

Simulations

Raphael Flauger

July 5, 2017

02.03

02

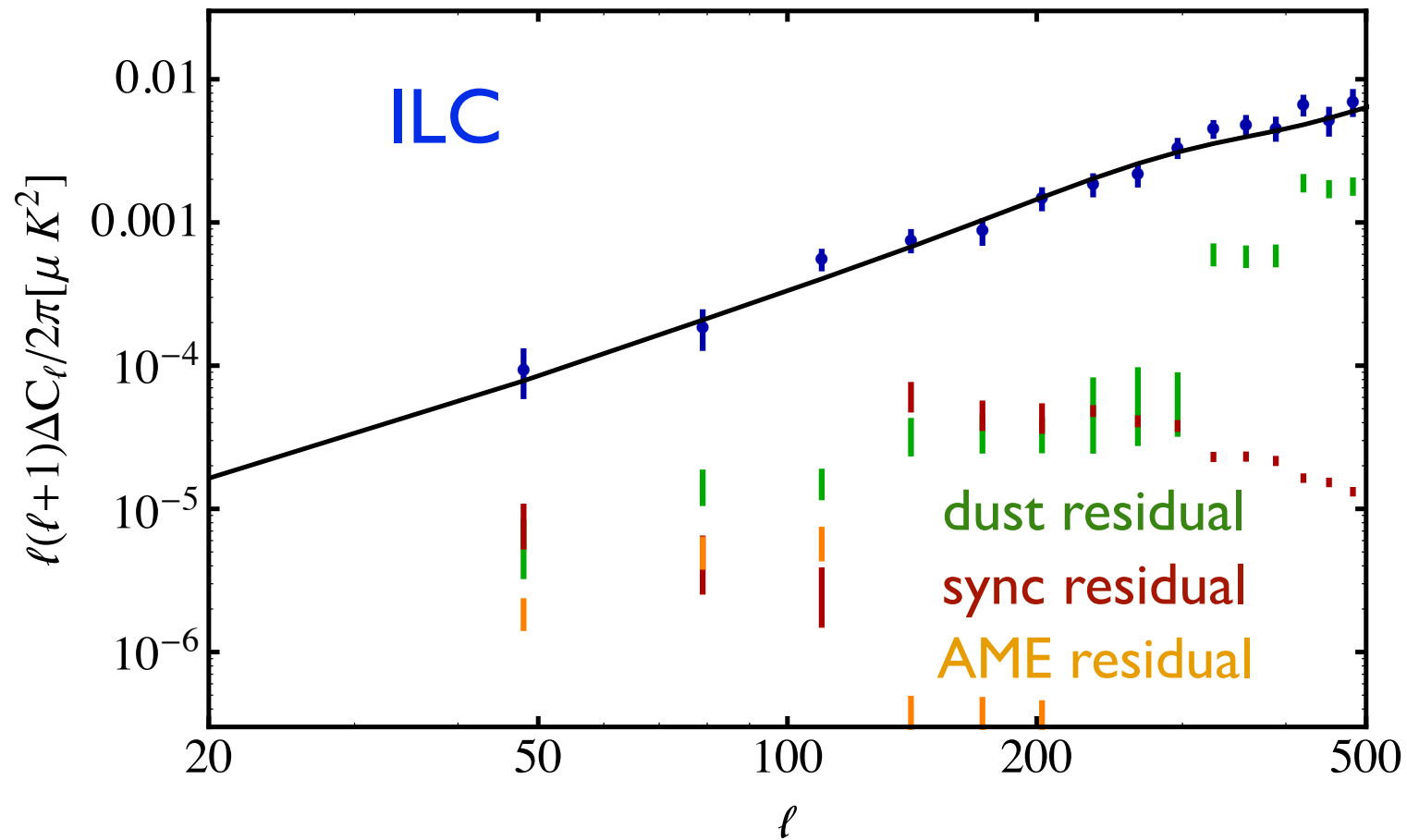
- sky fraction: 3%
- 1,000,000 detector years (150 GHz equiv.)

