



# Light Relics - Report Back

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for Maps to Power Spectra Working Group

# Topics Covered

## ❖ Ongoing Maps2Cell Work

- Neff Forecasting Framework Tool (Srinivasan Raghunathan)
- Systematic Studies: Foregrounds (Benjamin Wallisch)
- Systematic Studies: Beams (Dan Grin)

## ❖ Contributions

- Systematic Studies: bias to lensing from nonlinear evolution & baryons (Colin Hill)
- Joint  $\phi$ -delensed E bandpower estimation (Marius Millea)

## ❖ Discussion

# Neff Forecasting Tool - DRAFT

(Srinivasan Raghunathan, Joel Meyers, Cynthia Trendafilova, and Benjamin Wallisch)

ILC, Forecasts for  $\sigma N_{\text{eff}}$  +  $\Lambda$ CDM params for S4-Wide Chilean LATs + Delensing LAT

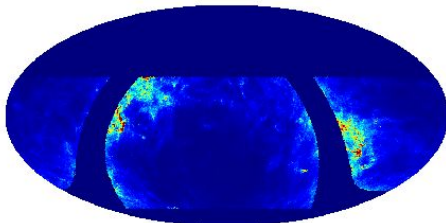
<https://github.com/sriniraghunathan/DRAFT>

Target  $\sigma(N_{\text{eff}}) = 0.03$  marginally achieved w/S4-wide clean + S4-ultra deep ( $\sigma(N_{\text{eff}}) = 0.0307$ )

Adding galaxy (S4-dirty) achieves goal ( $\sigma(N_{\text{eff}}) < 0.030$ ), but should be skeptical of foreground model in this region

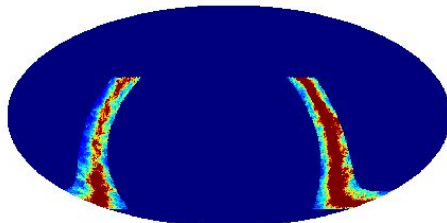
Mask 1

S4-Clean: fsky = 0.57



Mask 2

S4-Dirty: fsky = 0.11

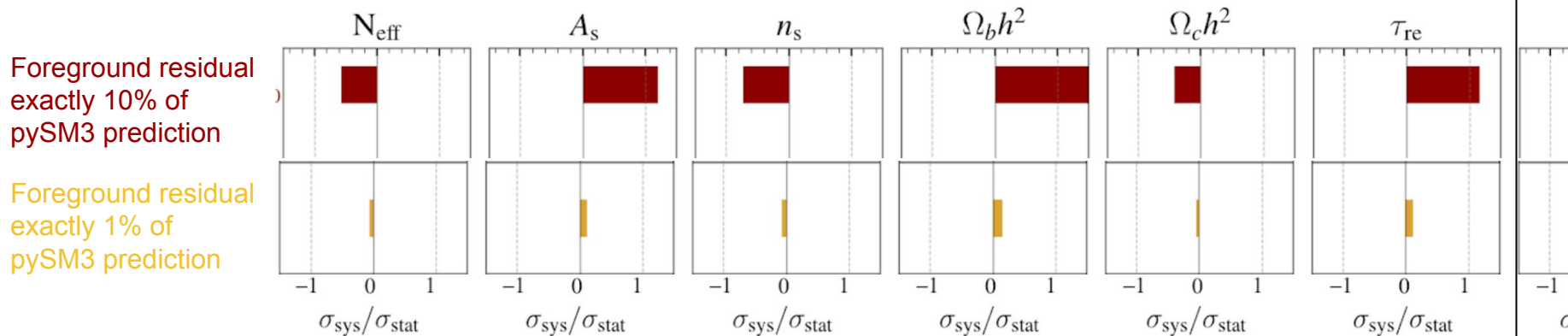


# Systematic Studies: Foregrounds



(Srinivasan Raghunathan, Joel Meyers, Cynthia Trendafilova, and Benjamin Wallisch)

Current work: Fisher calculation of bias to  $N_{\text{eff}}$  +  $\Lambda$ CDM params due to galactic foregrounds



