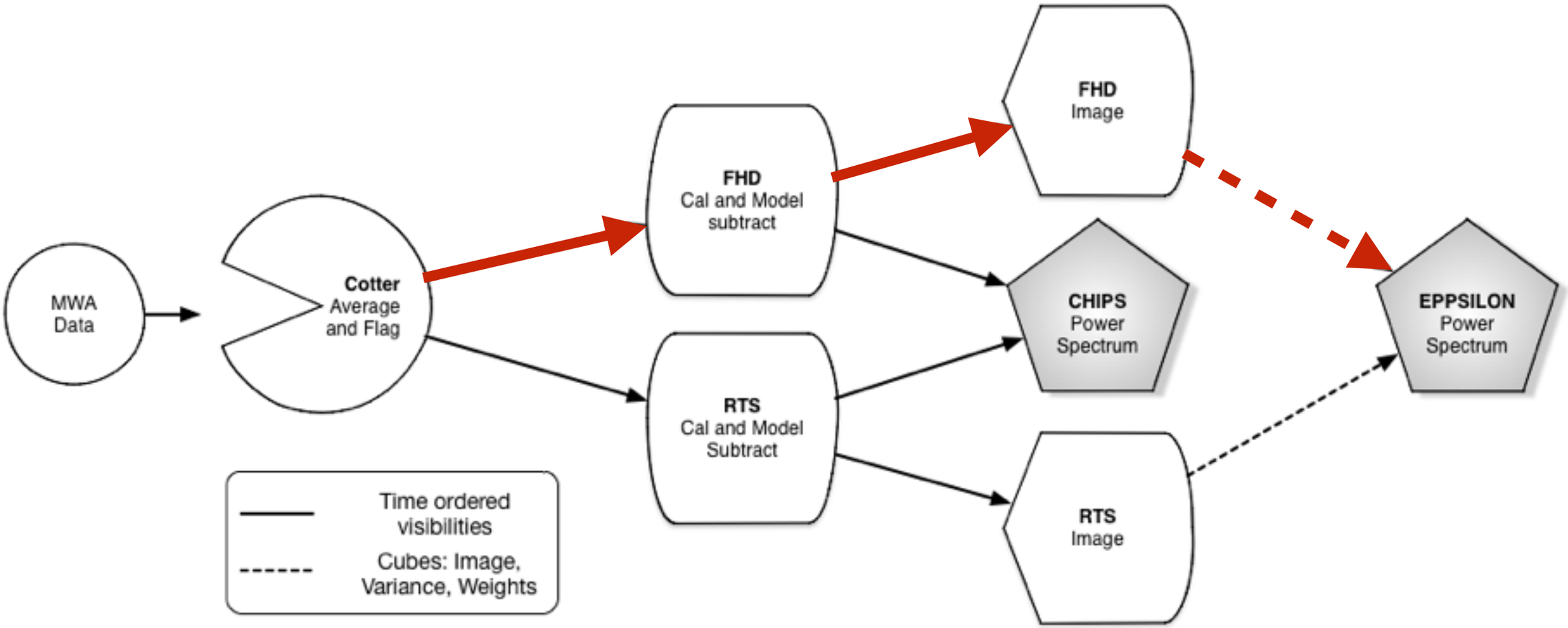
Murchison Widefield Array 21cm Year One Results

Adam Beardsley
4 December, 2015

Photo Credit: Peter Wheeler, ICRAR

MWA EoR Pipes

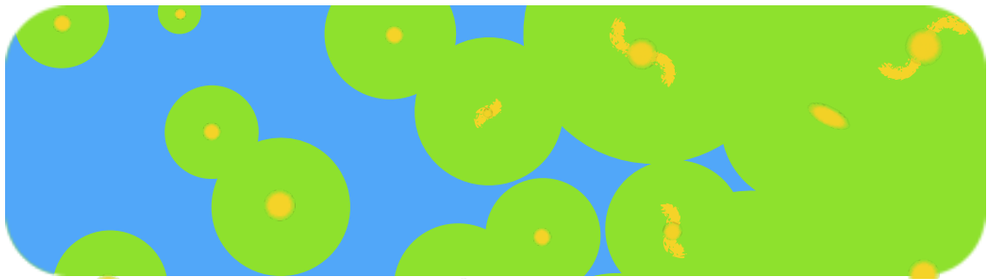
Jacobs, et al. 2015 (in prep)

