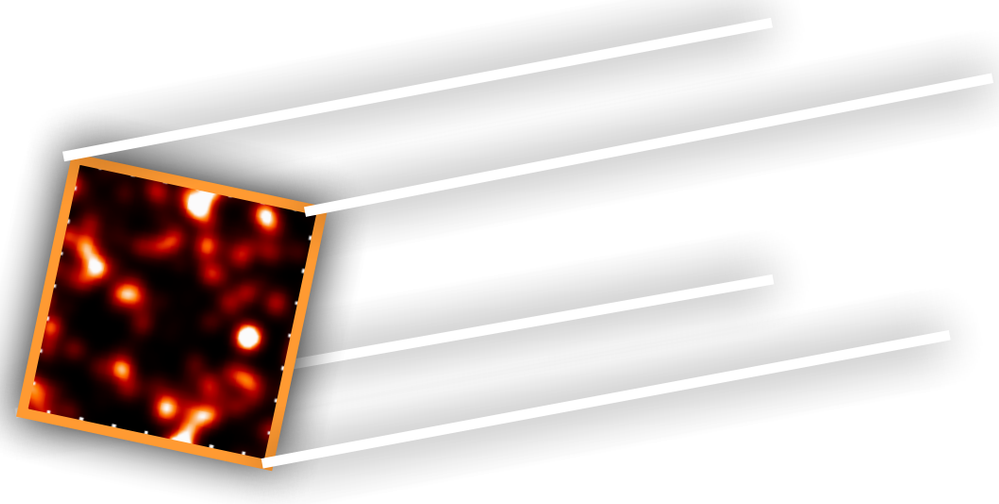
1.58 deg

True COMAP flythrough
7.8MHz Bandwidth

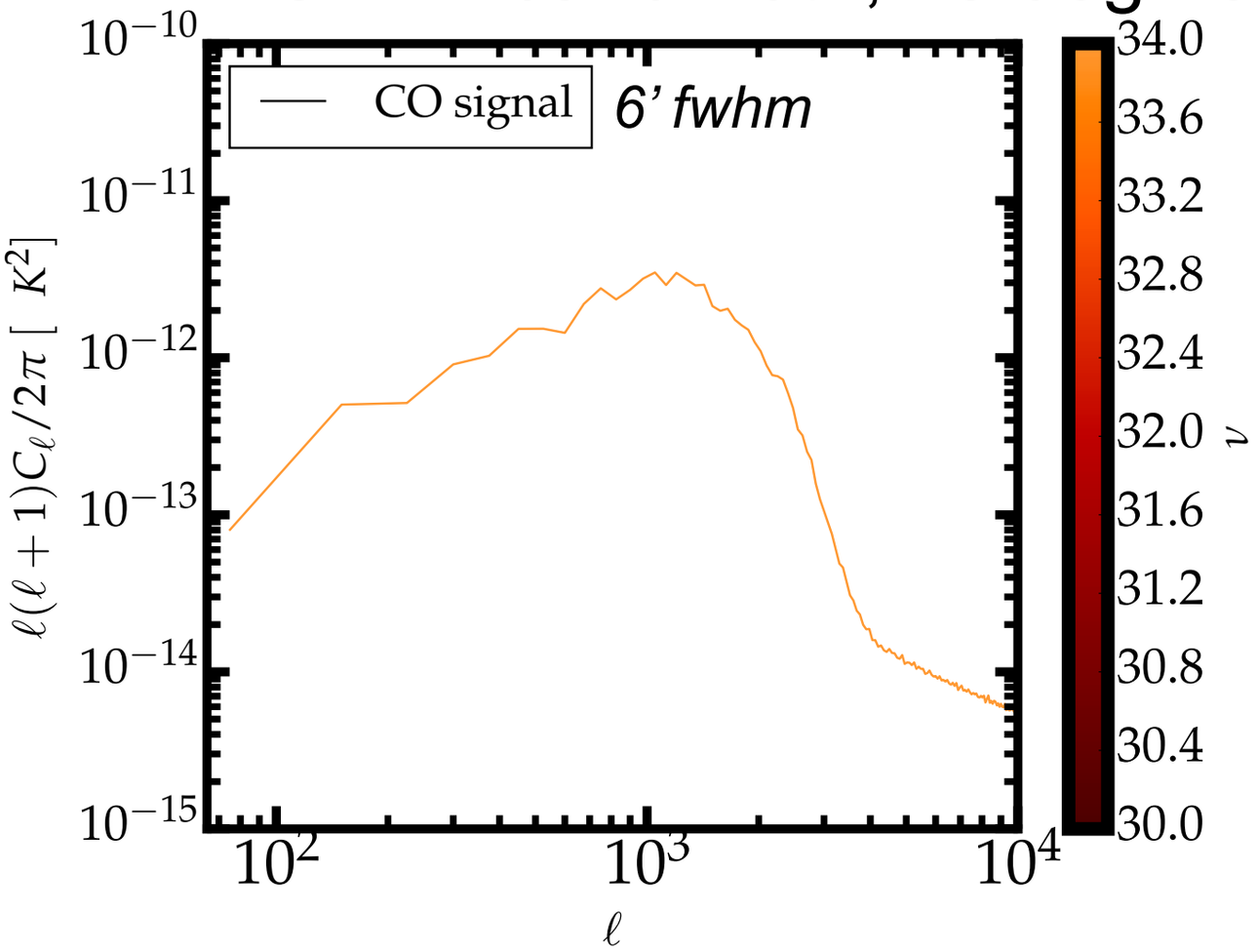


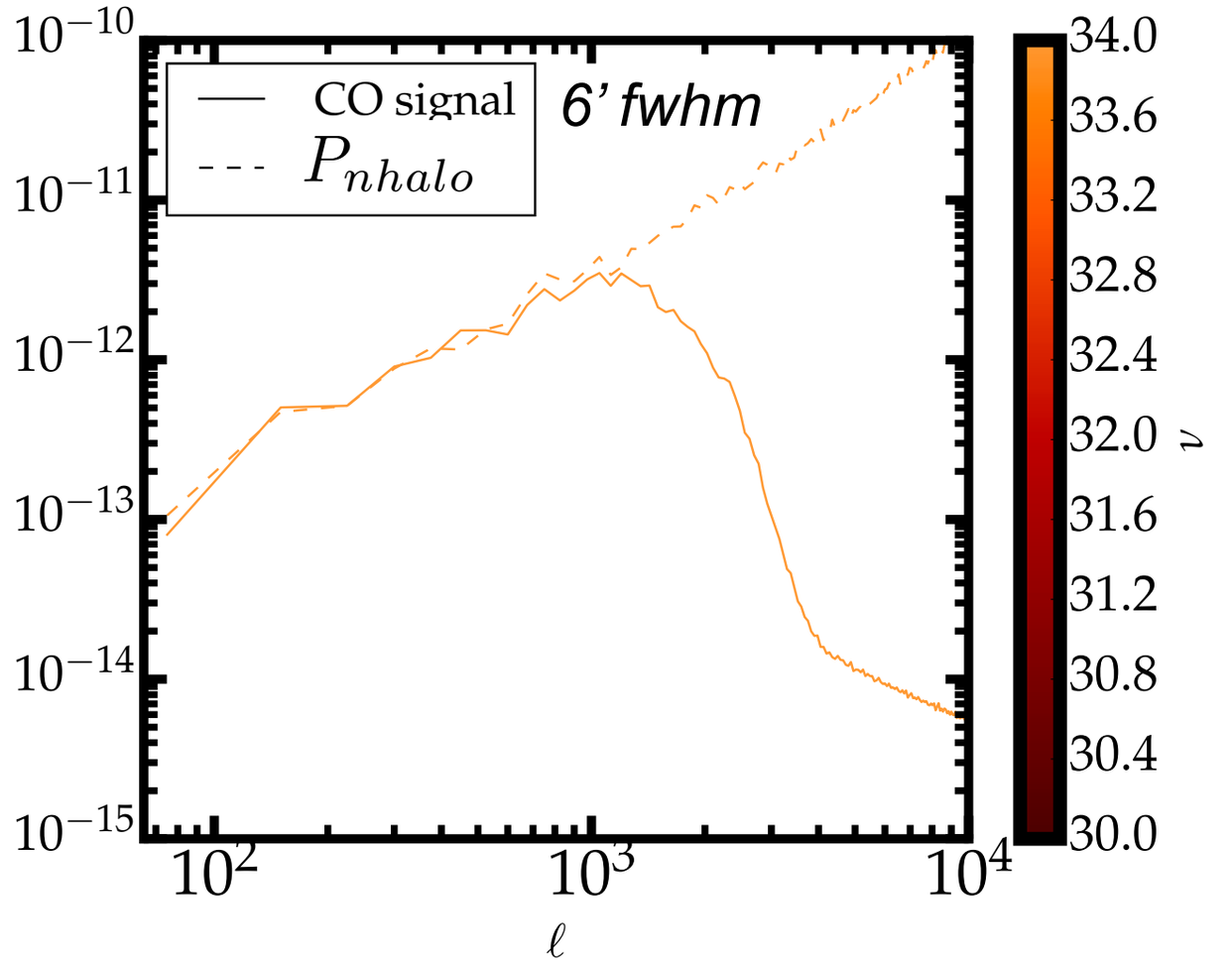


First Step: Tomographic Power Spectra

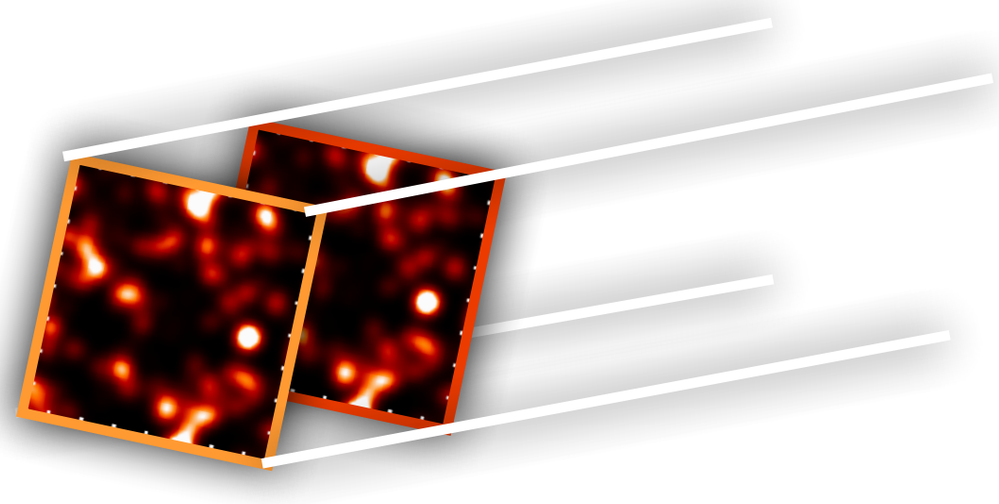


7.8MHz bandwidth, 23 deg^2 fov

