

Cosmology from ACT DR6 lensing cross-correlated with DES Y3 galaxies

(in prep work)

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ACT & DES collaborations

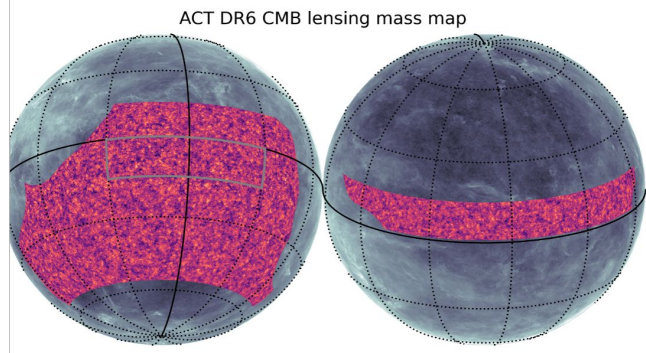


**Swiss National
Science Foundation**

Introduction

~ 9400 deg²

Signal dominated over degree scale

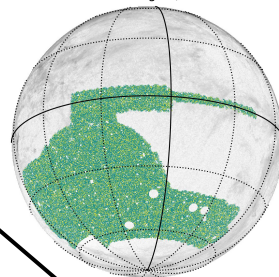


ACT Collaboration

Qu et al. 2023

X

DES Y3 Maglim, bin 5

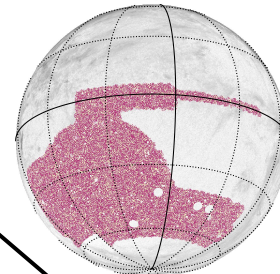


~ 4143 deg²

10 million galaxy positions

...