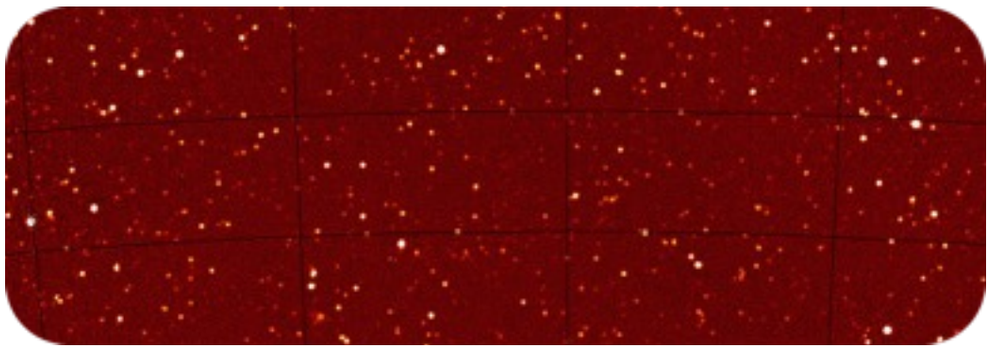


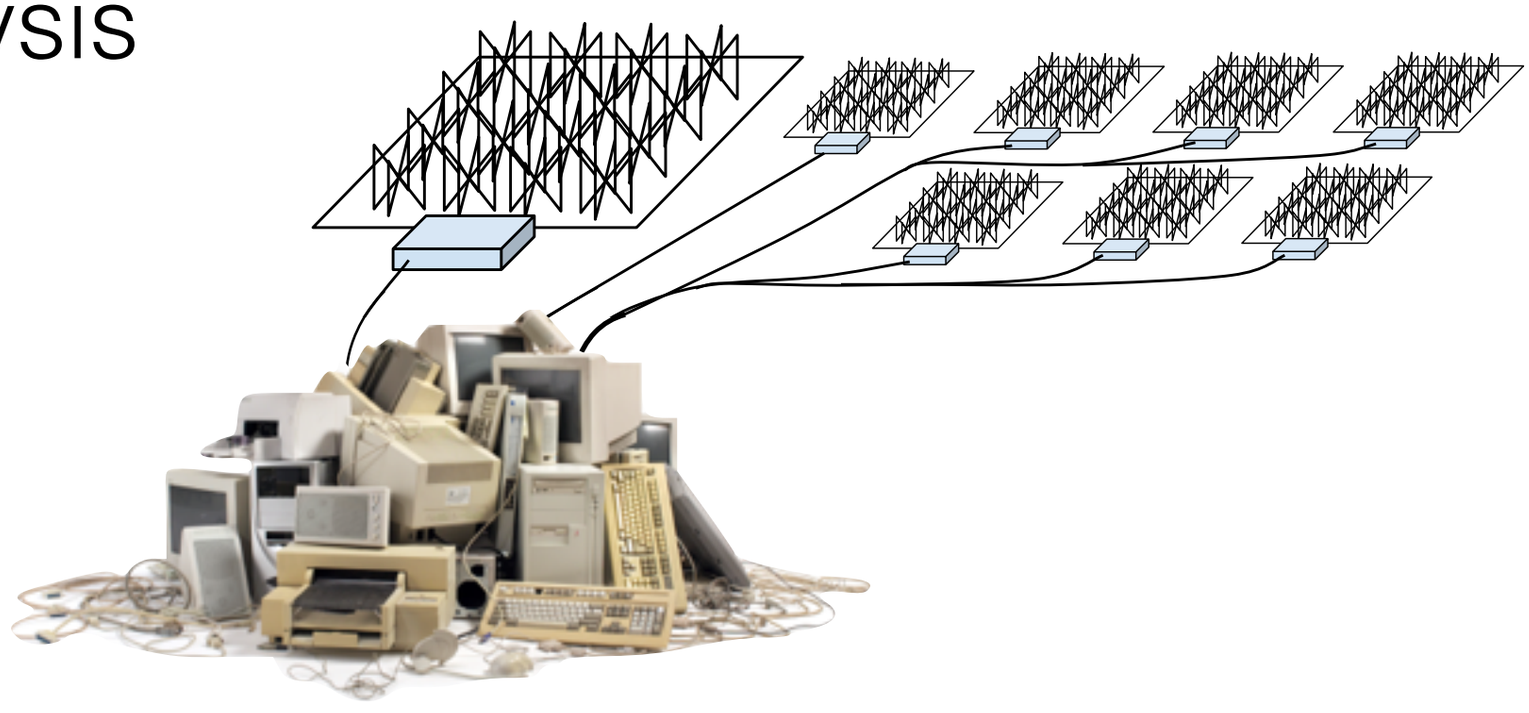
See Bart Pindor's poster for the OzPipe

Lessons learned

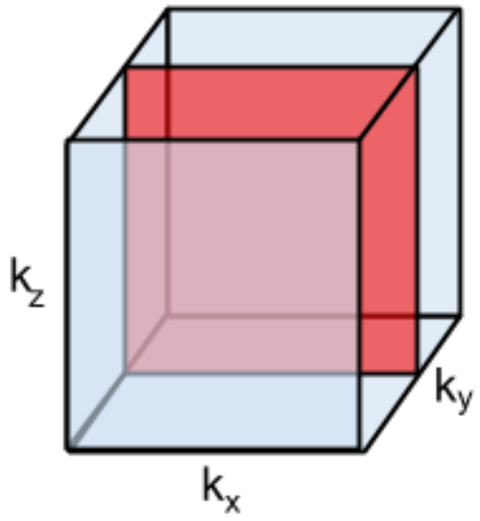
- Know thy sky
- Know thy instrument
- Know thy analysis