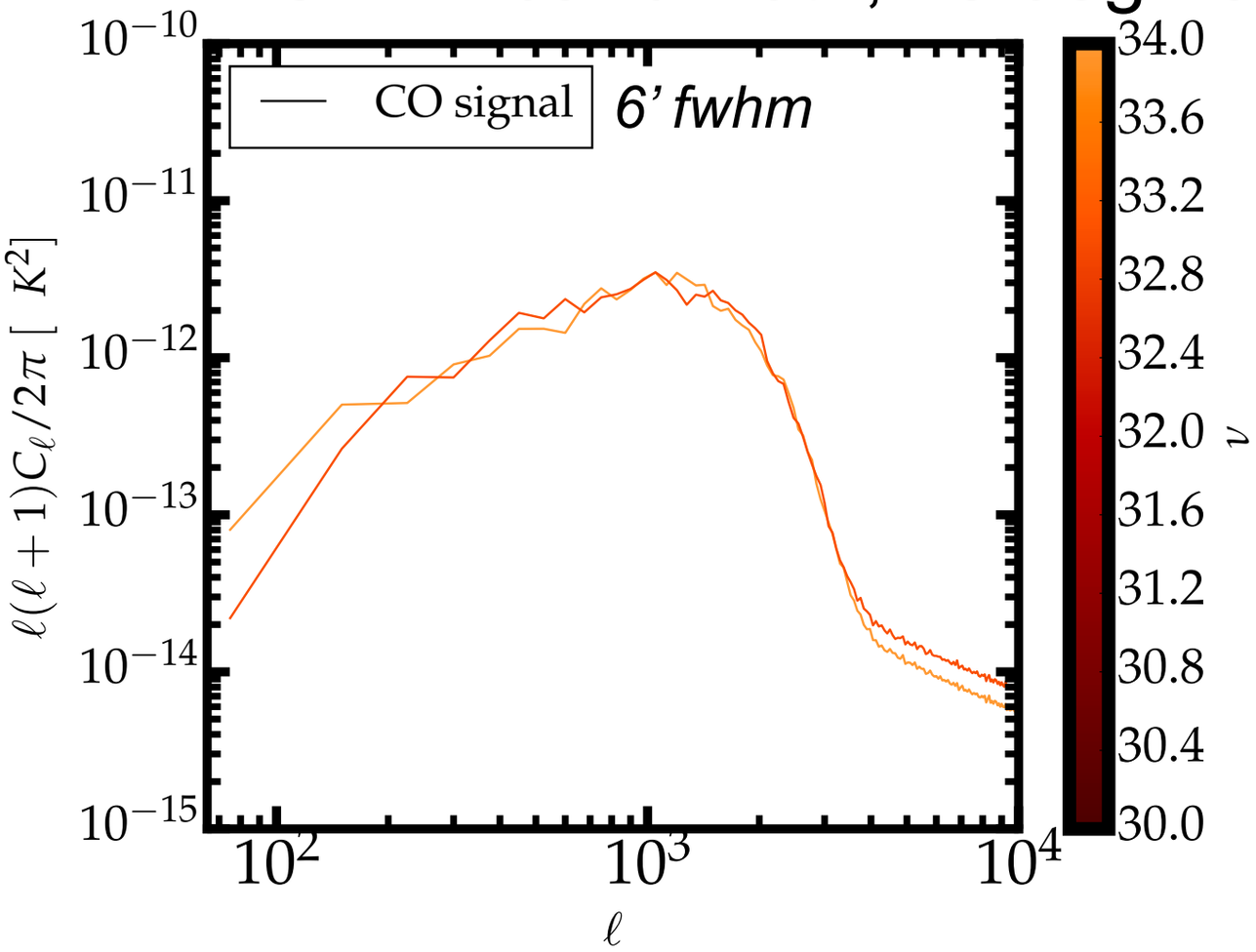


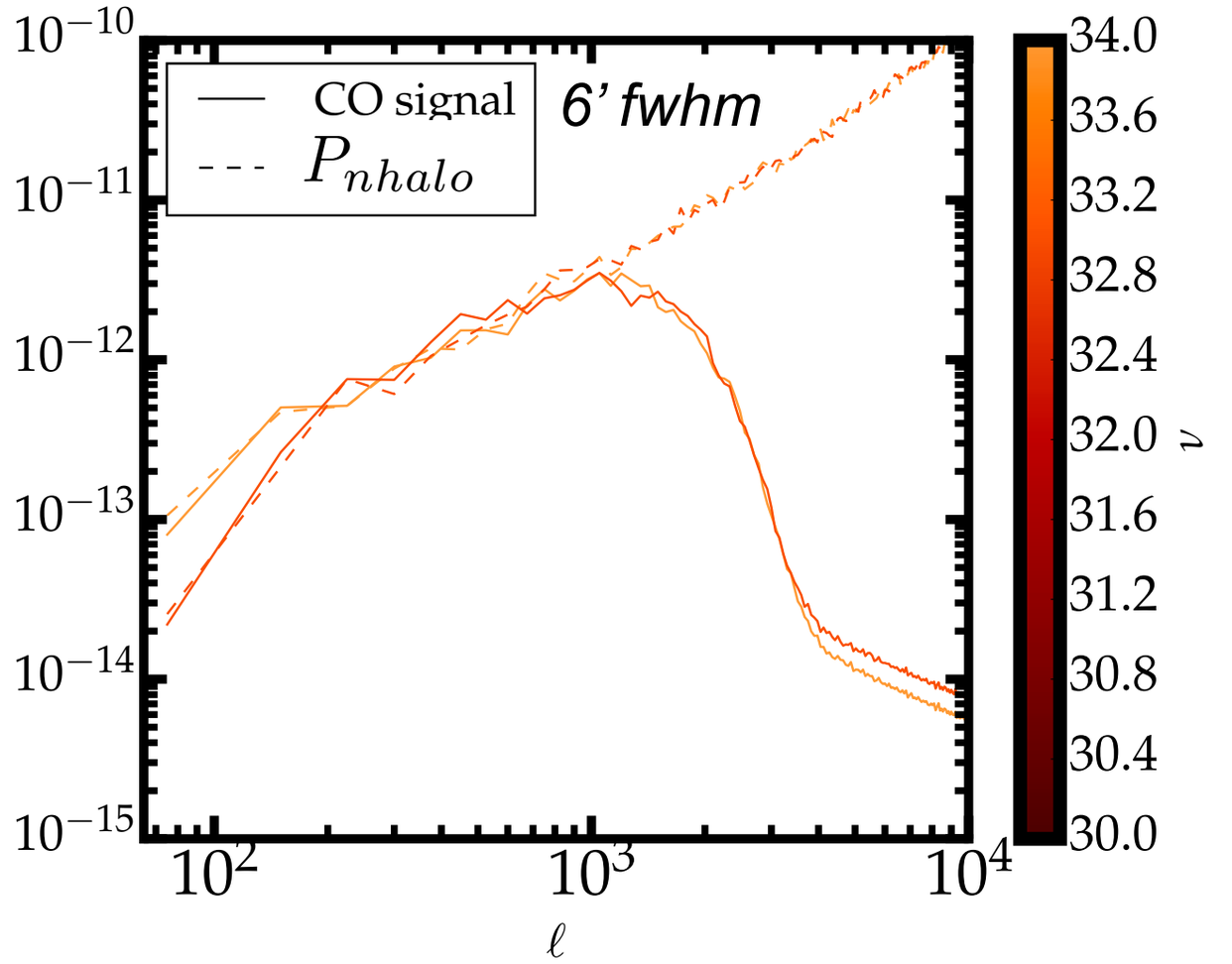


First Step: Tomographic Power Spectra

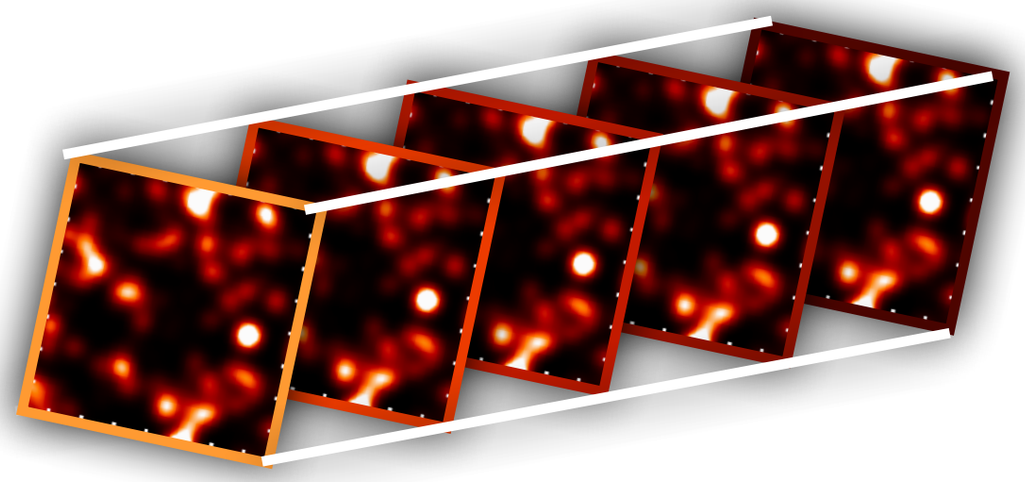


7.8MHz bandwidth, 23 deg^2 fov

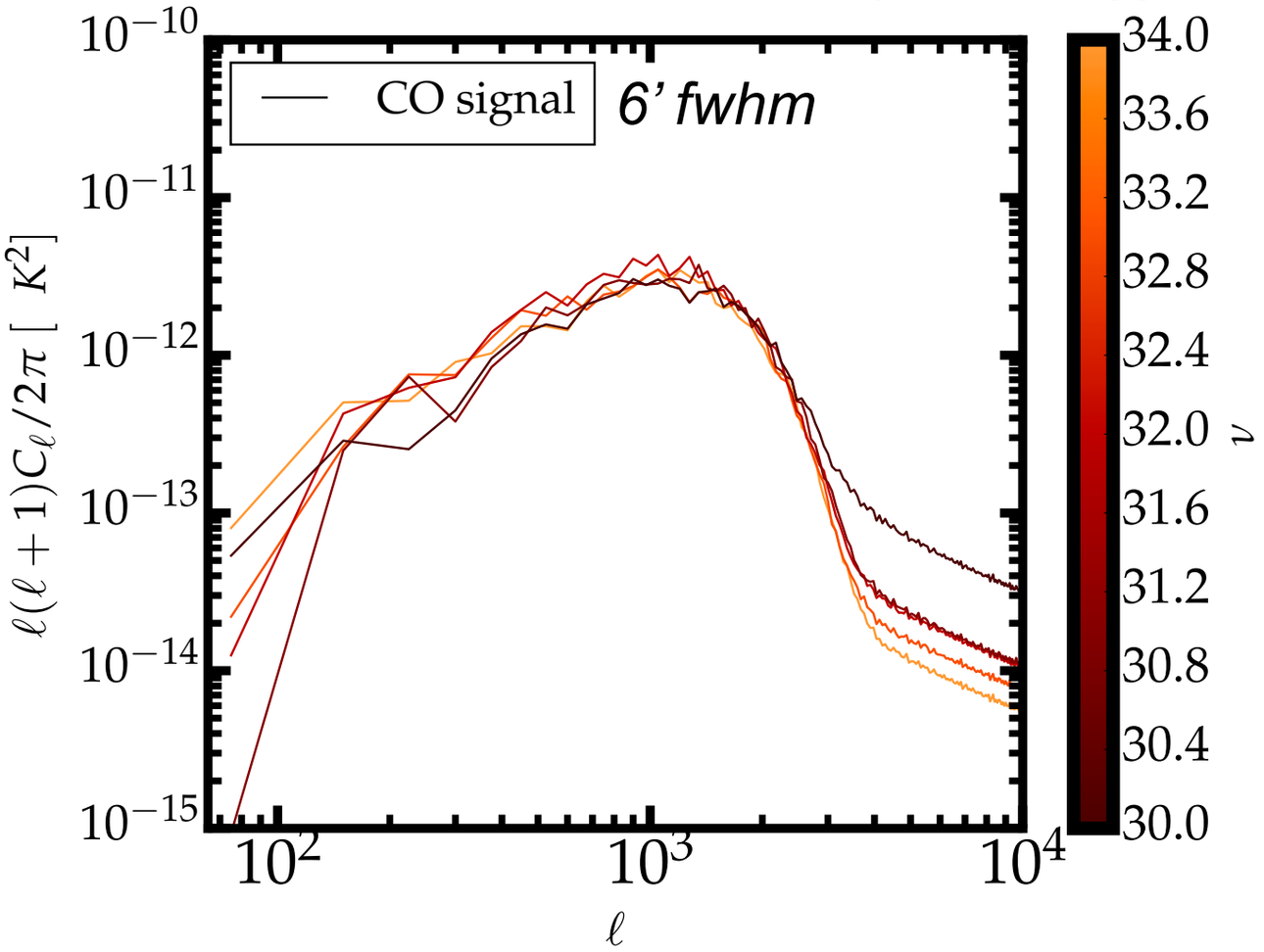


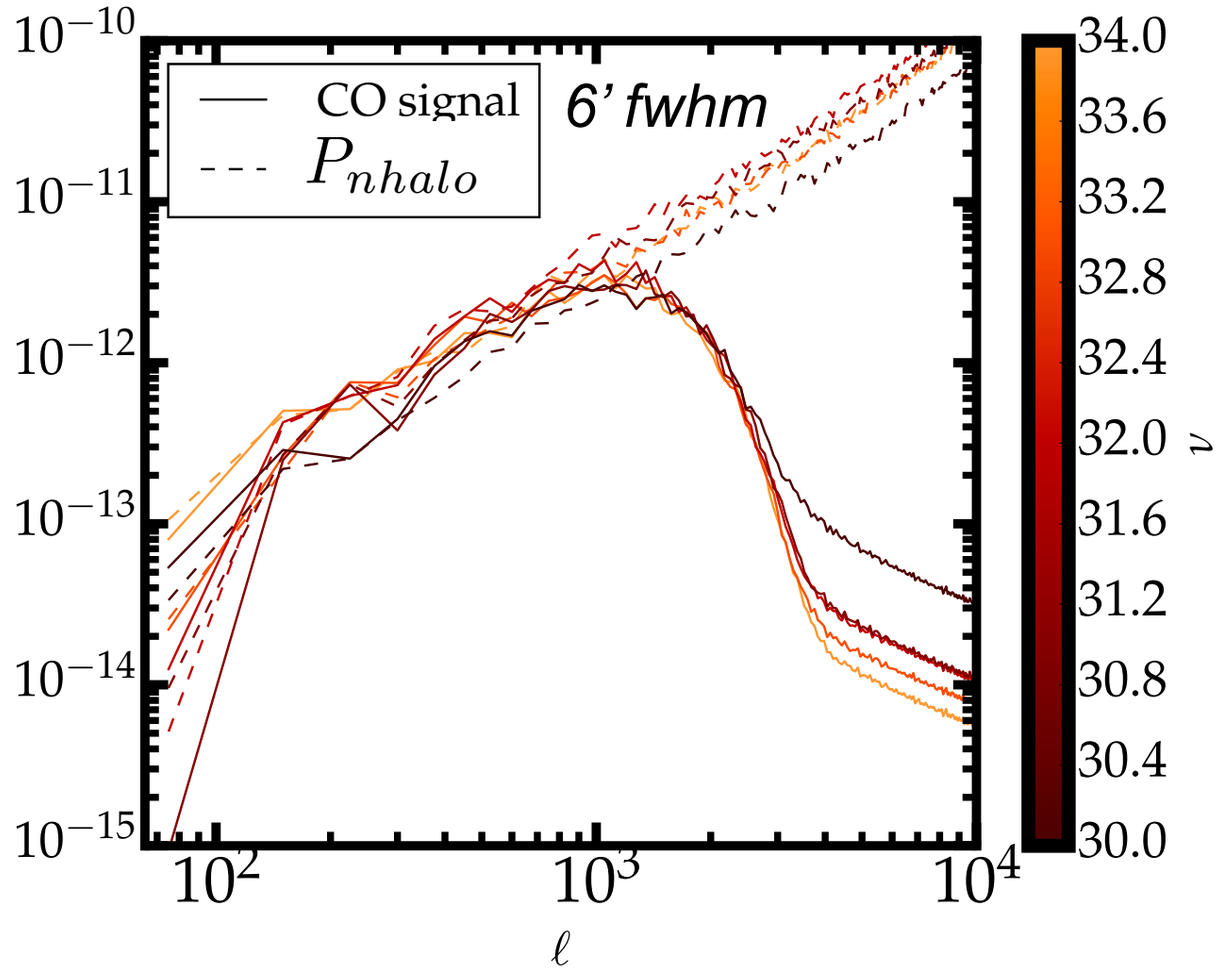