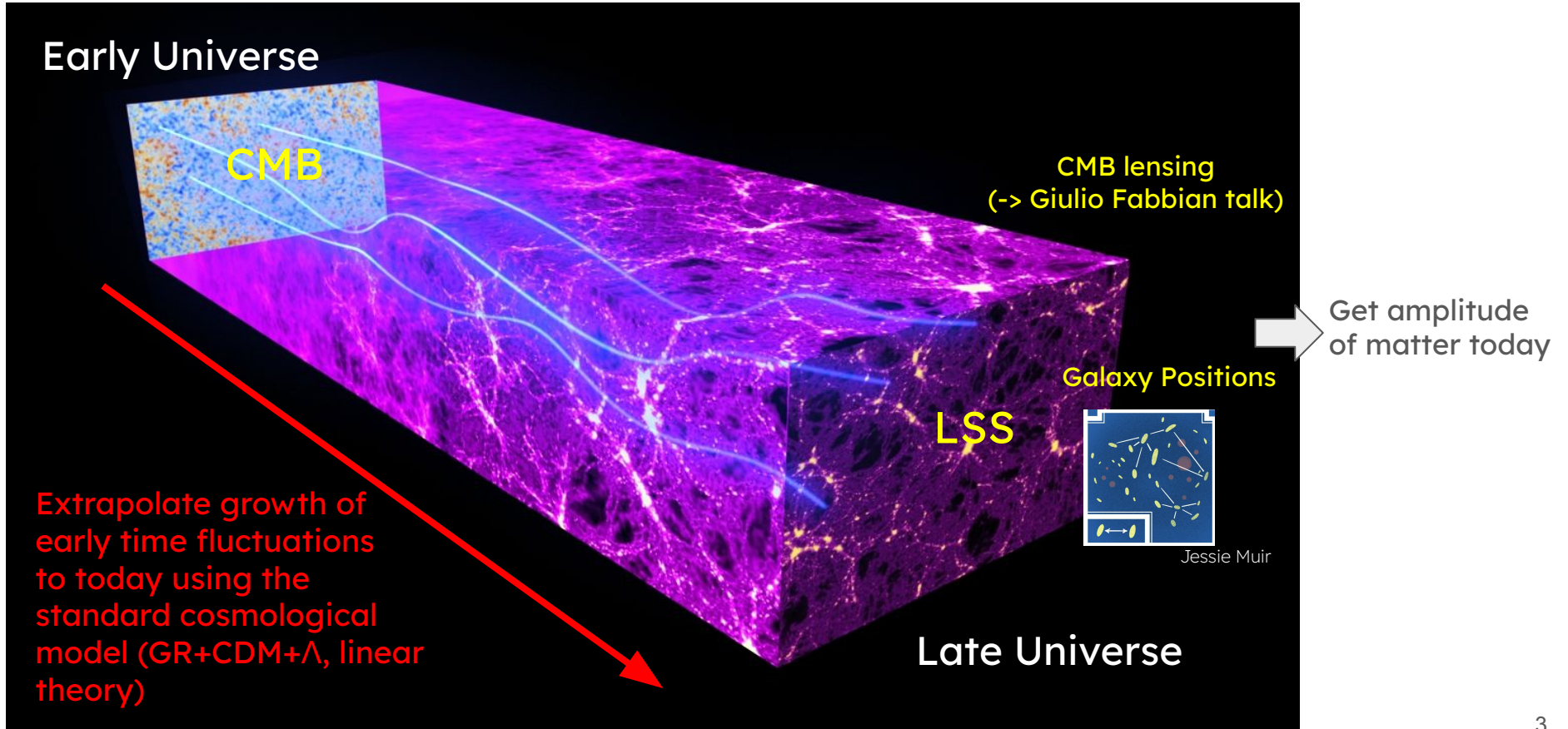
DES Y3 Maglim, bin 0



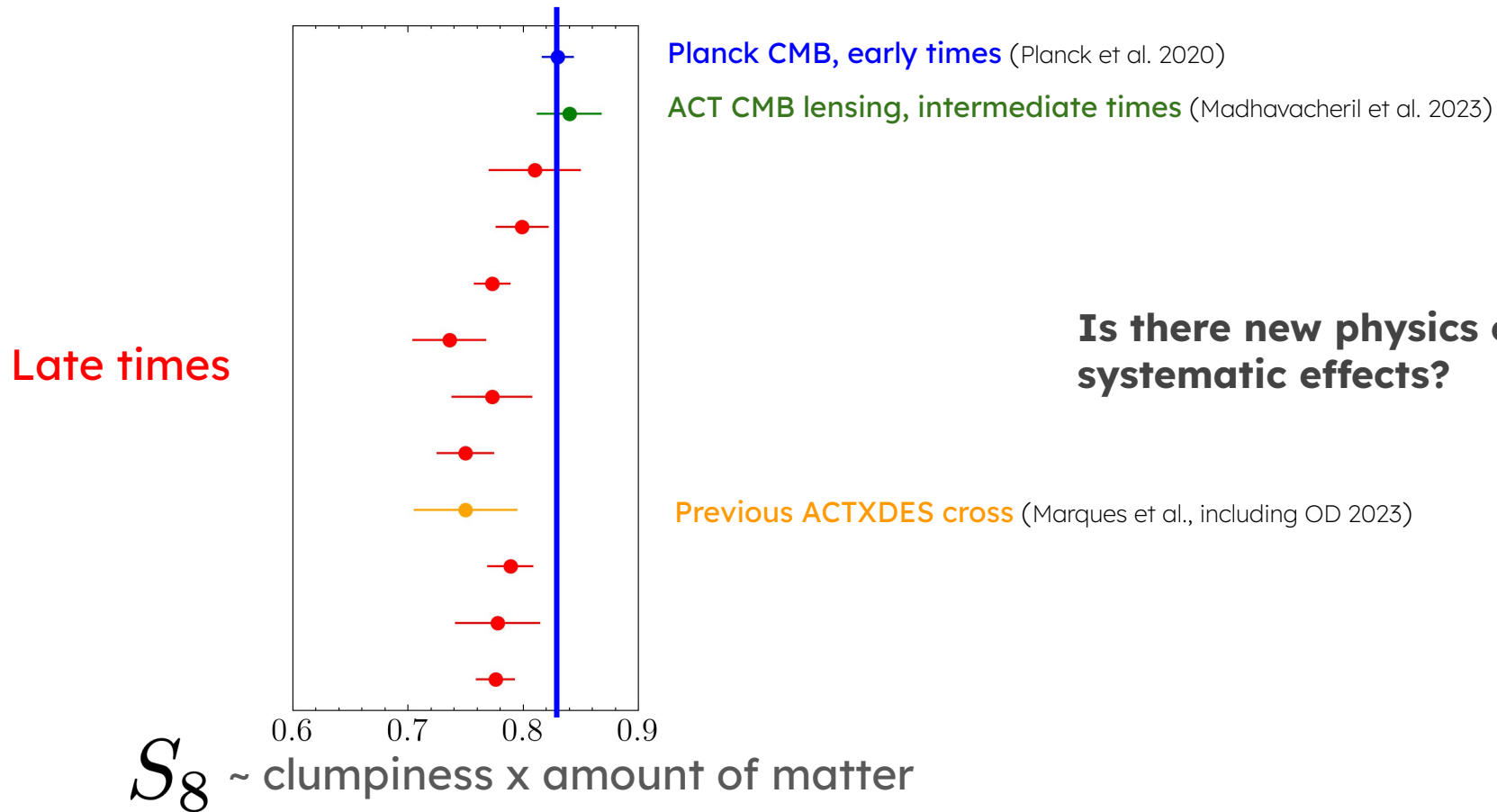
Redshift