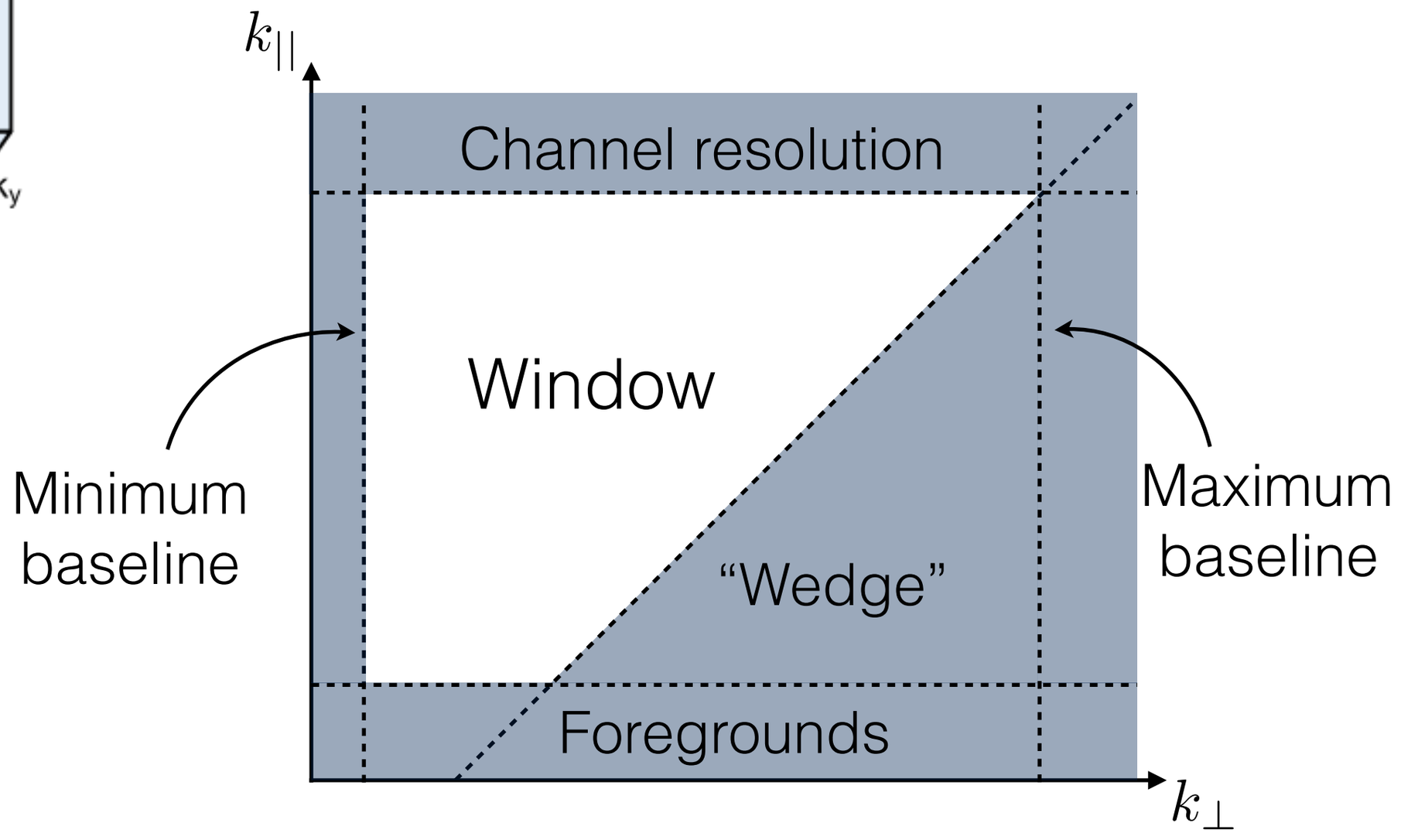






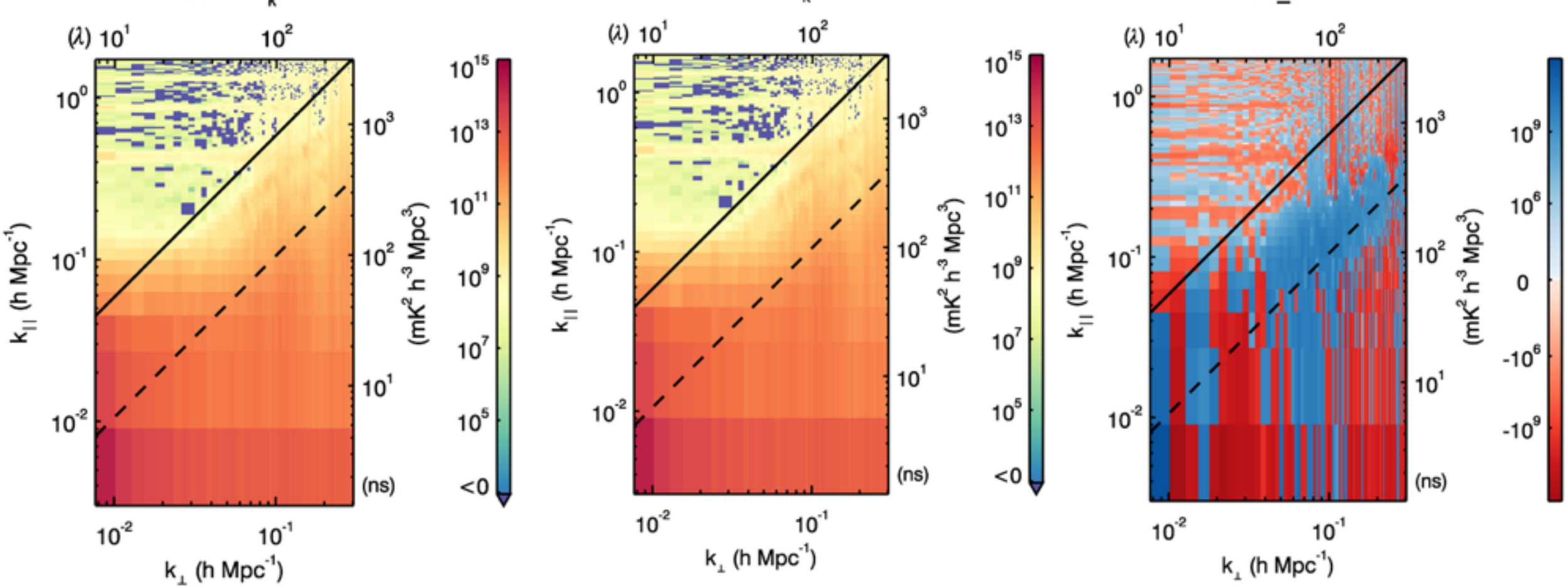
The “EoR Window”