First Step: Tomographic Power Spectra

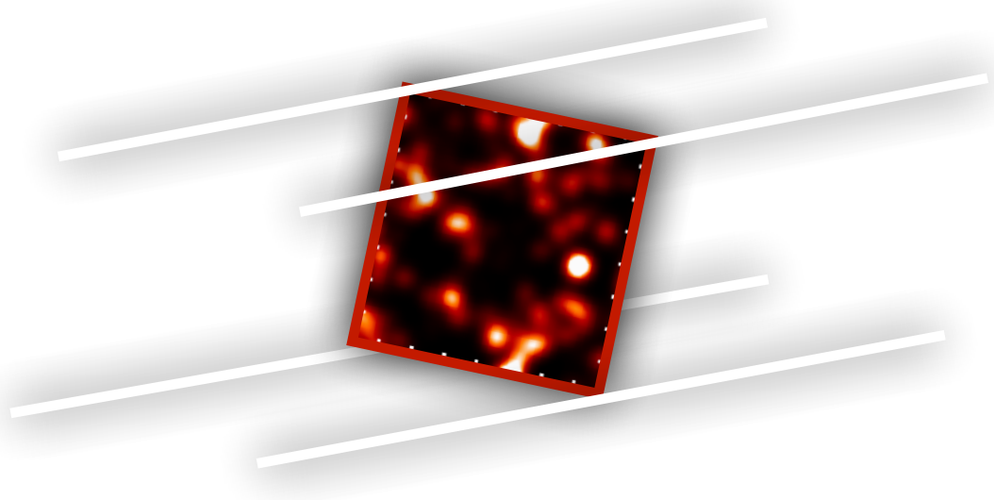


7.8MHz bandwidth, 23 deg^2 fov

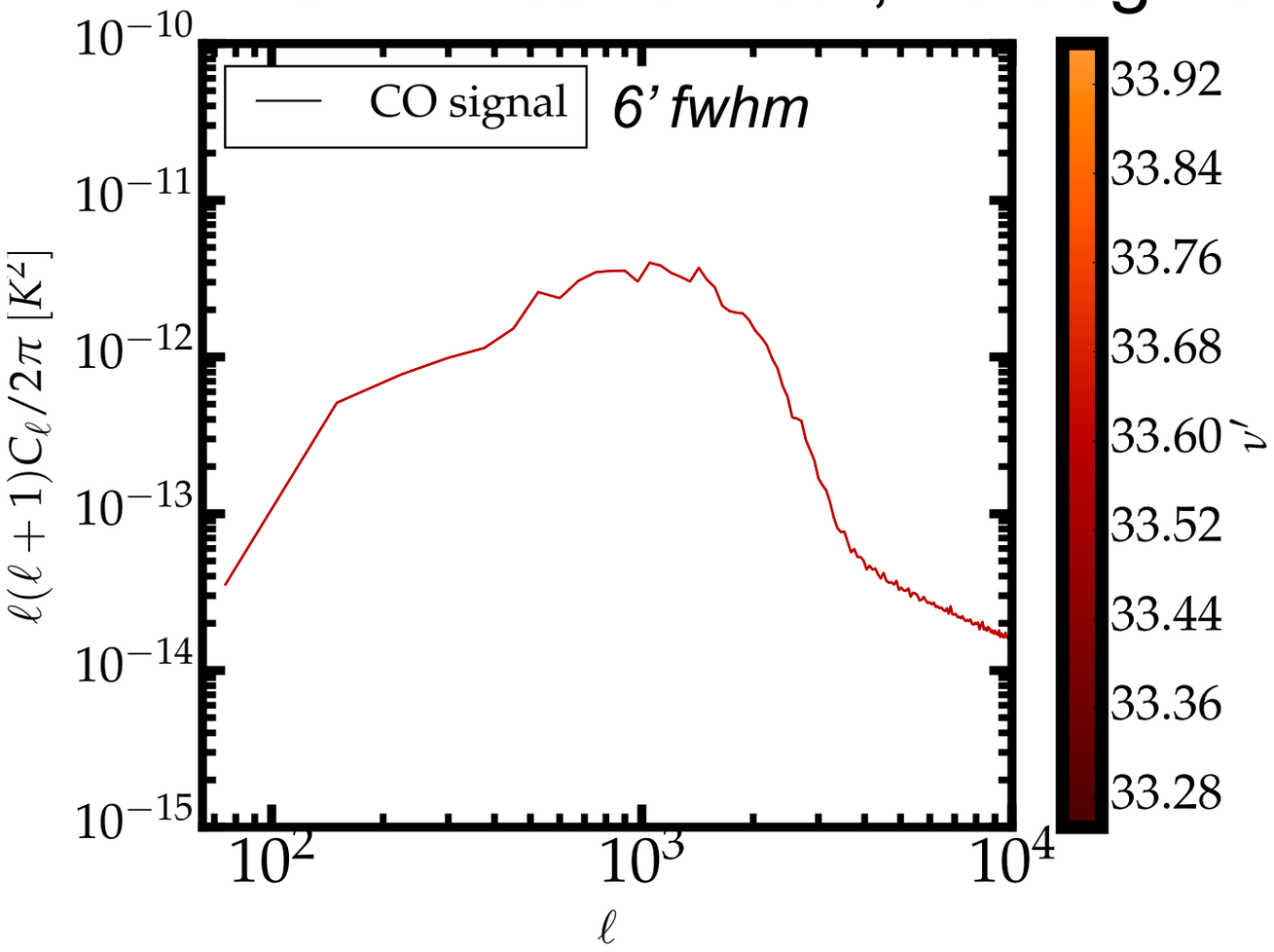


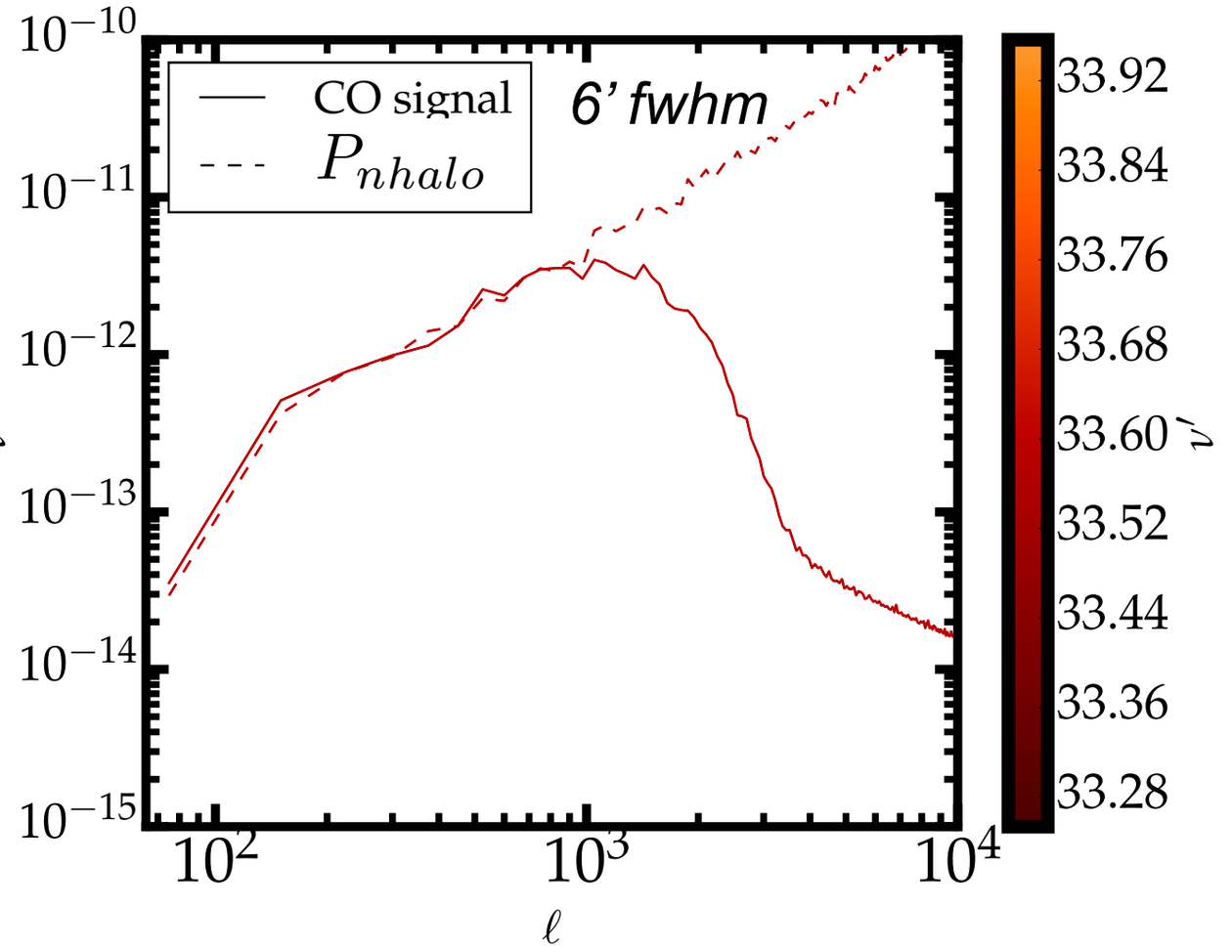


Cross Correlation Between 33.5GHz and Nearby Slices

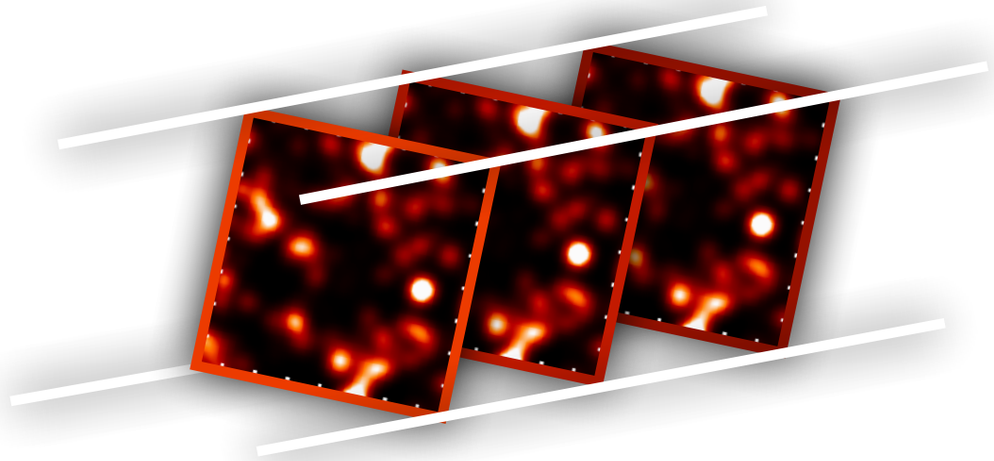