03

- dust (realistic spectral dependence from Brandon)
- synchrotron
- polarized AME ($p=2\%$)

02.03

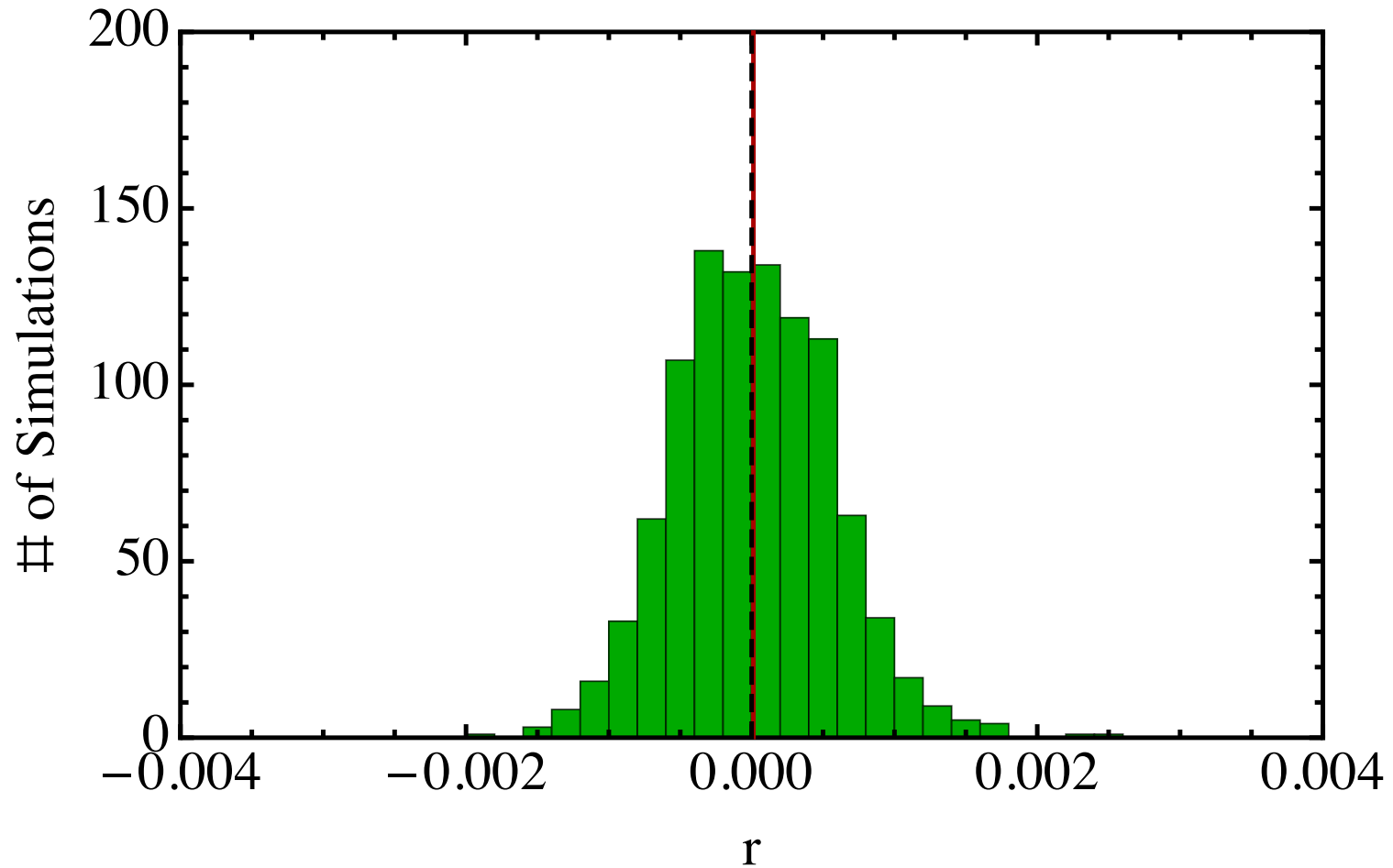
Sample simulation ($r=0, A_L=0.1$)