Know thy sky: Sidelobe sources

Standard - Test = Difference

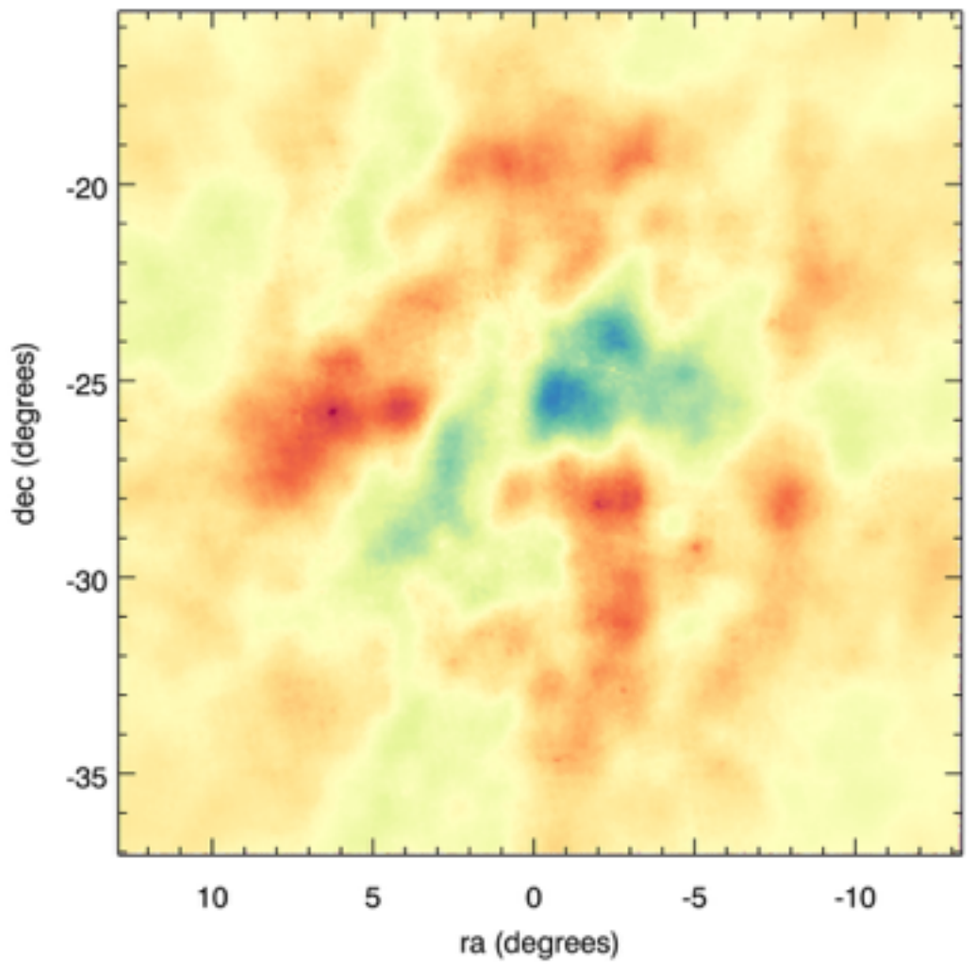


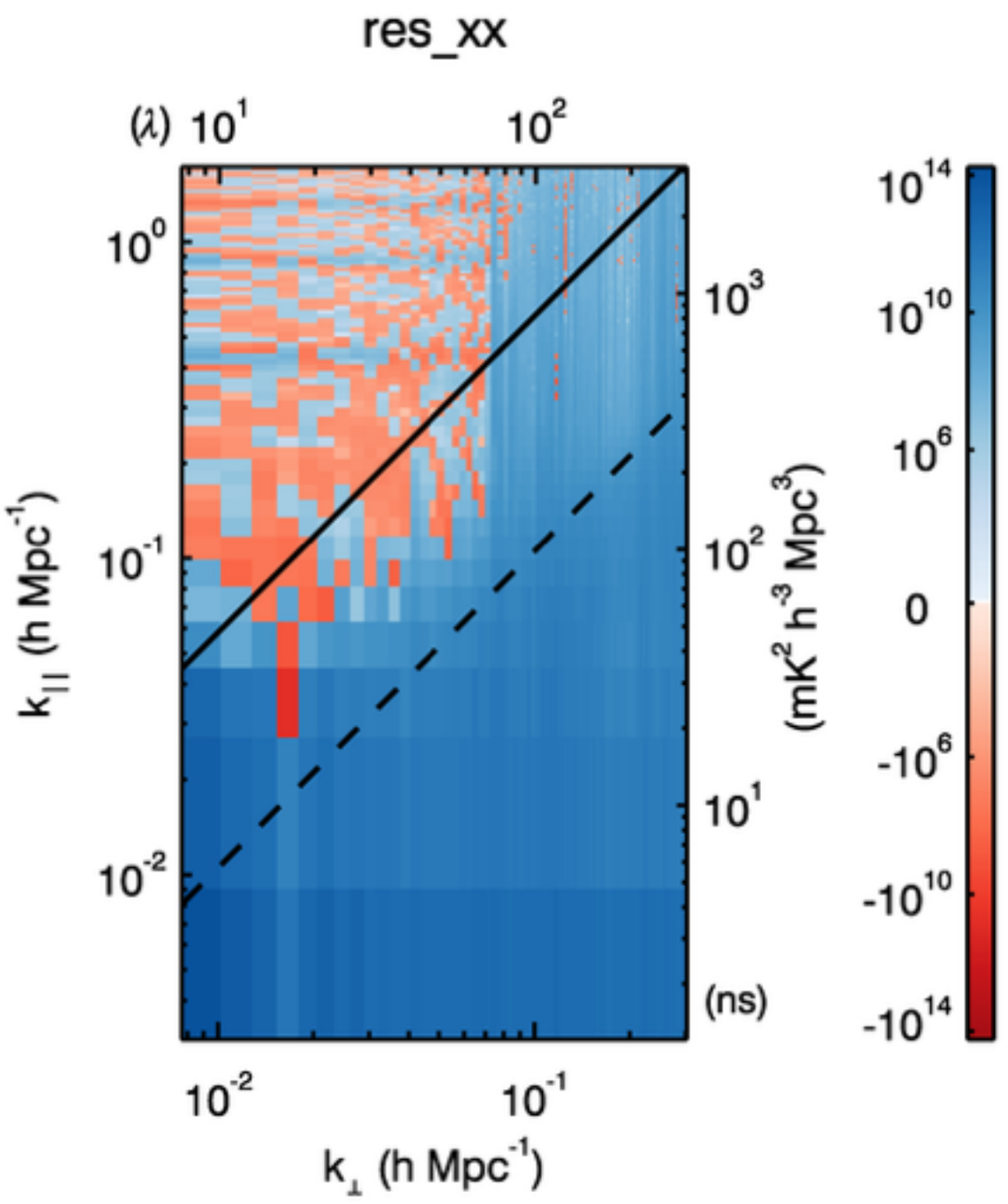