This talk: Challenge of astrophysical contamination

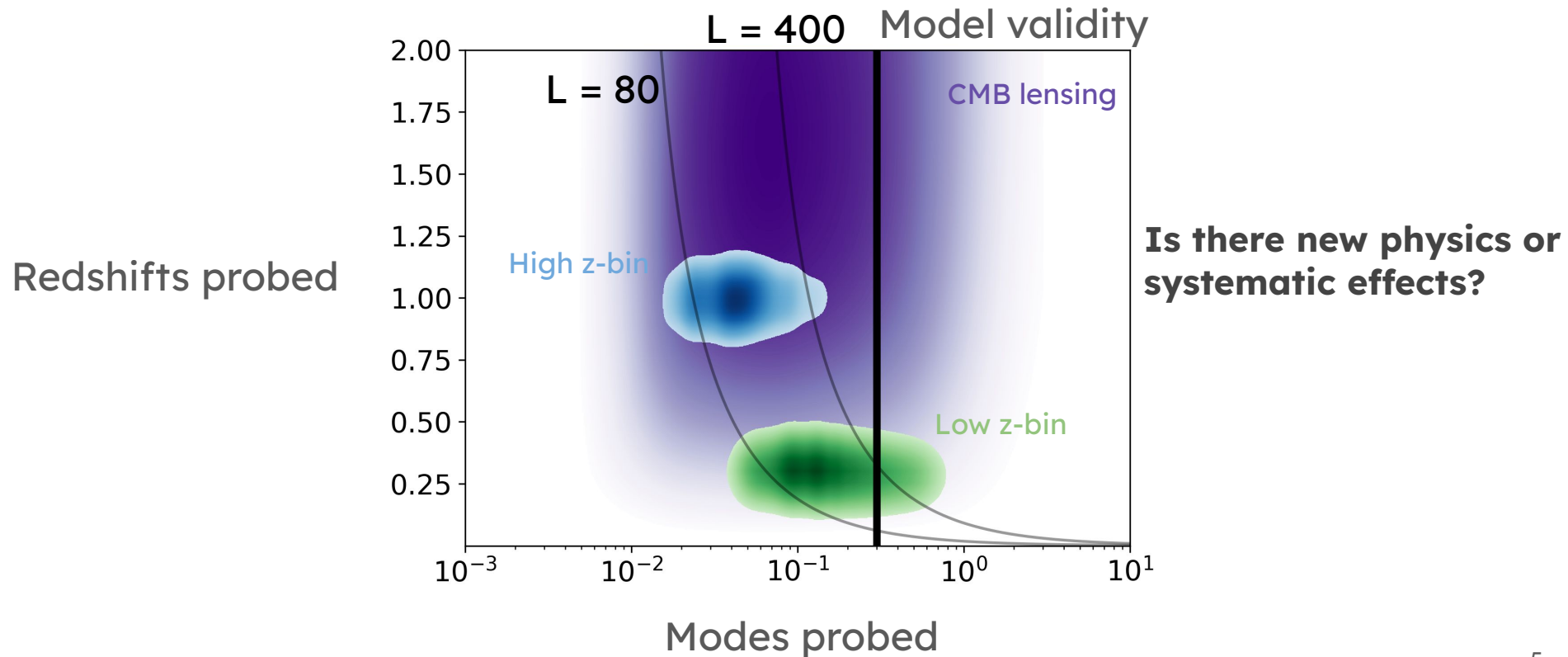
Is growth of structure consistent over time?