7.8MHz bandwidth, 23 deg^2 fov

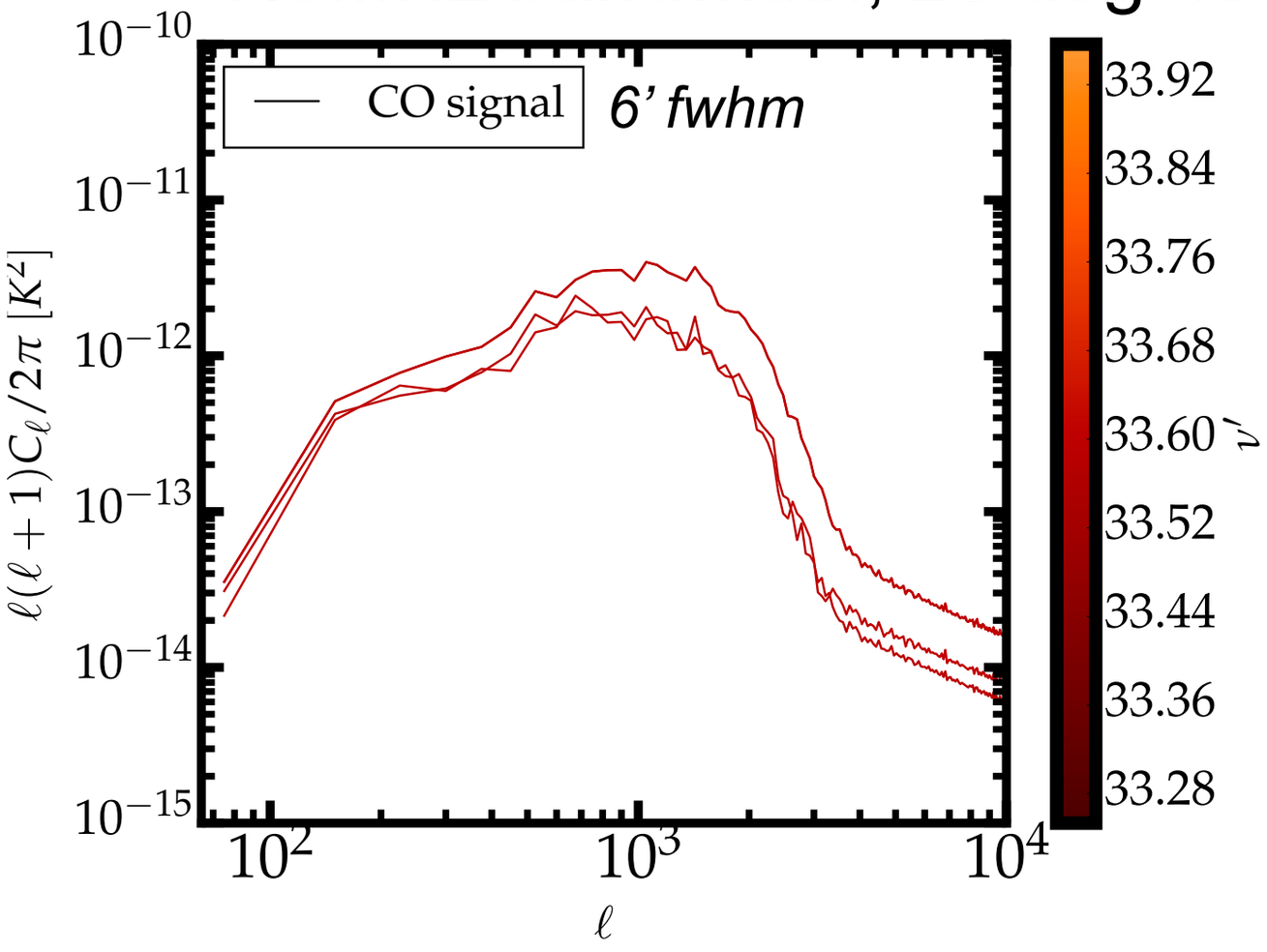


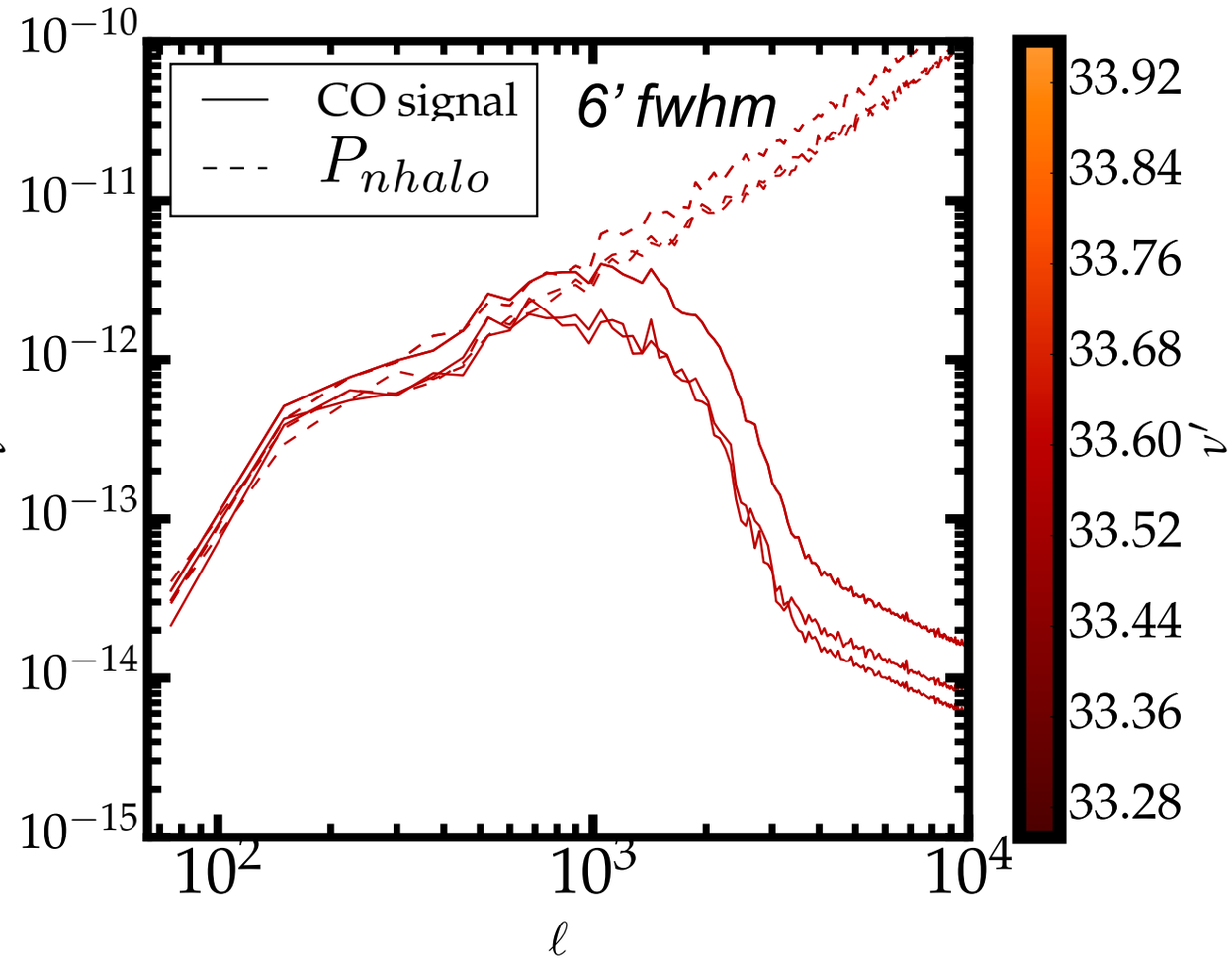


Cross Correlation Between 33.5GHz and Nearby Slices

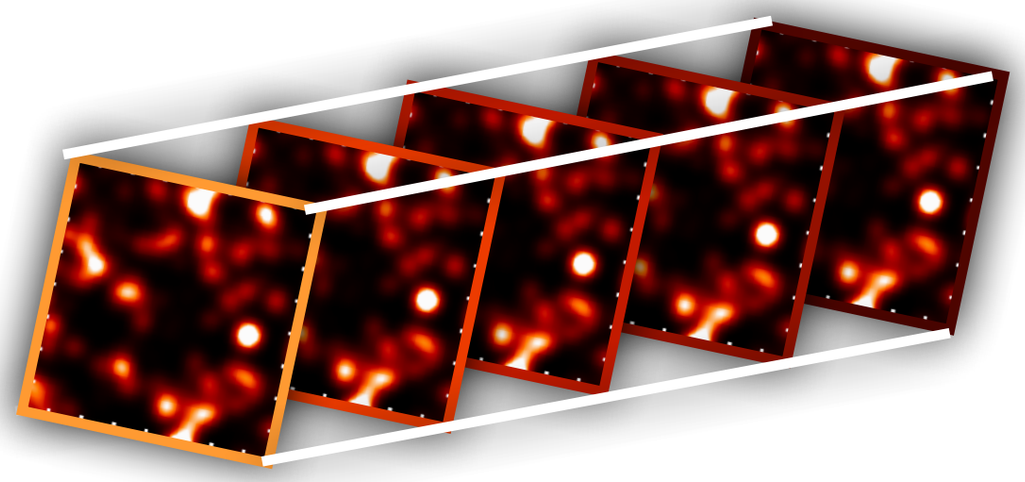


7.8MHz bandwidth, 23 deg^2 fov

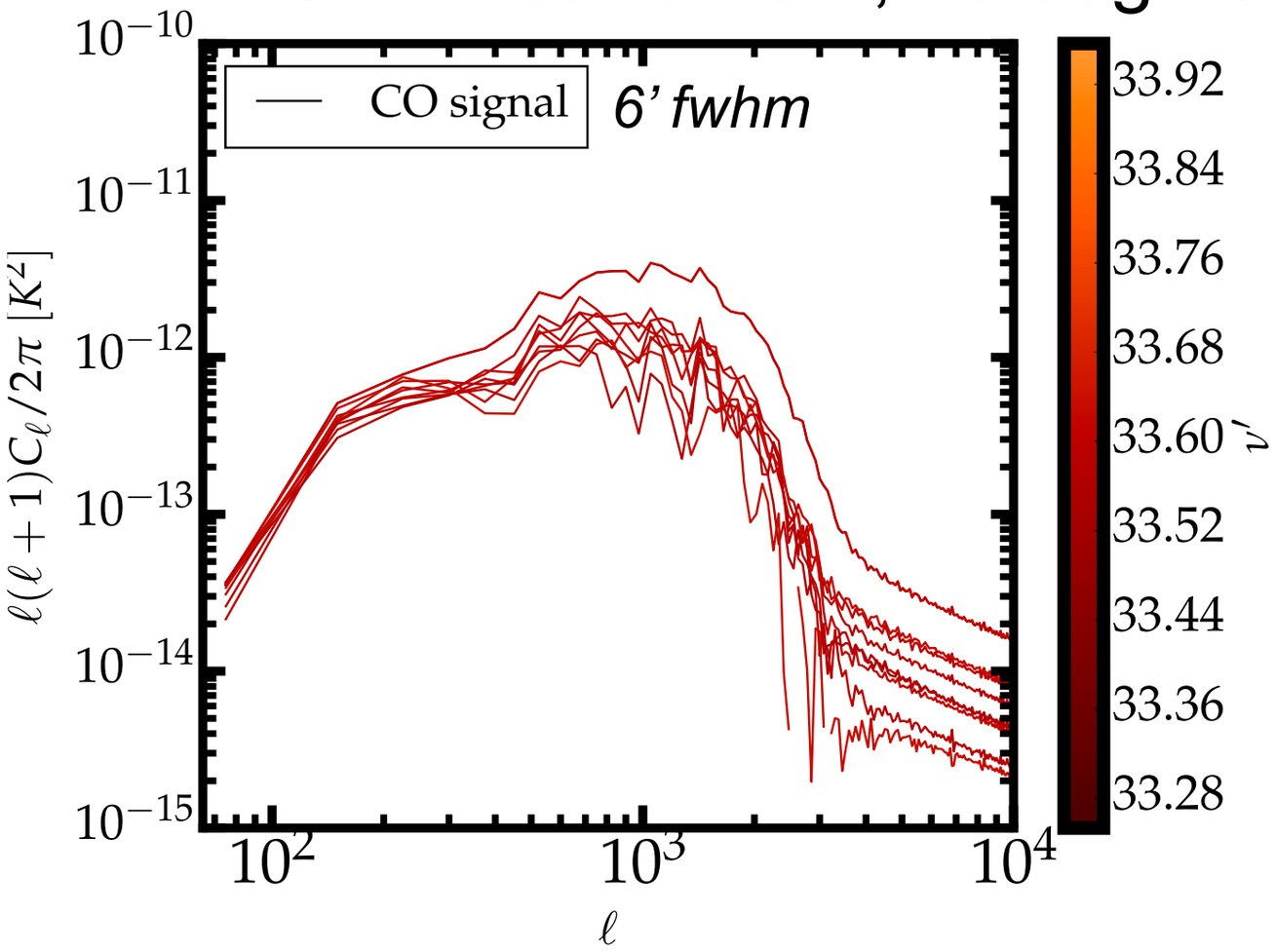