Pober, et al., 2015, submitted to ApJ

See also: Thyagarajan et al, 2015; Jack Line's talk

Know thy sky: Diffuse emission

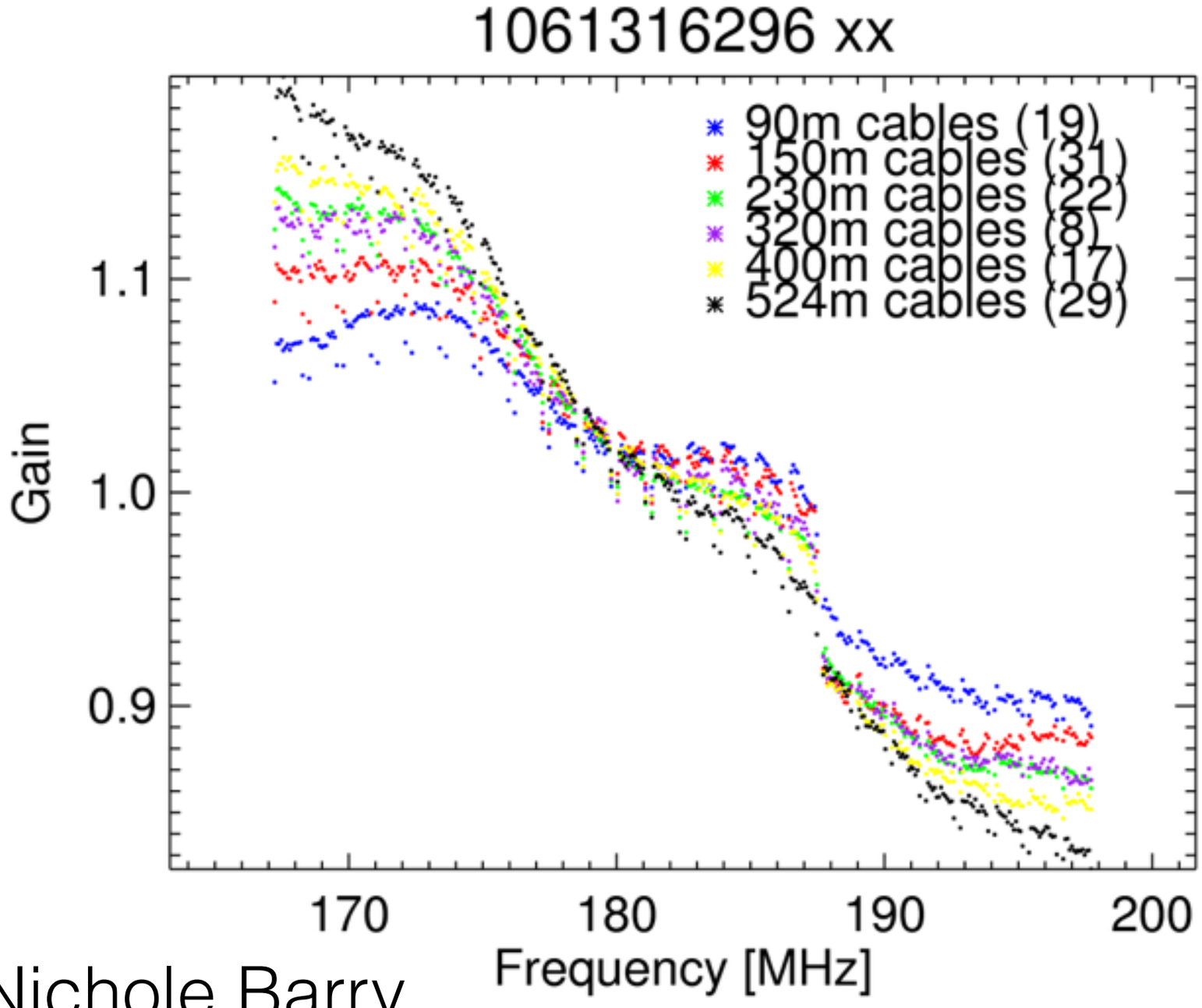
Model





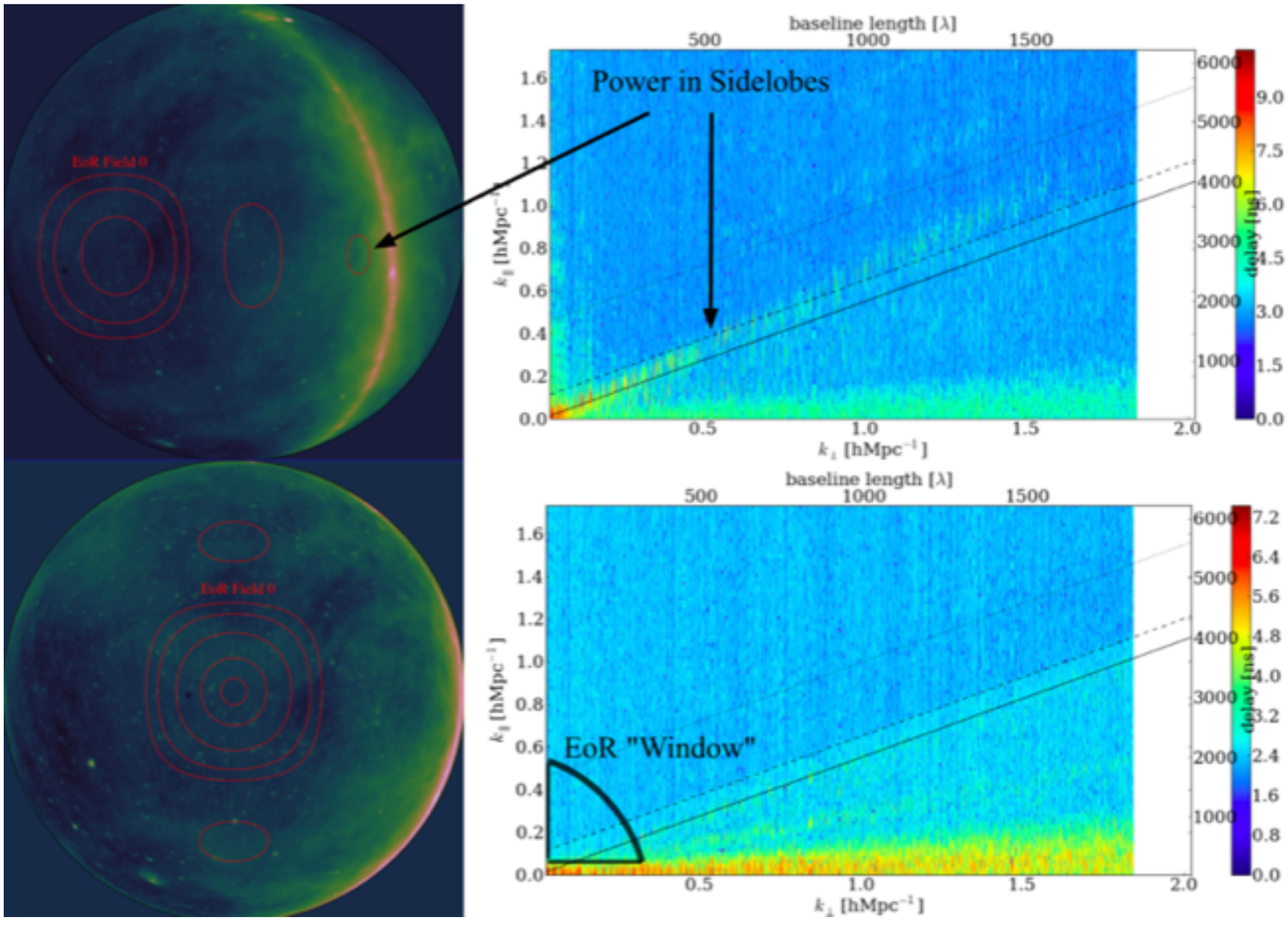
Beardsley, et al., 2015 (in prep)