02.03

Distribution for 1000 simulation

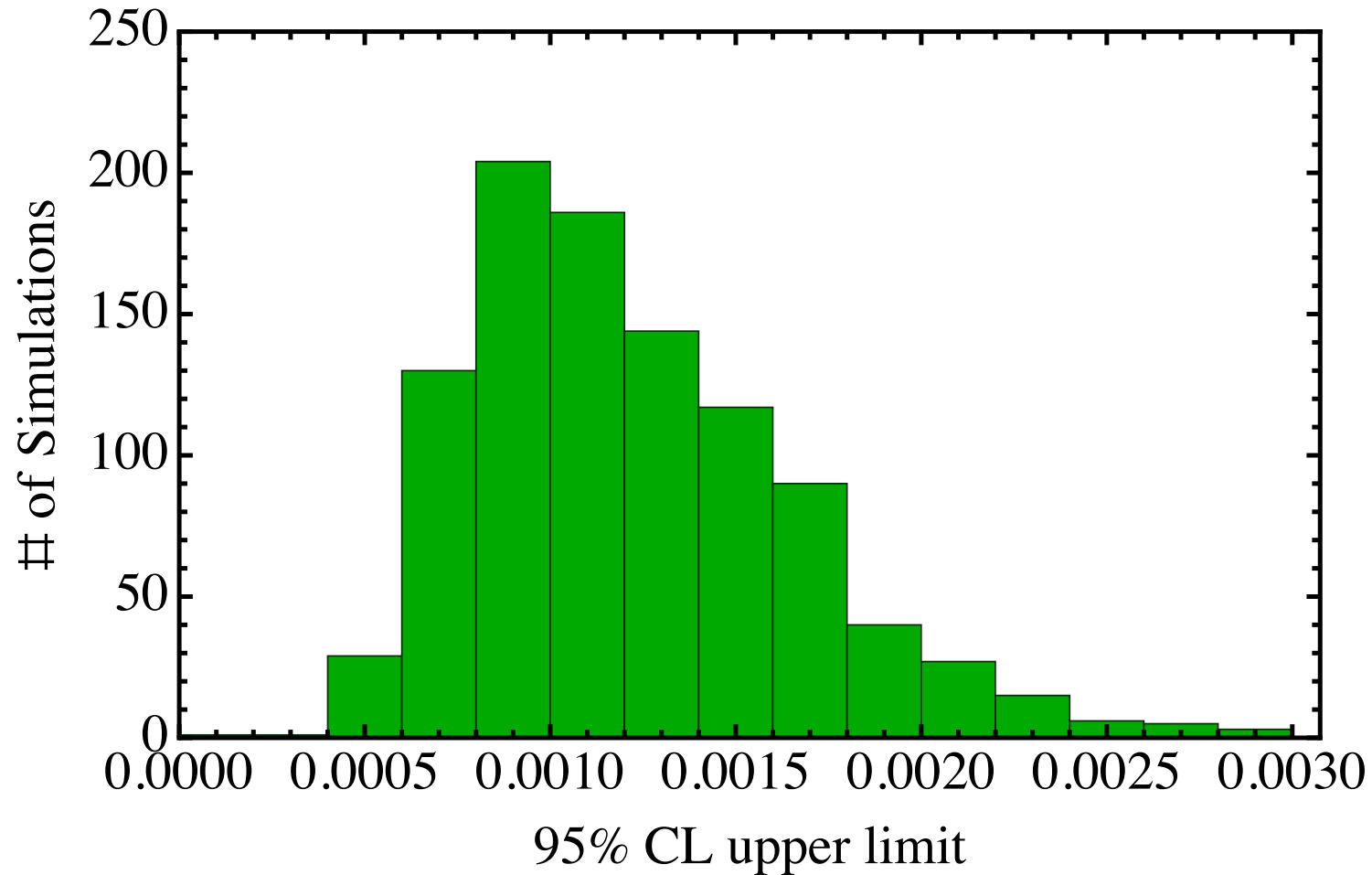
$$A_L=0.1$$