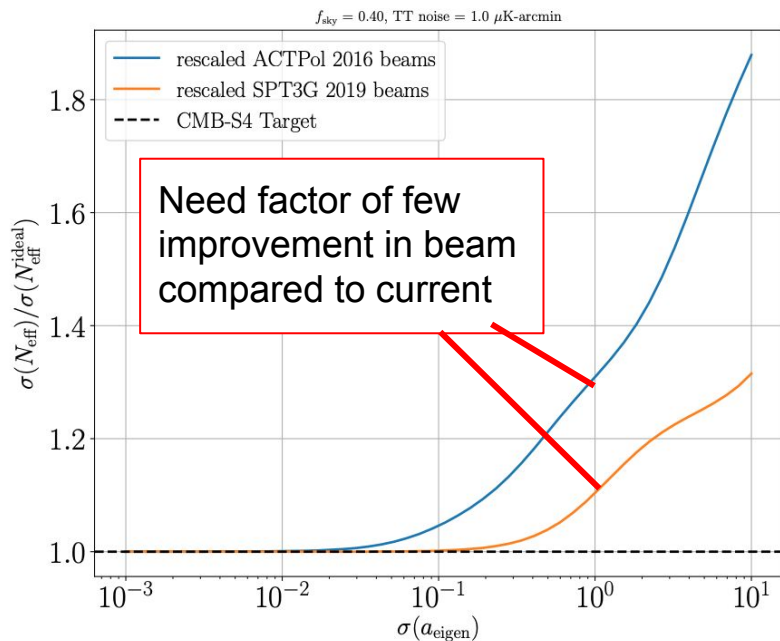
Dropping high-ell TT increases  $\sigma(N_{\text{eff}})$  by 10%, foregrounds still potentially an issue for high-ell TE, EE

**Need more work here (sims, expectations & knowledge for foregrounds at high ell, foreground TE)**

# Systematic Studies: Beams



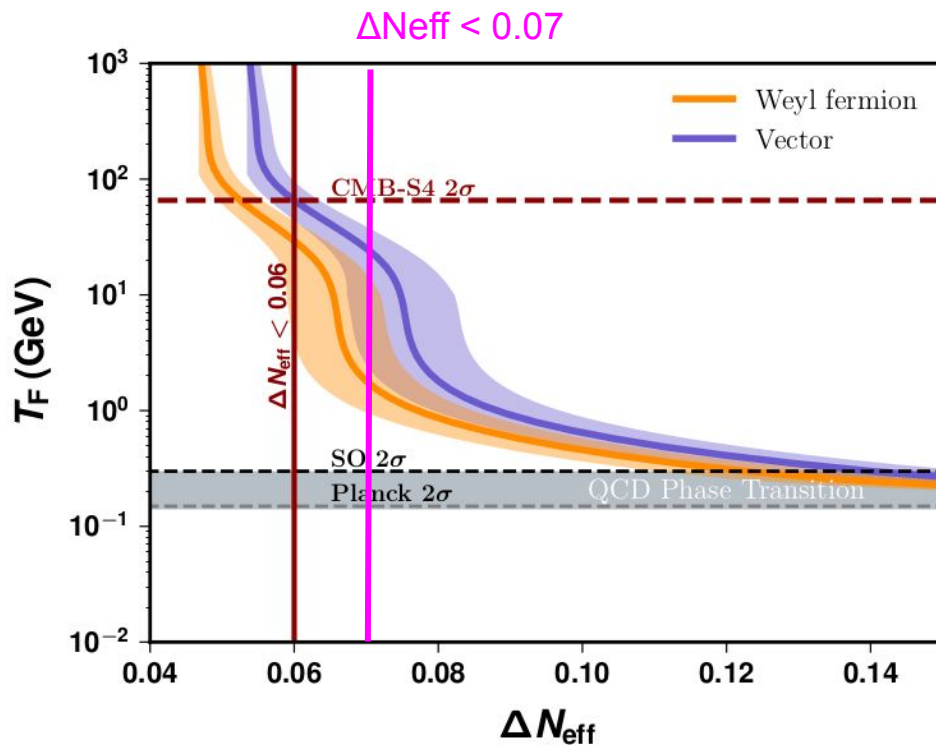
(Daniel Grin and Francis-Yan Cyr-Racine)



Plans:

- *Beam errors from current experiments not at a fundamental limit, but good enough for current science -- improvement is reasonable*
- Studies of impact of non-thermal calibration sources

# Reminder of $N_{\text{eff}}$ and $T_{\text{freeze-out}}$



# Future Plans

- Foreground strategies
  - Galactic foregrounds at small scales
  - Foregrounds closer to the Galactic Plane
  - Foreground mitigation strategies
- Calibration requirements
  - Beam
  - Absolute calibration/polarization angle efficiency/bandpasses
- Data challenges
- Science and flowdown for CIB, SZ power spectra