Know thy instrument: Bandpass



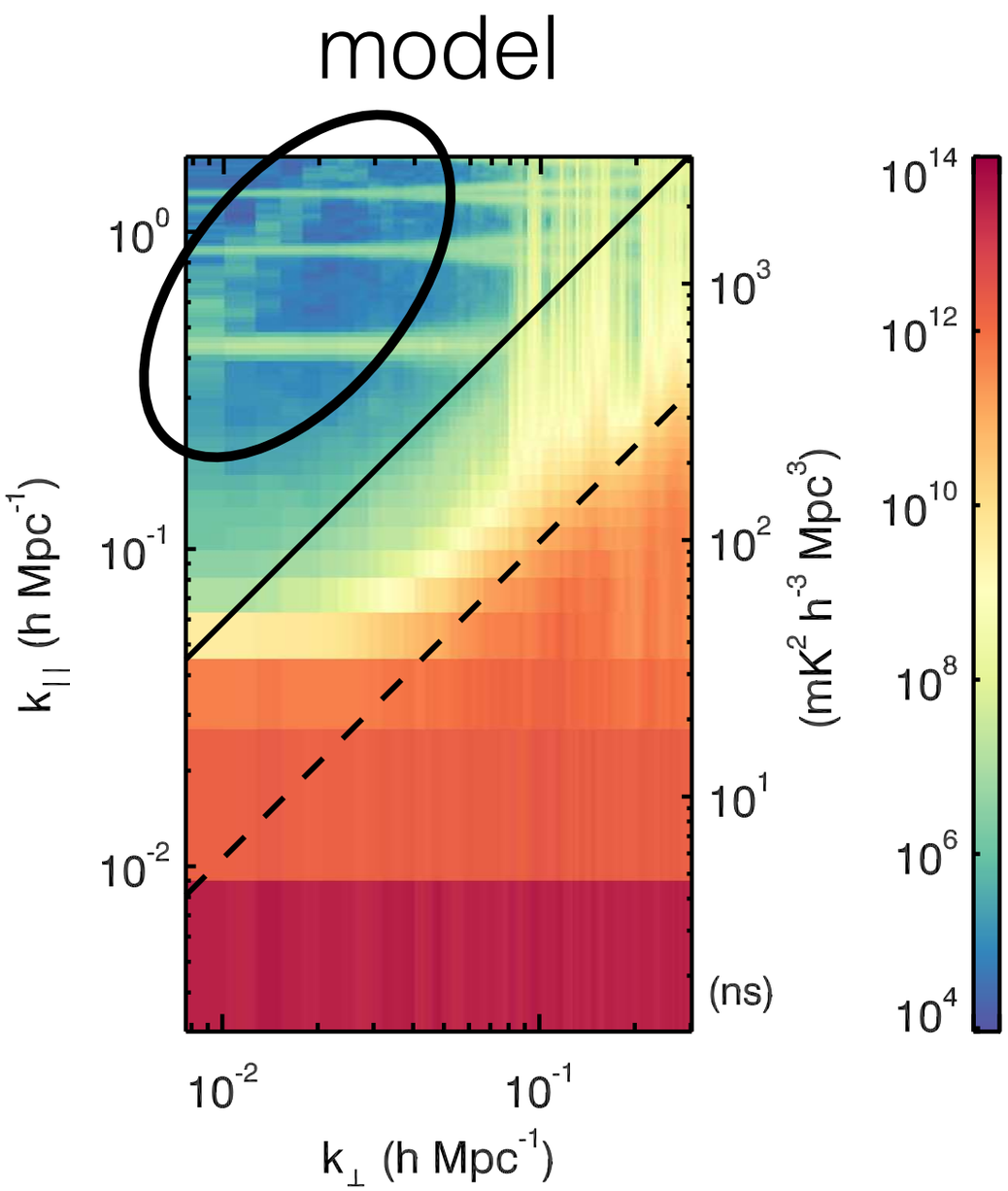
Credit: Nichole Barry

Know thy instrument: Primary beam



See: Danny Jacob's talk; Neben et al, 2015; Sutinjo et al, 2015

Know thy analysis: Ghost line



Due to insufficient beam model resolution

Now use 0.007 λ

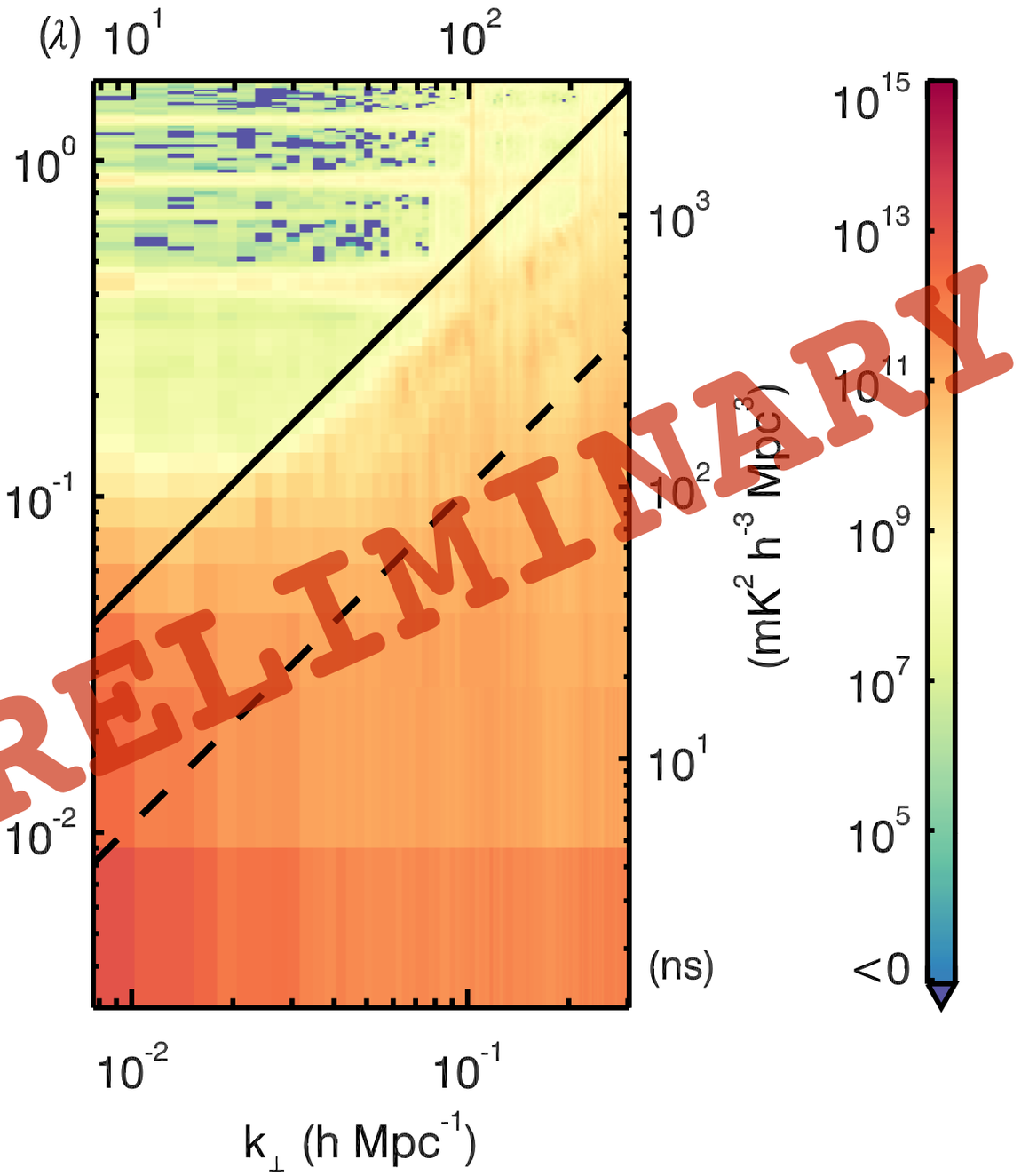
Towards a cosmological measurement…

- Data:
  - “High band” - 182 MHz (z~6.8)
  - Single sky field