Growth of structure from cosmological analyses

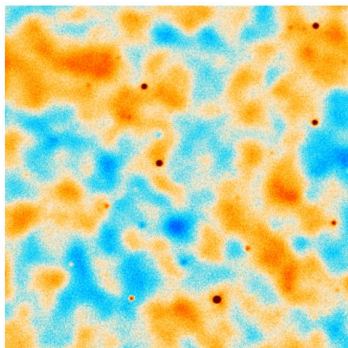


Why CMB lensing cross-correlations?

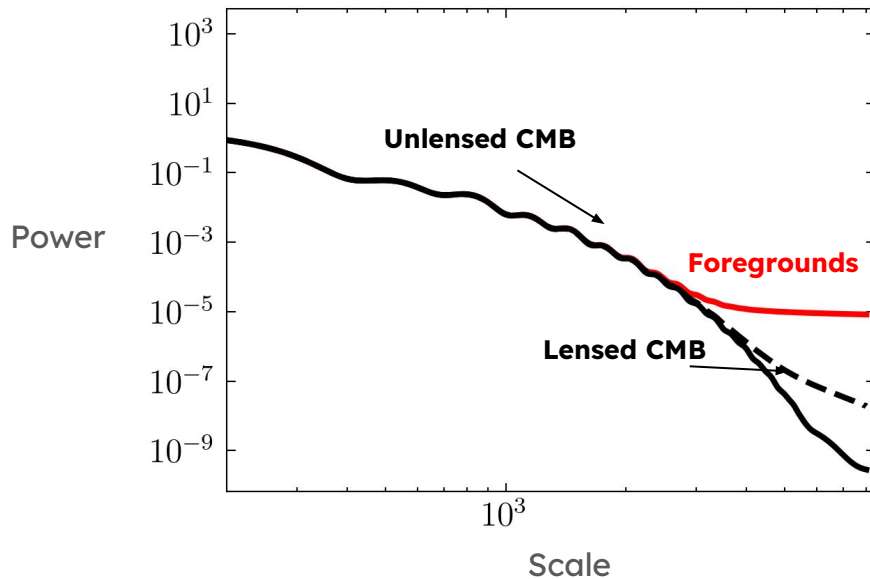


Challenge of astrophysical contamination

High-resolution CMB surveys are also LSS surveys, especially at the temperature channel

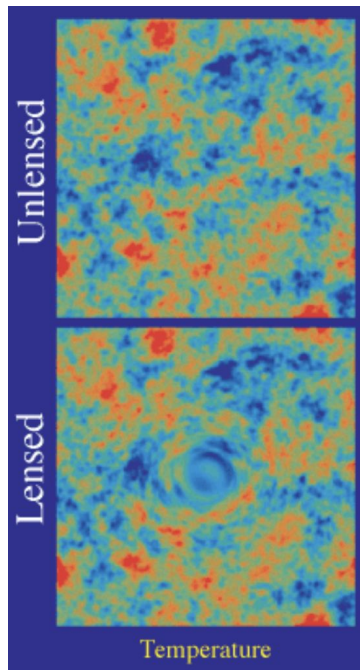


Naess et al. (2020)