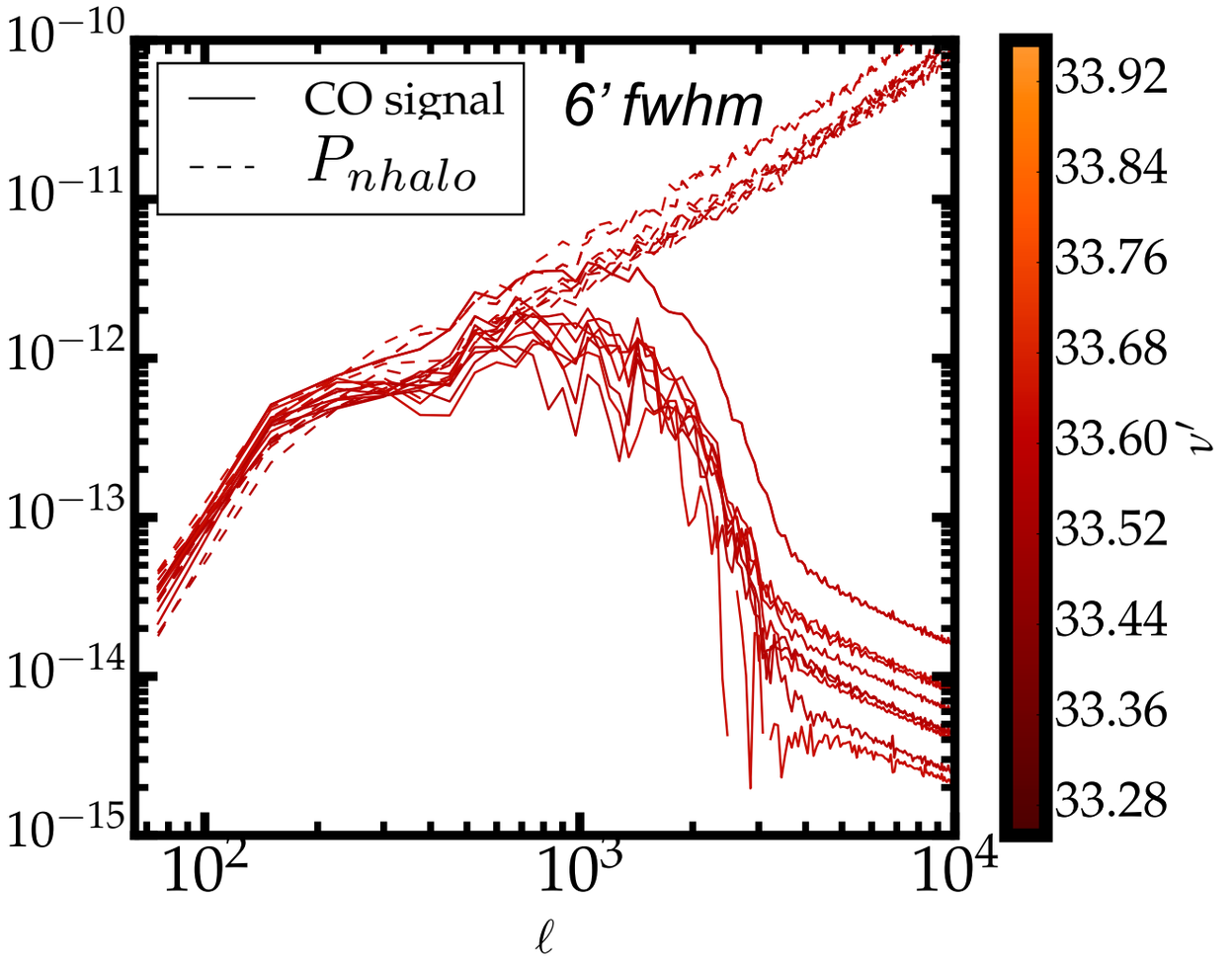


Cross Correlation Between 33.5GHz and Nearby Slices

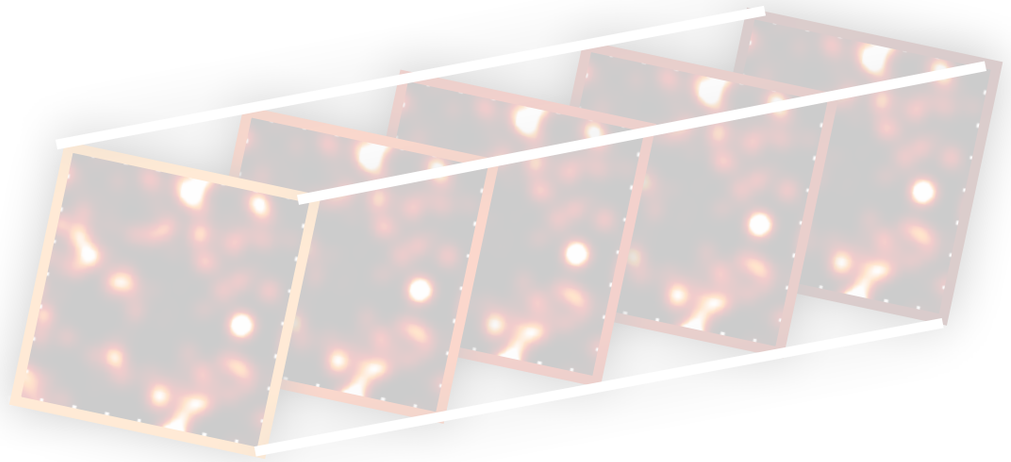


7.8MHz bandwidth, 23 deg^2 fov

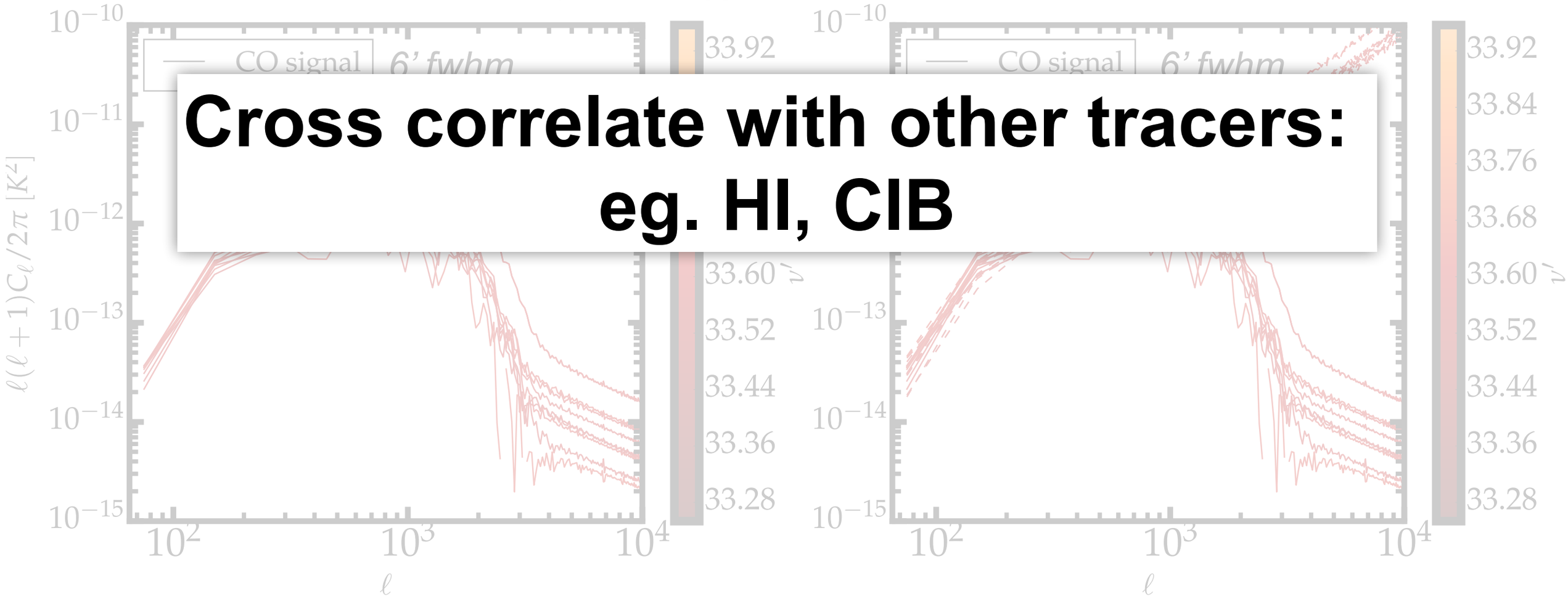




Cross Correlation Between 33.5GHz and Nearby Slices