  - 86.5 hours, or about 125 TB
  - Need to weed out the bad

After some data cuts*

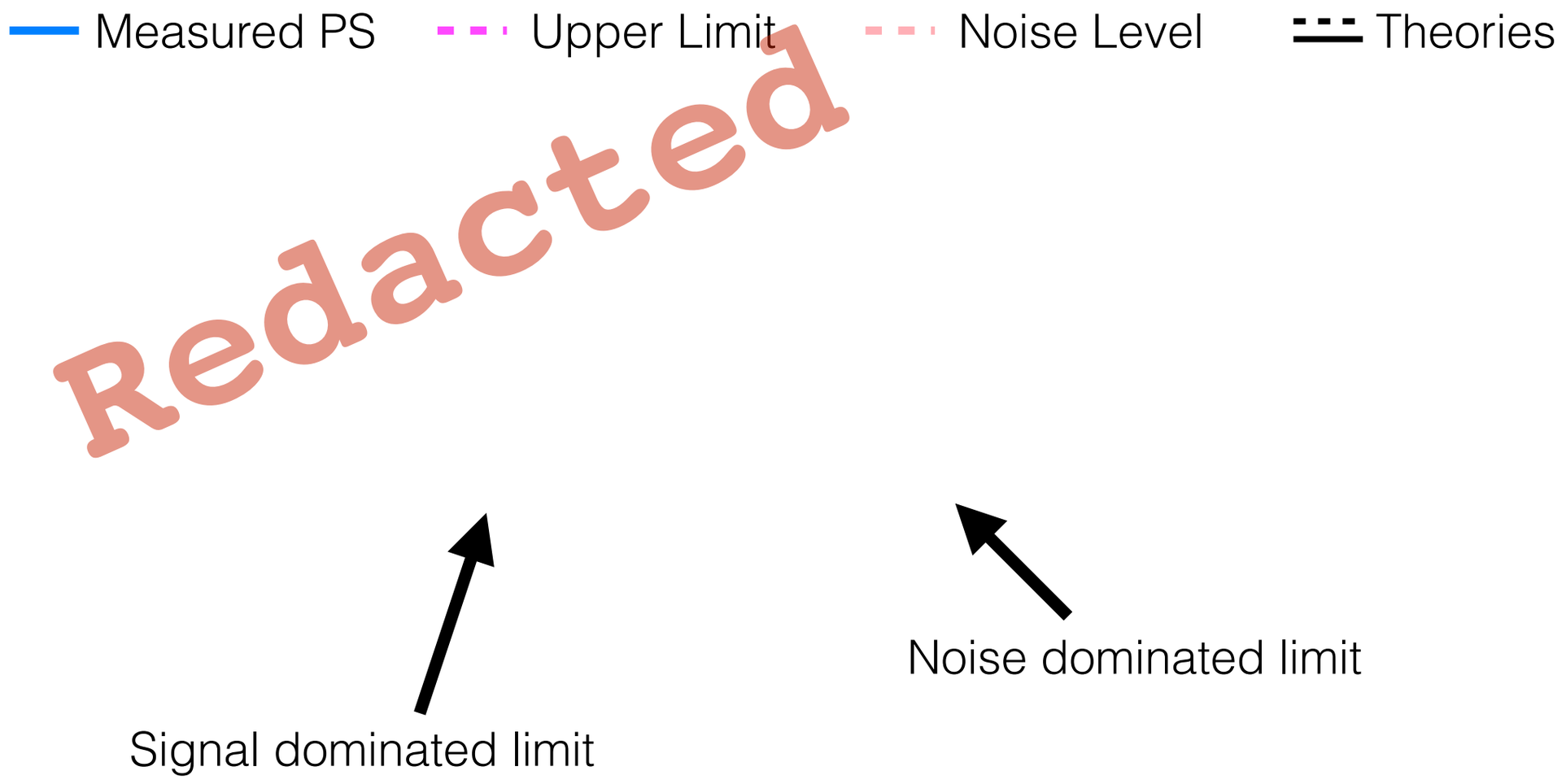
residual

32 hours of data



* based on jackknives, delay spectra, and residual fluxes

Deep 1D Power Spectrum



Two strategies to proceed

- Go deeper
  - Can improve higher k with data in can
  - Modest analysis improvements
- Remove systematics
  - Unknown cause - but we have ideas
  - Tougher problem, but better pay-off

Thank you