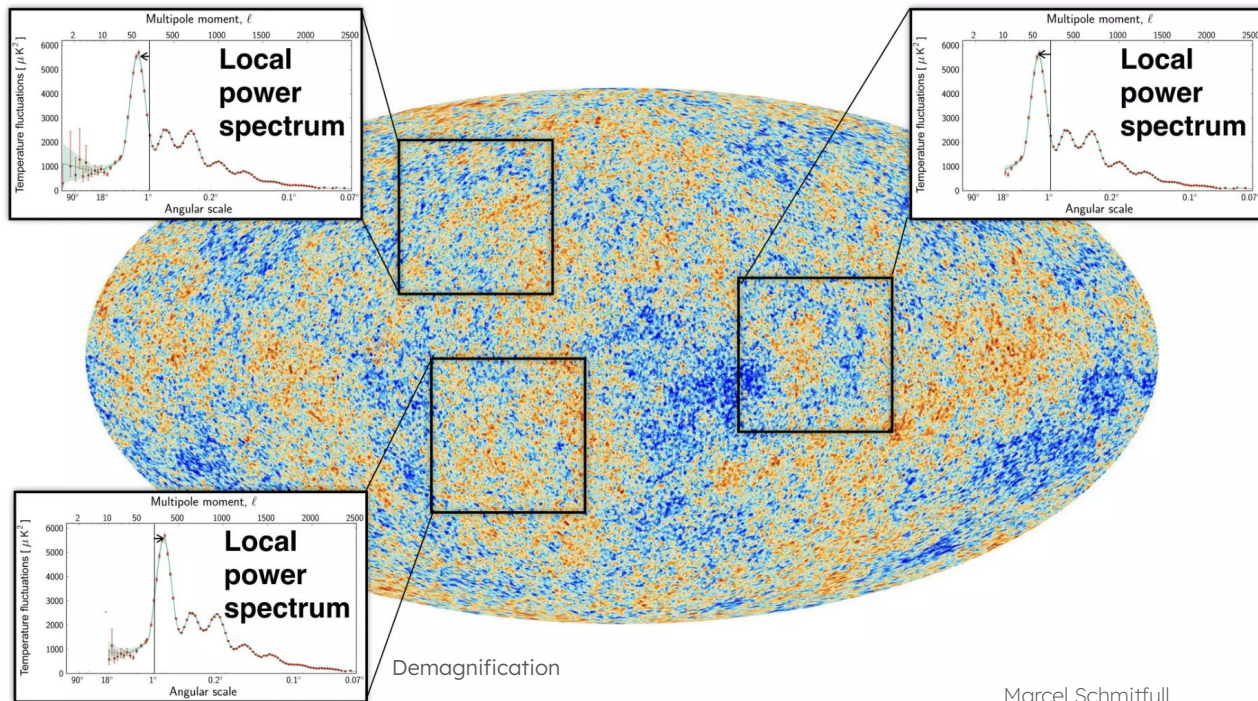


Contamination **lowers amplitude of** cross-correlations!