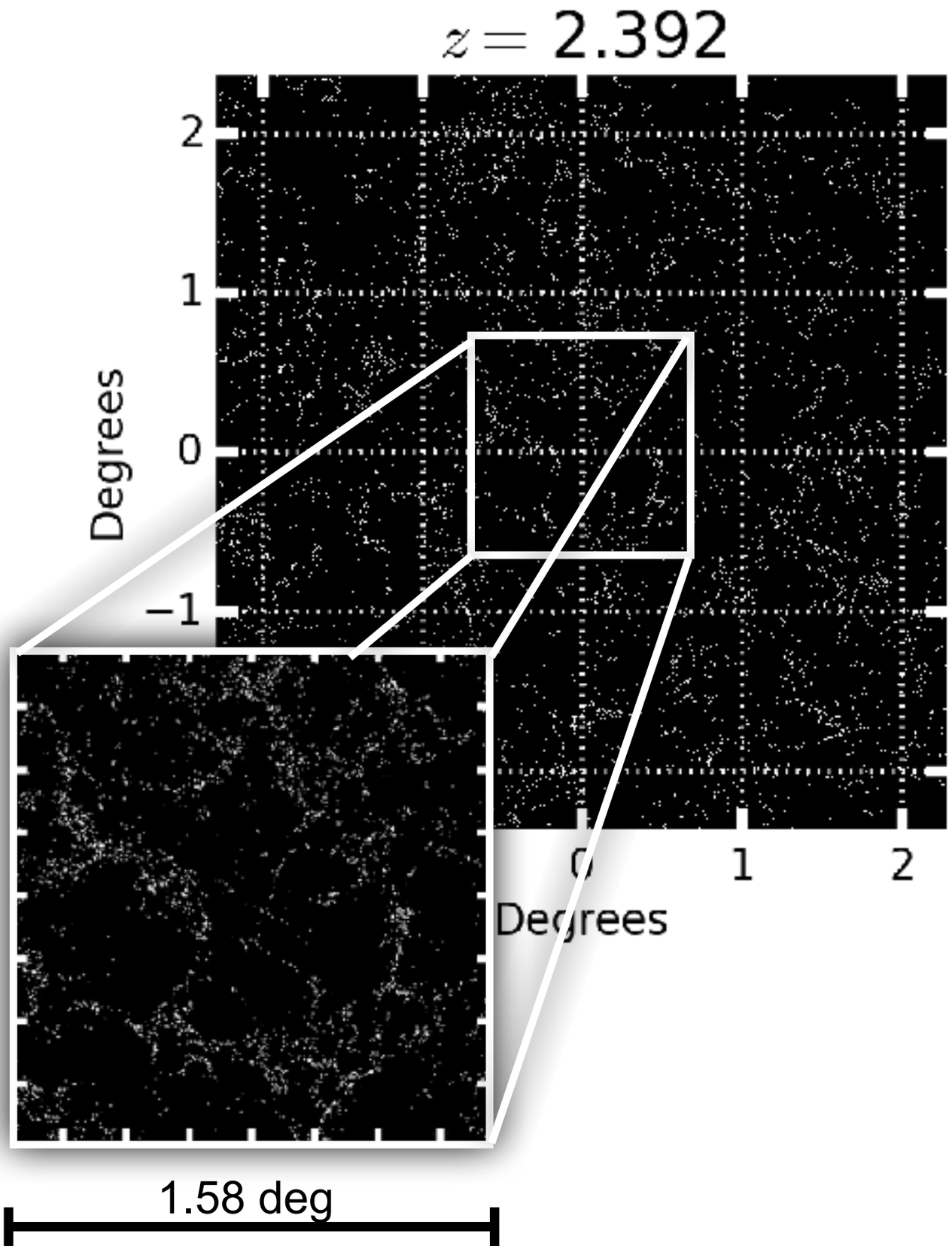


7.8MHz bandwidth, 23 deg^2 fov



Cross correlate with other tracers: eg. HI, CIB

Halos



HI Model

- Villaescusa-Navarro et al. 2014

1. $M_{HI}(M_{Halo})$

$$M_{HI} = f \frac{M_{Halo}}{1 + \frac{M_{Halo}}{M_{Max}}}$$
$$if \quad M_{Halo} > M_{Min}$$

