GBT 21 cm intensity mapping collaboration

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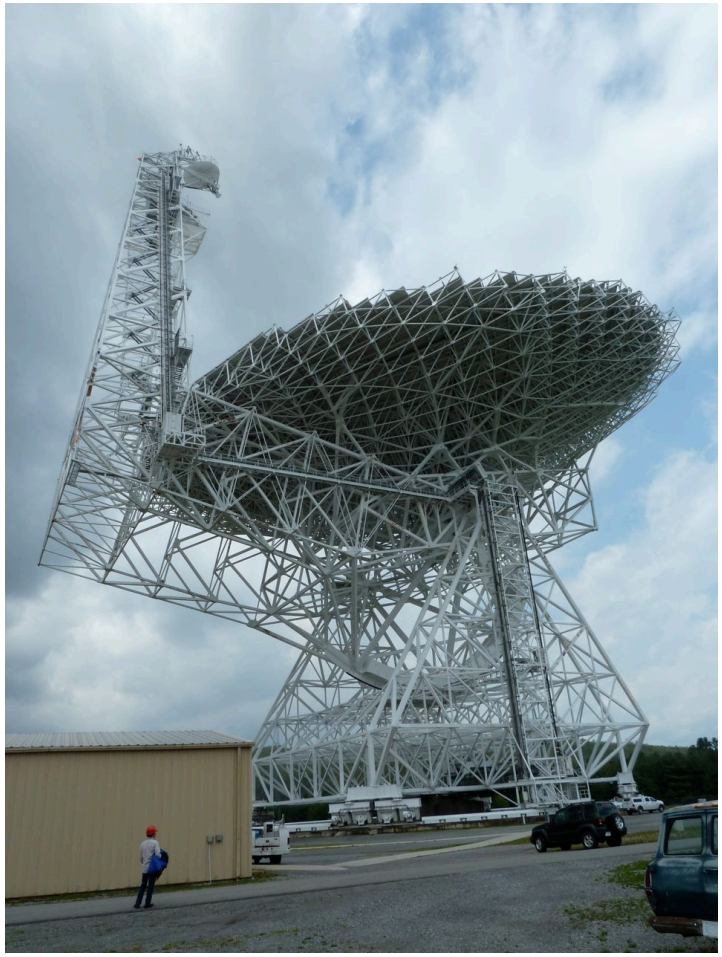
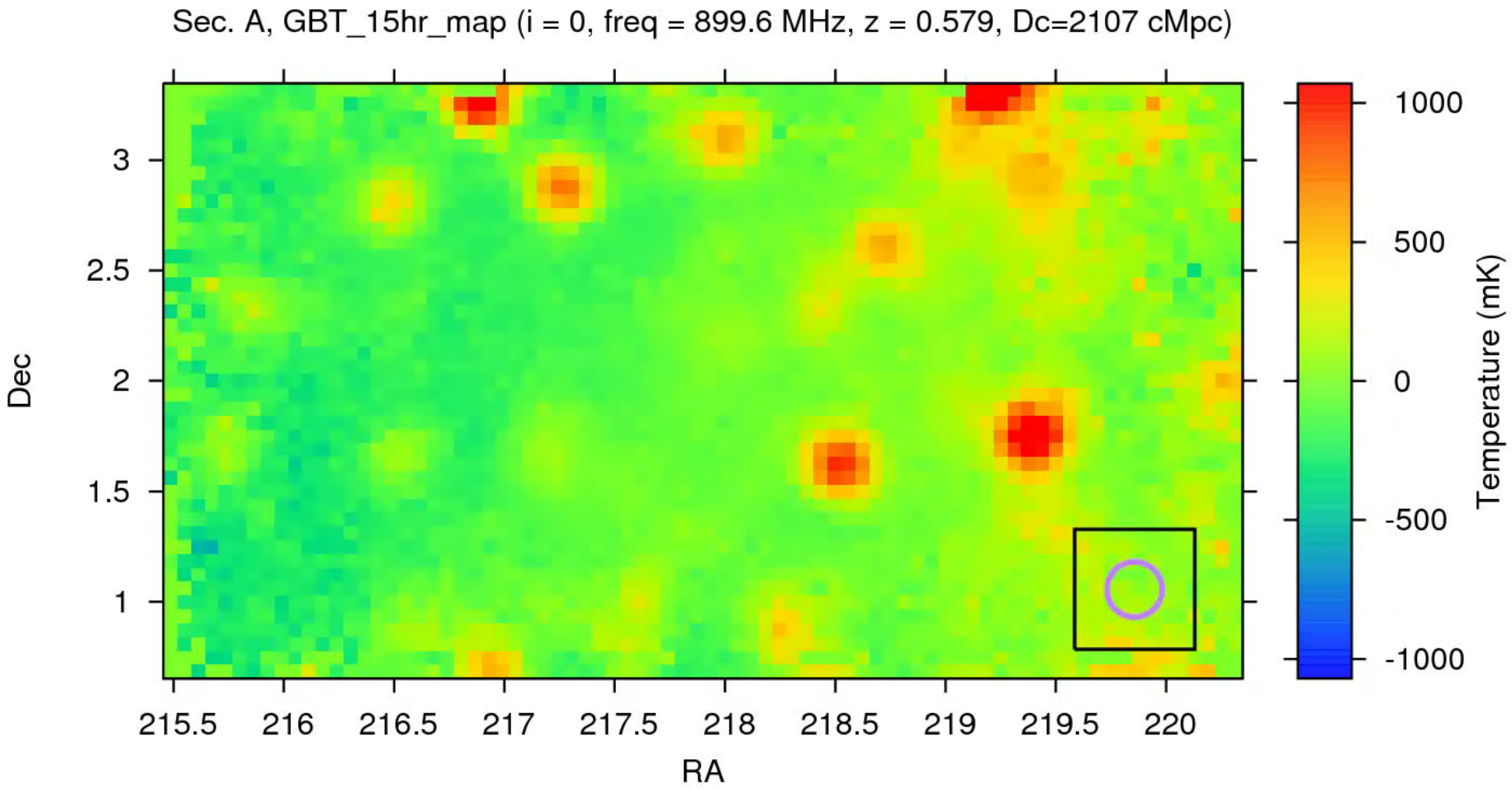