02.03

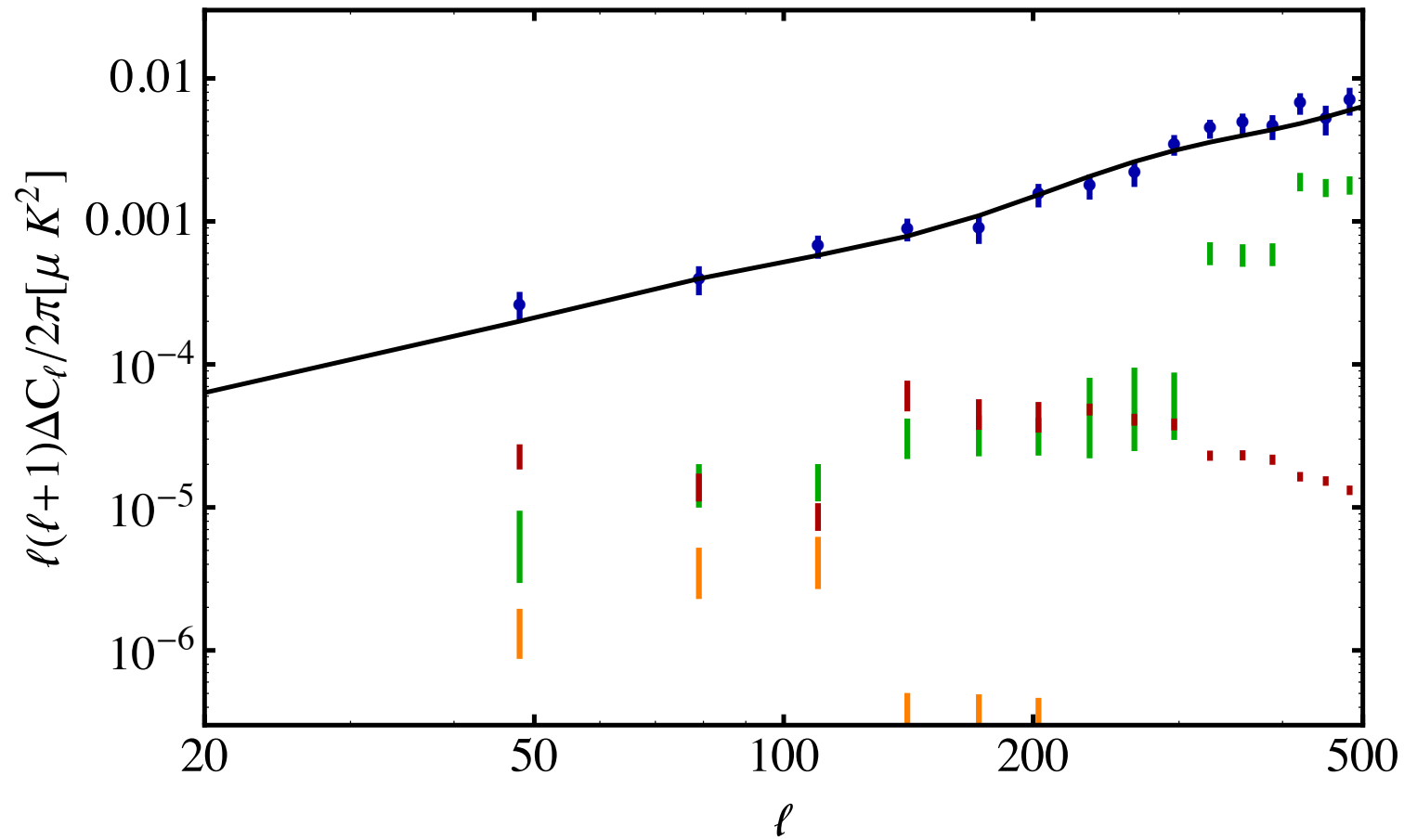
95% CL upper limits for 1000 simulation

$$A_L=0.1$$