2. $L_{HI}(M_{HI})$

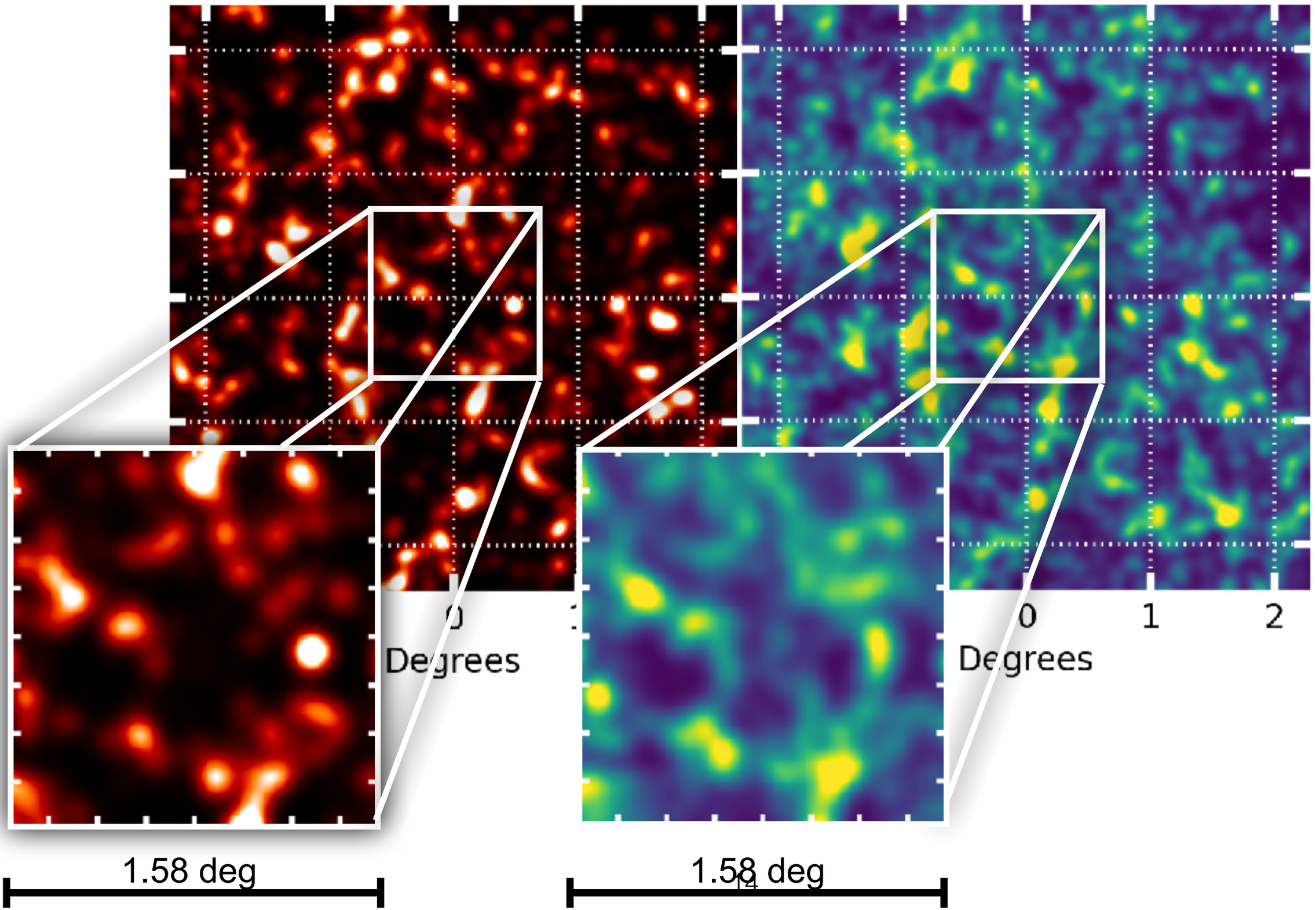
$$L_{HI} = \frac{3A_{10}h\nu_0}{4m_p} M_{HI}$$