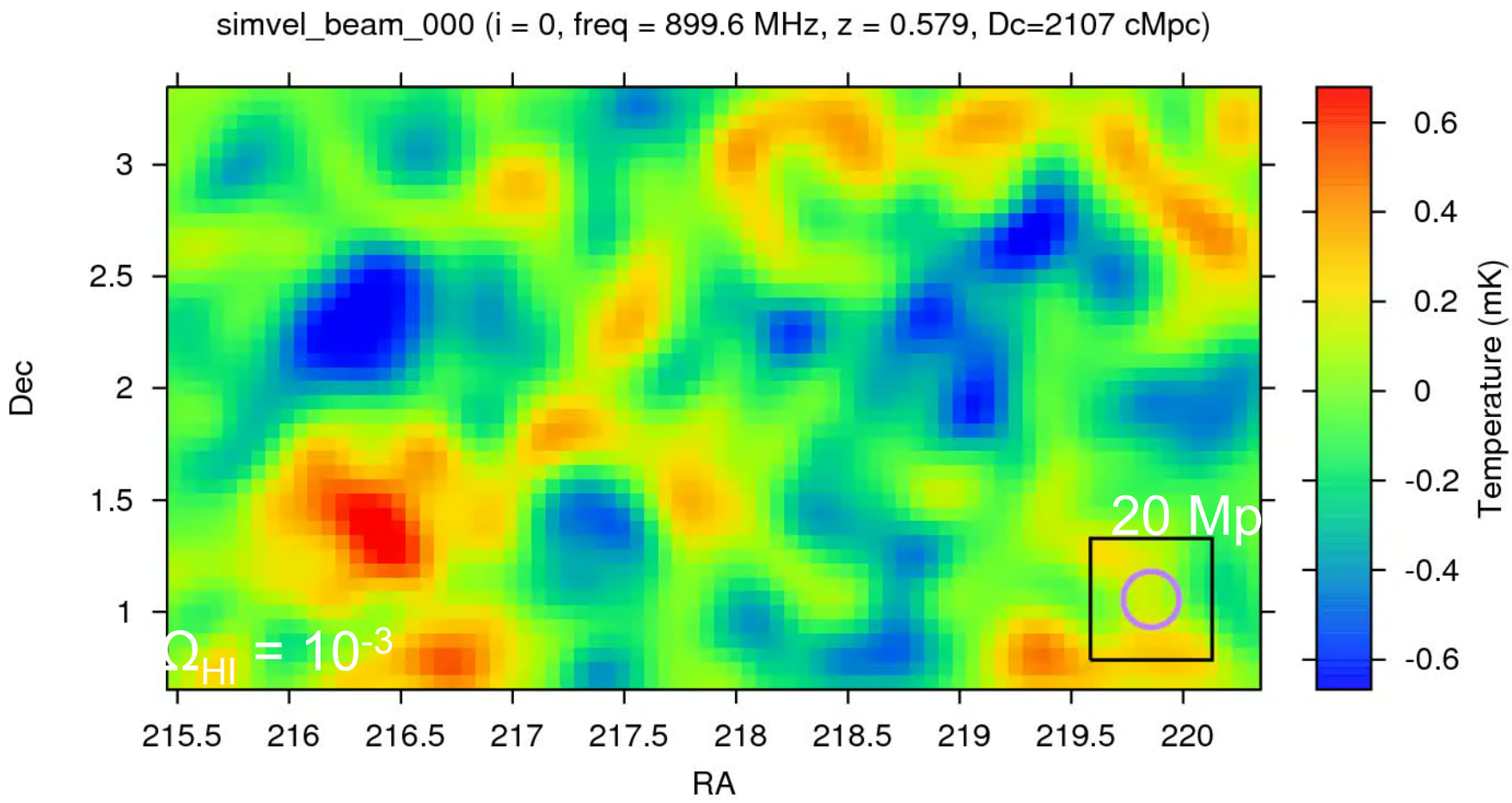
Status Update

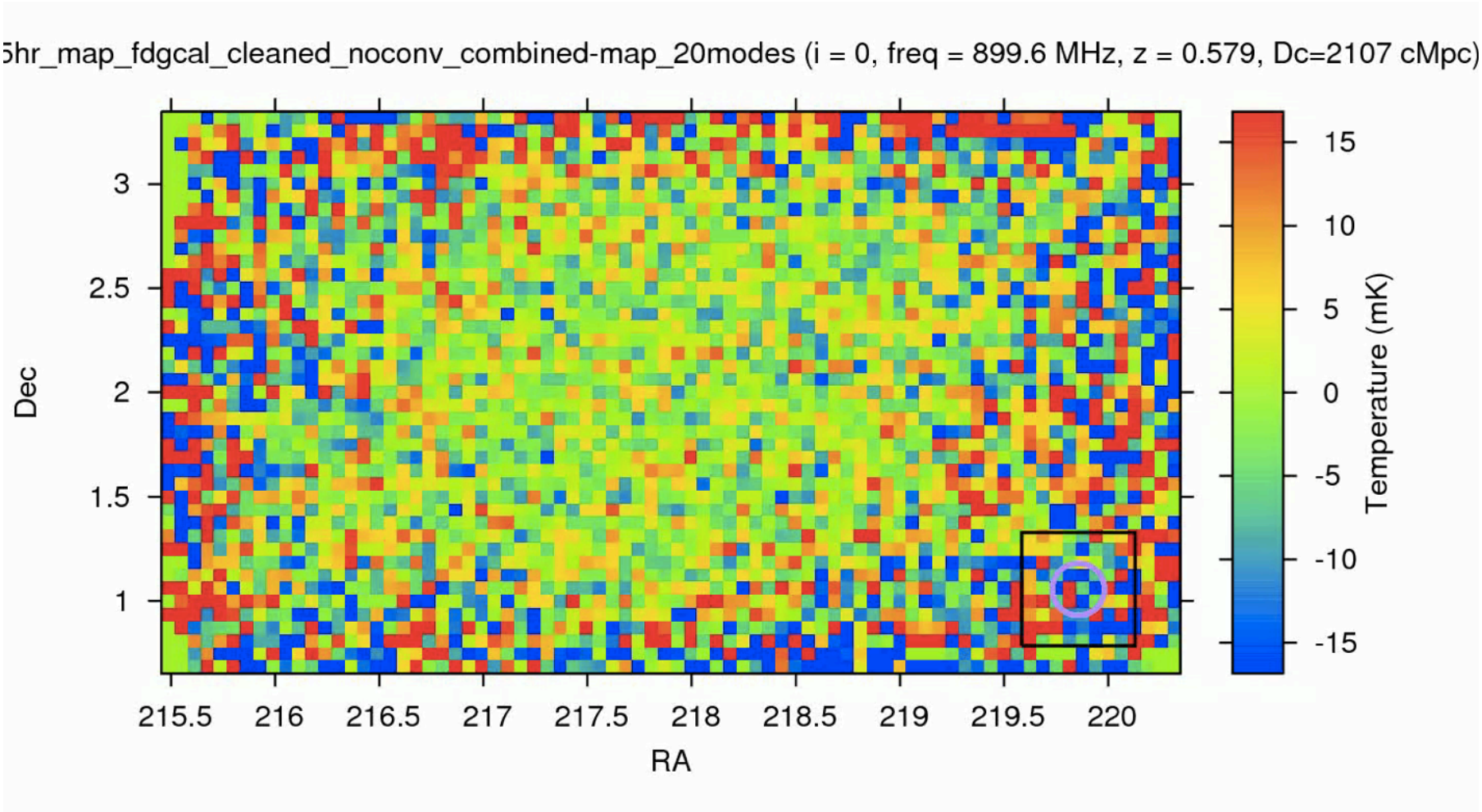
- Pilot study for larger IM experiments
- ~200 hours on sky, 100m aperture, 25K T_{sys}, ~100 square degrees
- Polarized foreground challenges: 10% off axis leakage (c.f. squint): > mK leakages. Requires polarized mapping and leakage removal
- Thermal noise dominated maps
- New 9 pixel cryogenic receiver array under construction at ASIAA
- Polarization beam mapping/calibration with pulsars
- Proposal submitted for 1<z<1.8 IM.