CMB lensing reconstruction



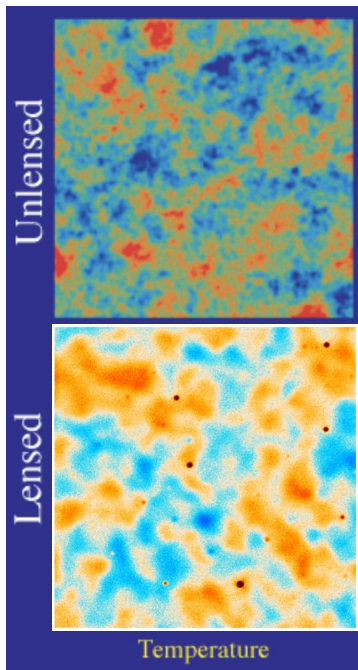
Wayne Hu



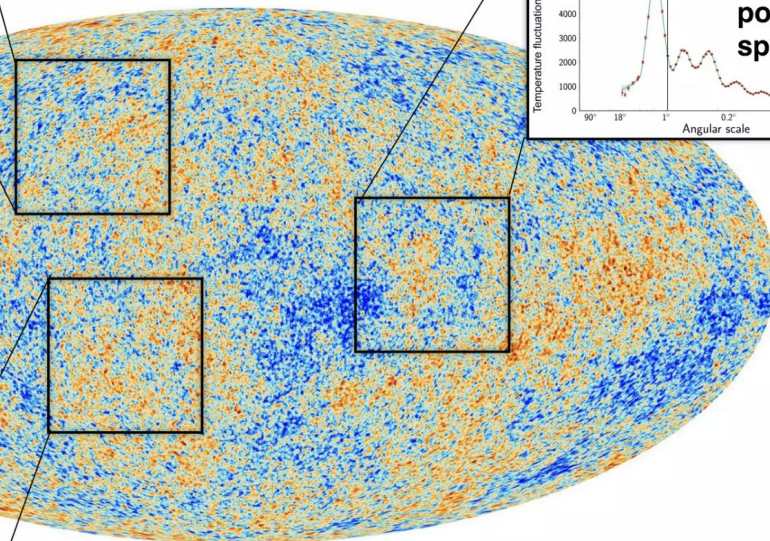
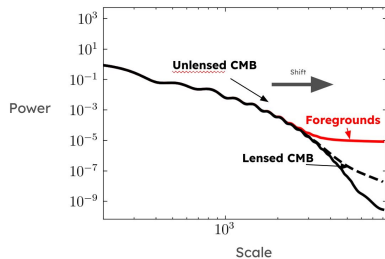
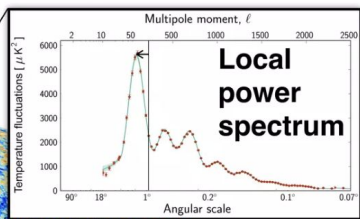
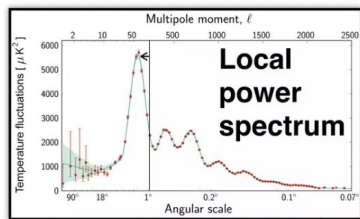
Marcel Schmittfull

Large lens modulates small scale CMB power spectrum ->
look at shifts in the power spectrum to reconstruct the lens!