Halos

$\nu = 33.980$ GHz

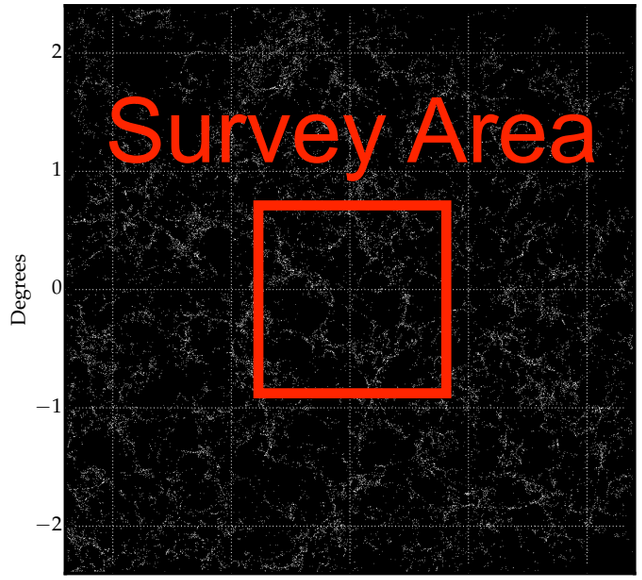
HI,
COMAP beam

$\nu = 0.419$ GHz



Halos

40 MHz slicing

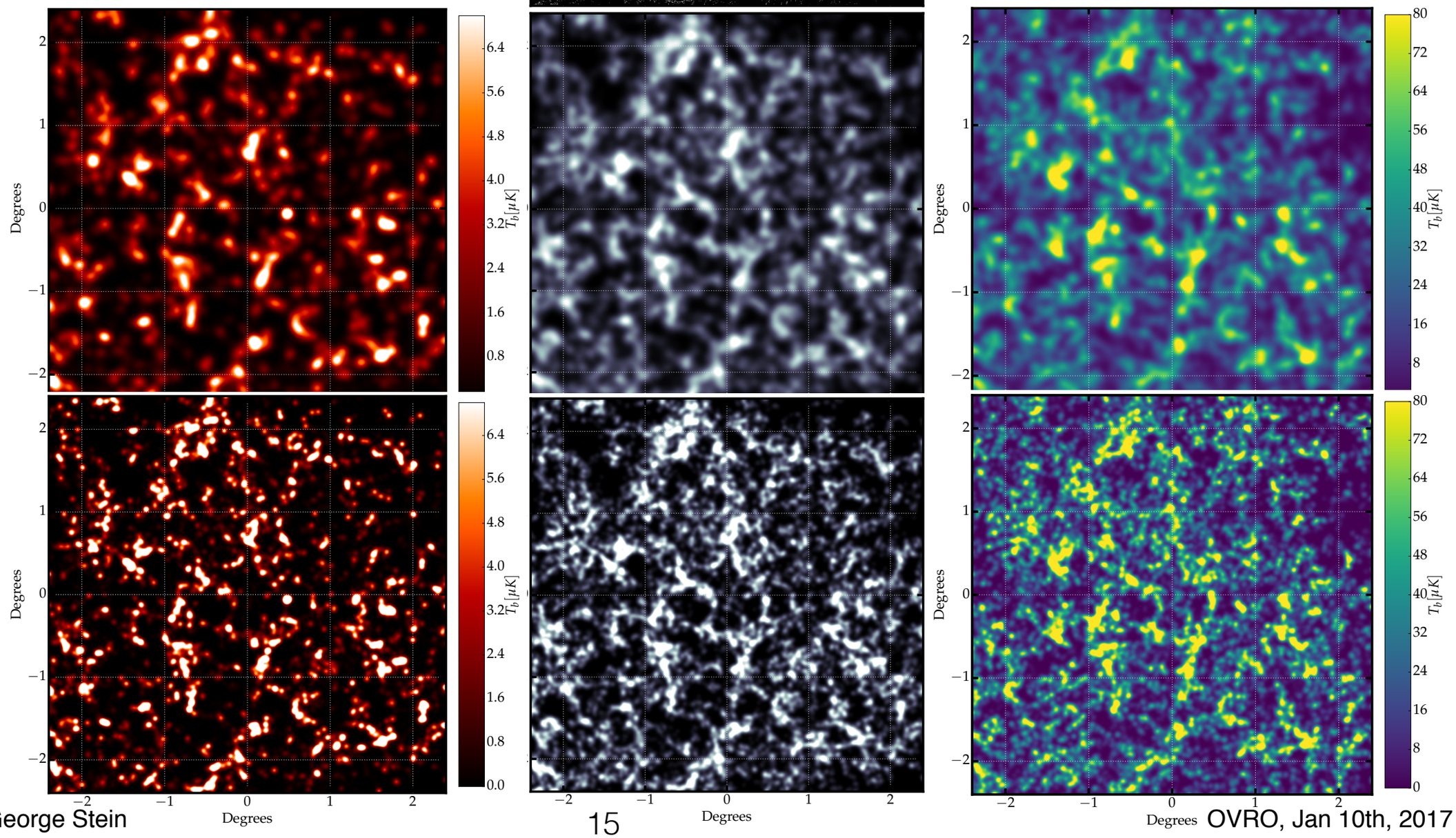


CO

HI

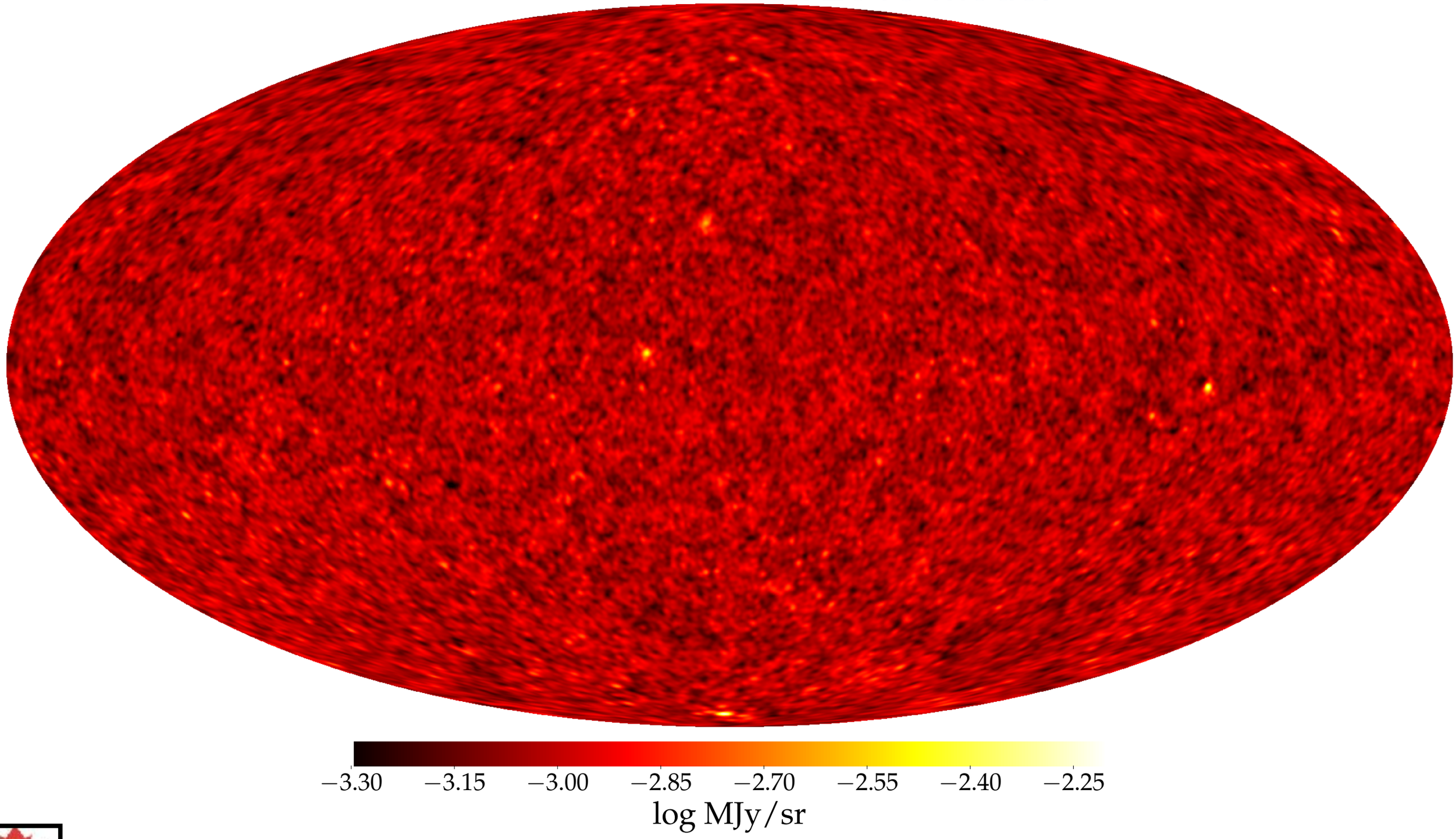
6’ Beam

3’ Beam



CIB = Integrated Line Intensity Map

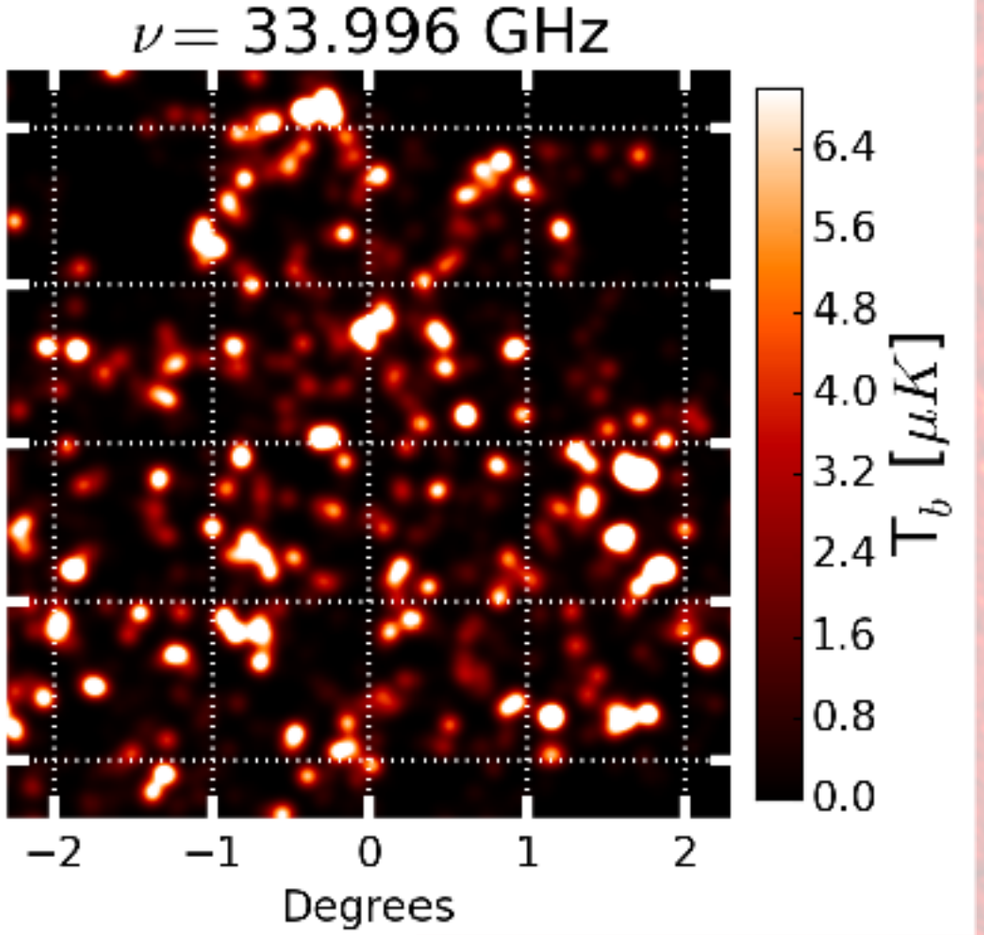
- Planck 2015 model targeting tSZ x CIB
- Planck 2013 model



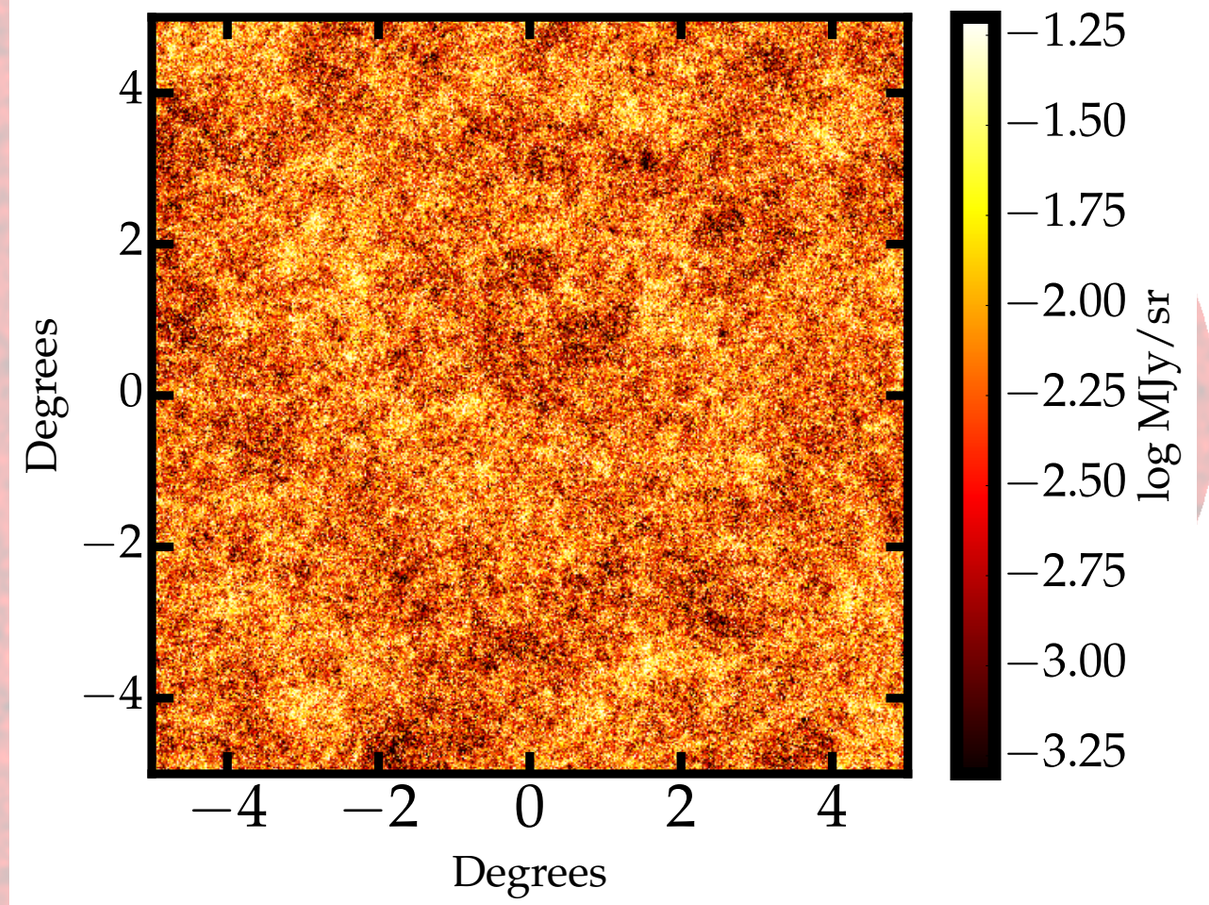
CIB = Integrated Line Intensity Map

- Planck 2015 model targeting tSZ x CIB
- Planck 2013 model

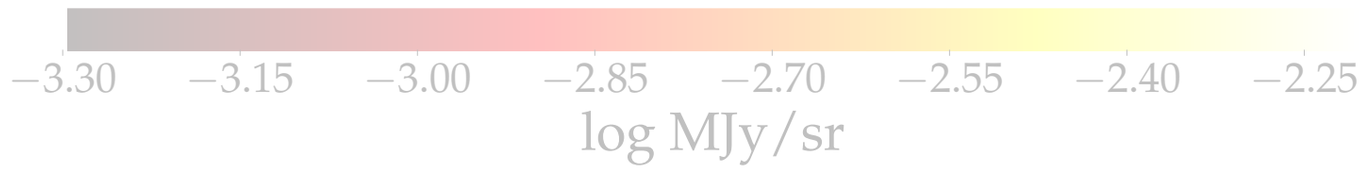
CO



CIB: z = 2.4-2.8



Planck 2013 Model

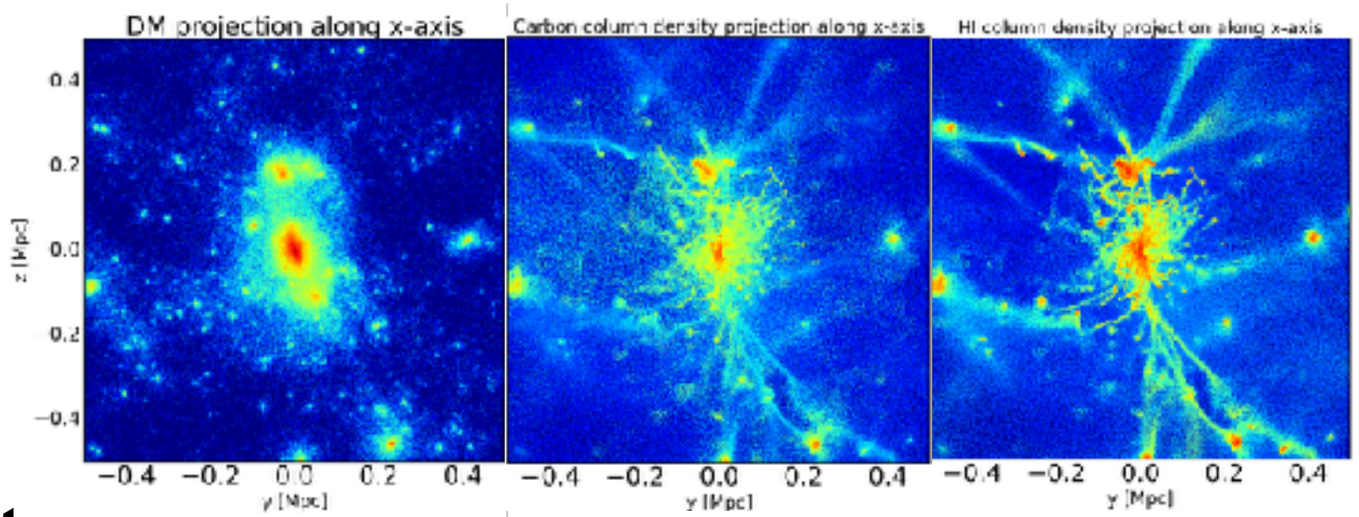


Summary:

To maximize the cosmological information extracted from COMAP we must fully understand:

- **Intrinsic Scatter**
  - eg. SFR(Mass), LCO(SFR) - Li et al. 2016
  - **Hydro Sims** - Bond, Stein, Alvarez, Lakhlani

z = 2.5



0.6 arcmin

- **Cosmic Scatter**
  - COMAP fov highly subject to cosmic variance
  - **Monte Carlo** Peak Patch Sims

- **Beyond Powerspectrum**
  - Cross correlations, Stacking, …