The real data



Signal-only simulations




5hr_map_fdgcal_cleaned_noconv_combined-map_20modes (i = 0, freq = 899.6 MHz, z = 0.579, Dc=2107 cMpc)
Dec
3
2.5
2
1.5
1
215.5
216
216.5
217
217.5
218
218.5
219
219.5
220
RA
15
10
5
0
-5
-10
-15
Temperature (mK)

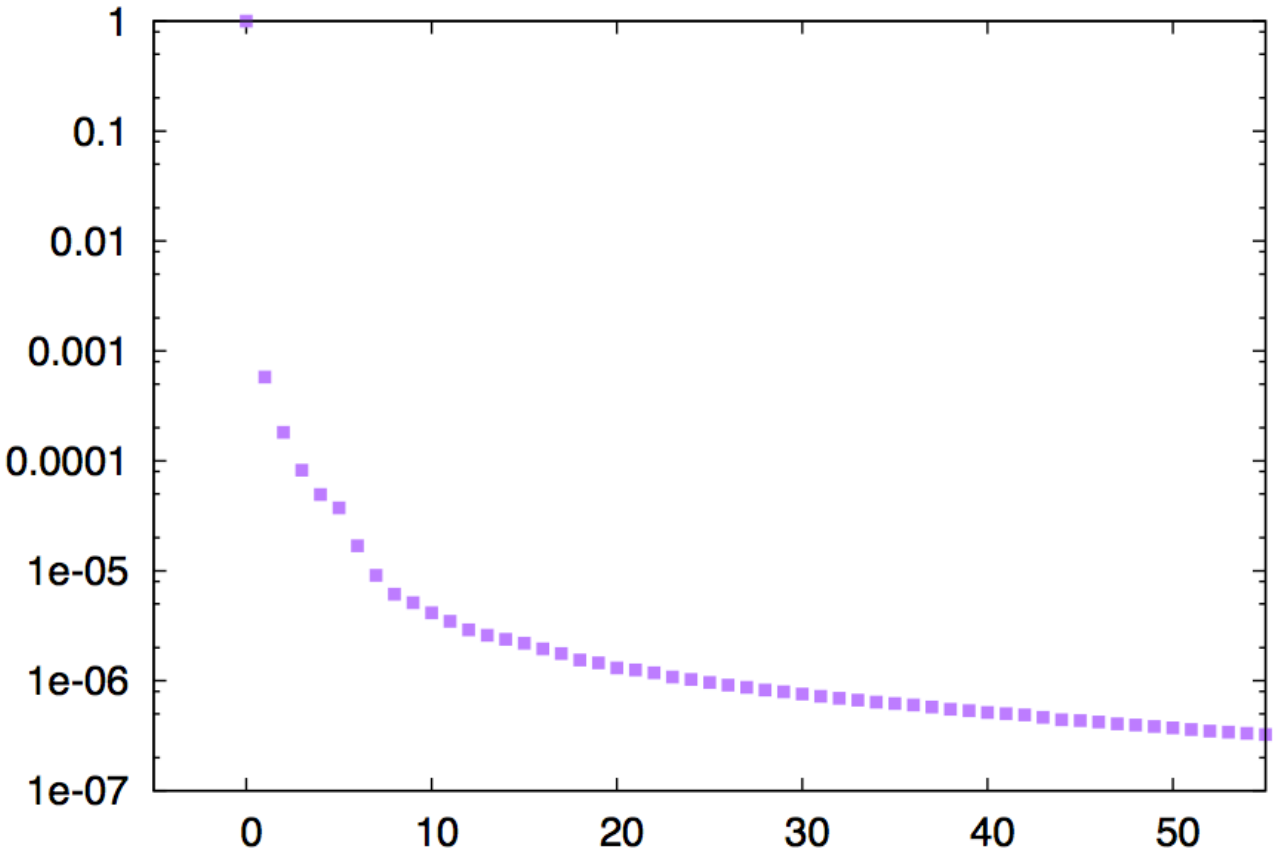
Polarization

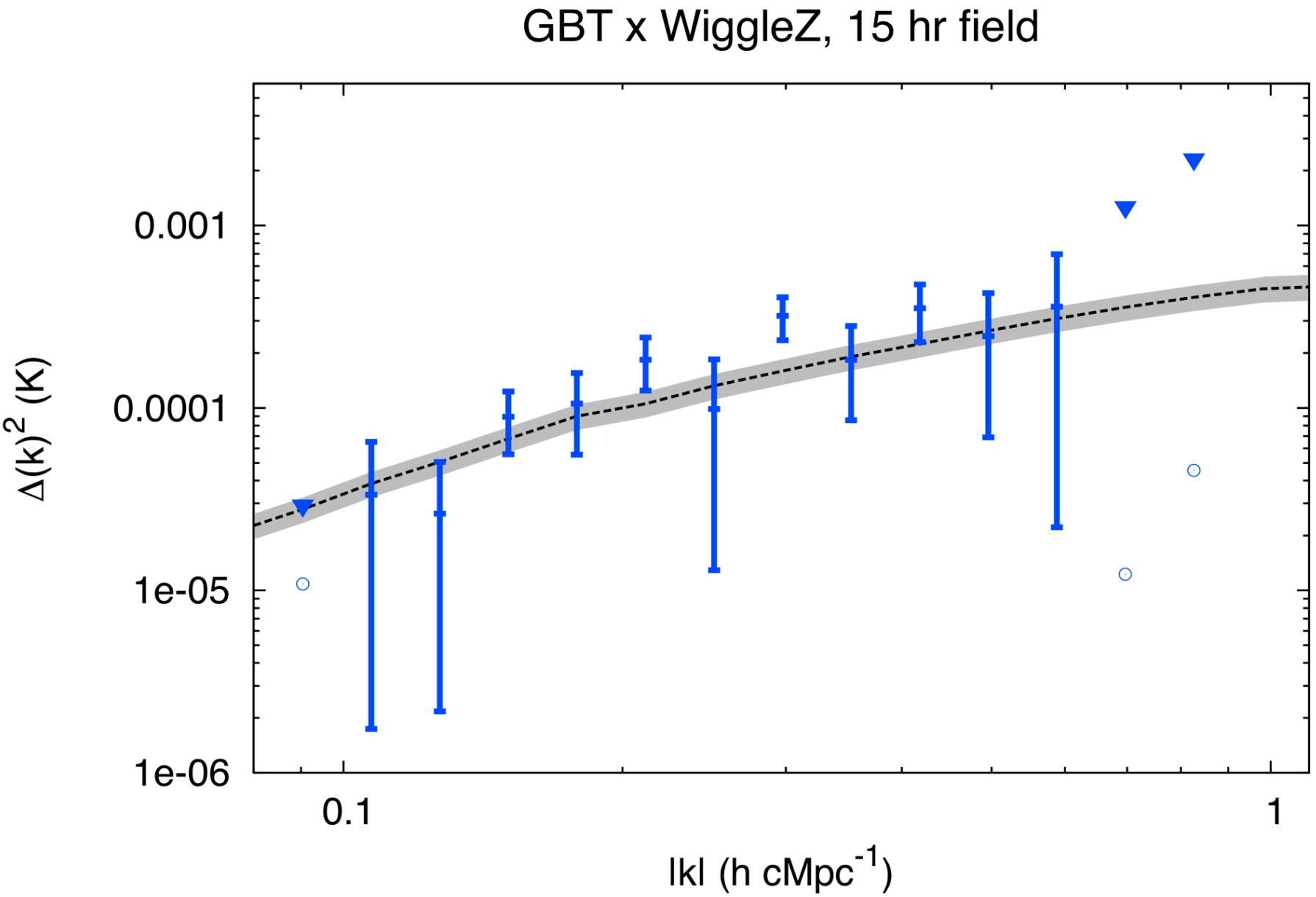
-- Frequency dependence through faraday rotation

-- joint I-Q-U-V cleaning required

-- Rotation measure space movie:

SVD eigenvalues





0.6<z<1, Masui et al, 1208.0331, GBT-IM collaboration.

$$\Omega_{\rm HI} b_{\rm HI} r = [0.43 \pm 0.07({\rm stat.}) \pm 0.04({\rm sys.})] \times 10^{-3}$$

Conclusions

- Initial IM results at 0.5<z<1 promising
- Primary challenge: small polarization leakage at beam edge.
- Conceptual challenges: residuals must be smaller than BAO feature (~μK).