CMB lensing reconstruction



Wayne Hu

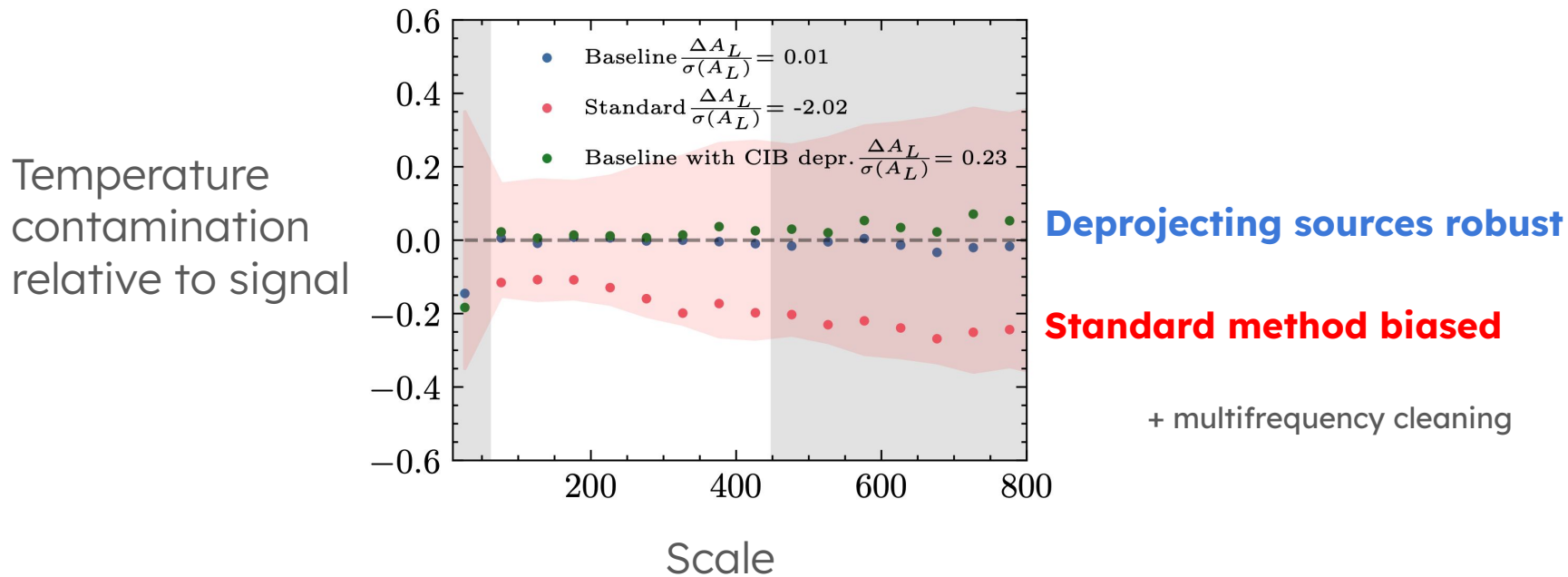


Demagnification

Marcel Schmittfull

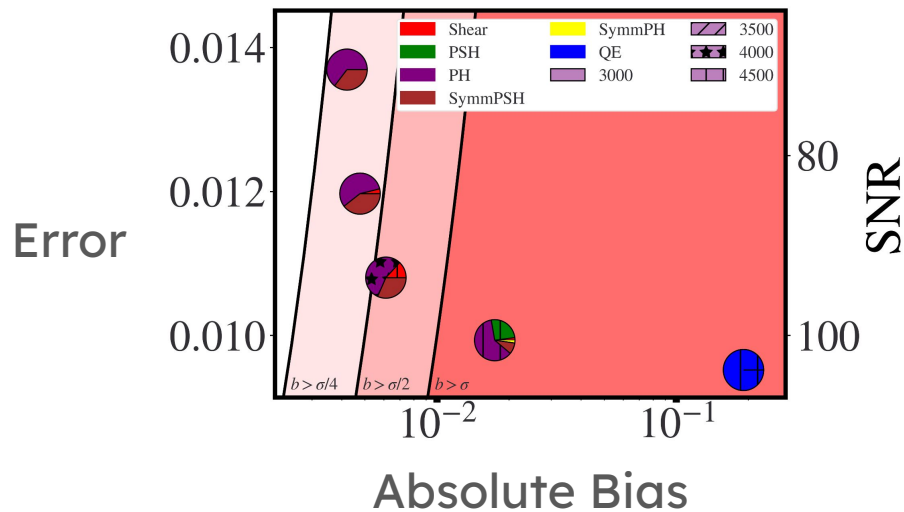
CMB lensing estimator thinks there is an underdensity!
Galaxy on overdensity x underdensity -> **Negative Signal**

Extragalactic foregrounds: sims based



MacCran et al. 2023
Darwish et al., in prep

Improving mass maps for future cross-correlations



Darwish et al., 2022

With future cross-correlations that include Simons Observatory, will need to use smaller and smaller scales.

Need a combination of methods to have competitive measurements.

Plus, better simulations.

Ongoing cross-correlations

DESI LRGs: Kim & Sailer et al.
Sailer & Kim et al.
Hang & Qu et al.

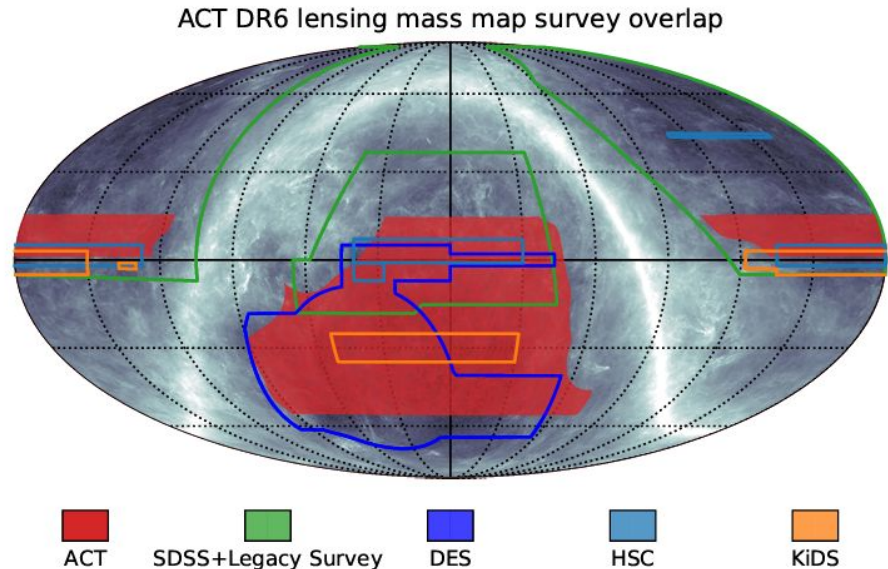
SDSS BOSS: Wenzl et al.

DES-Y3: Shaikh & Harrison et al.
Pitocco et al.

DES-Y3 voids: Marques et al.

Planck CIB: Mheta et al.

Planck/ACT tSZ: Bolliet et al.



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