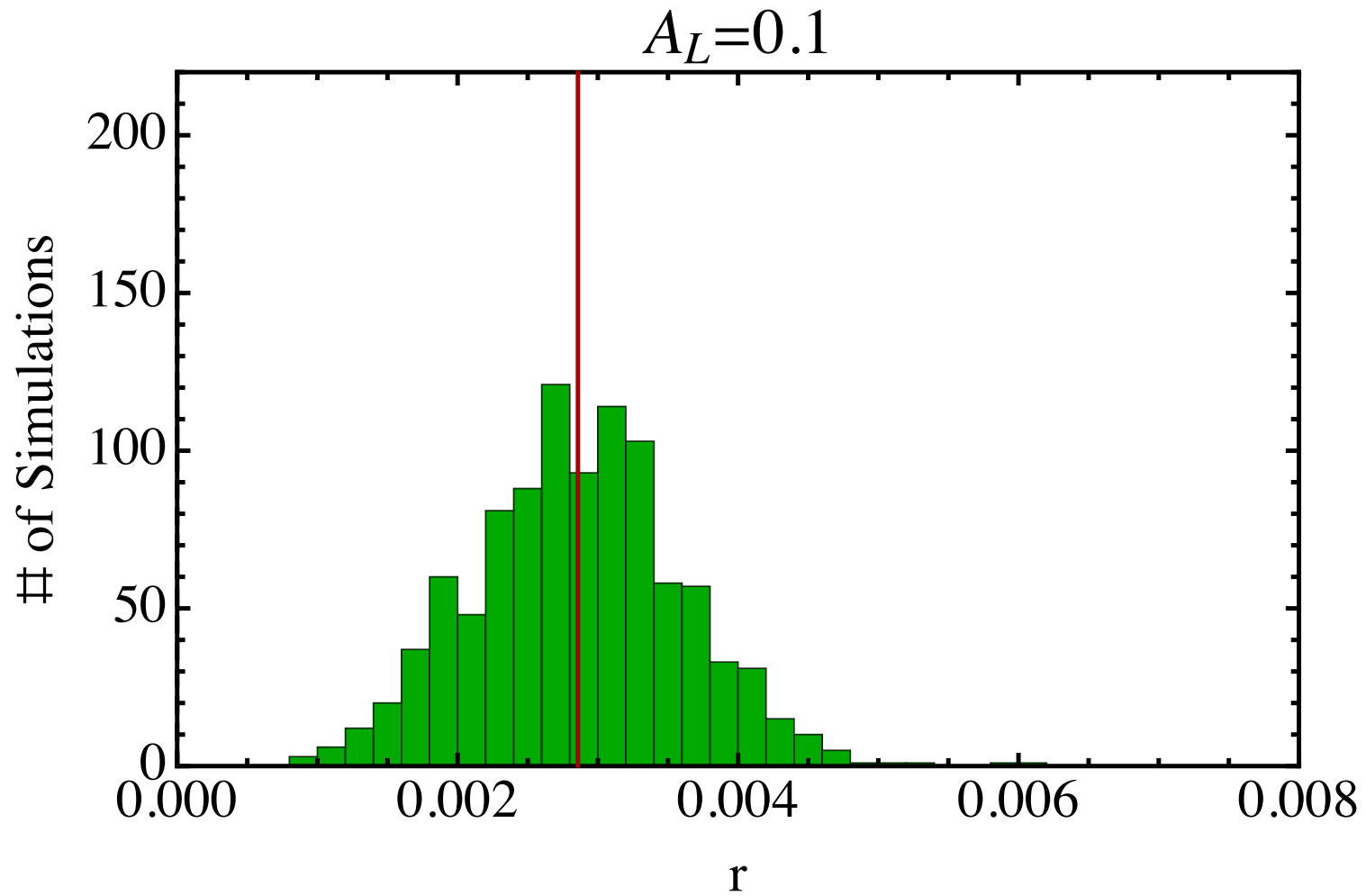
02.03

Sample simulation ($r=0.003, A_L=0.1$)



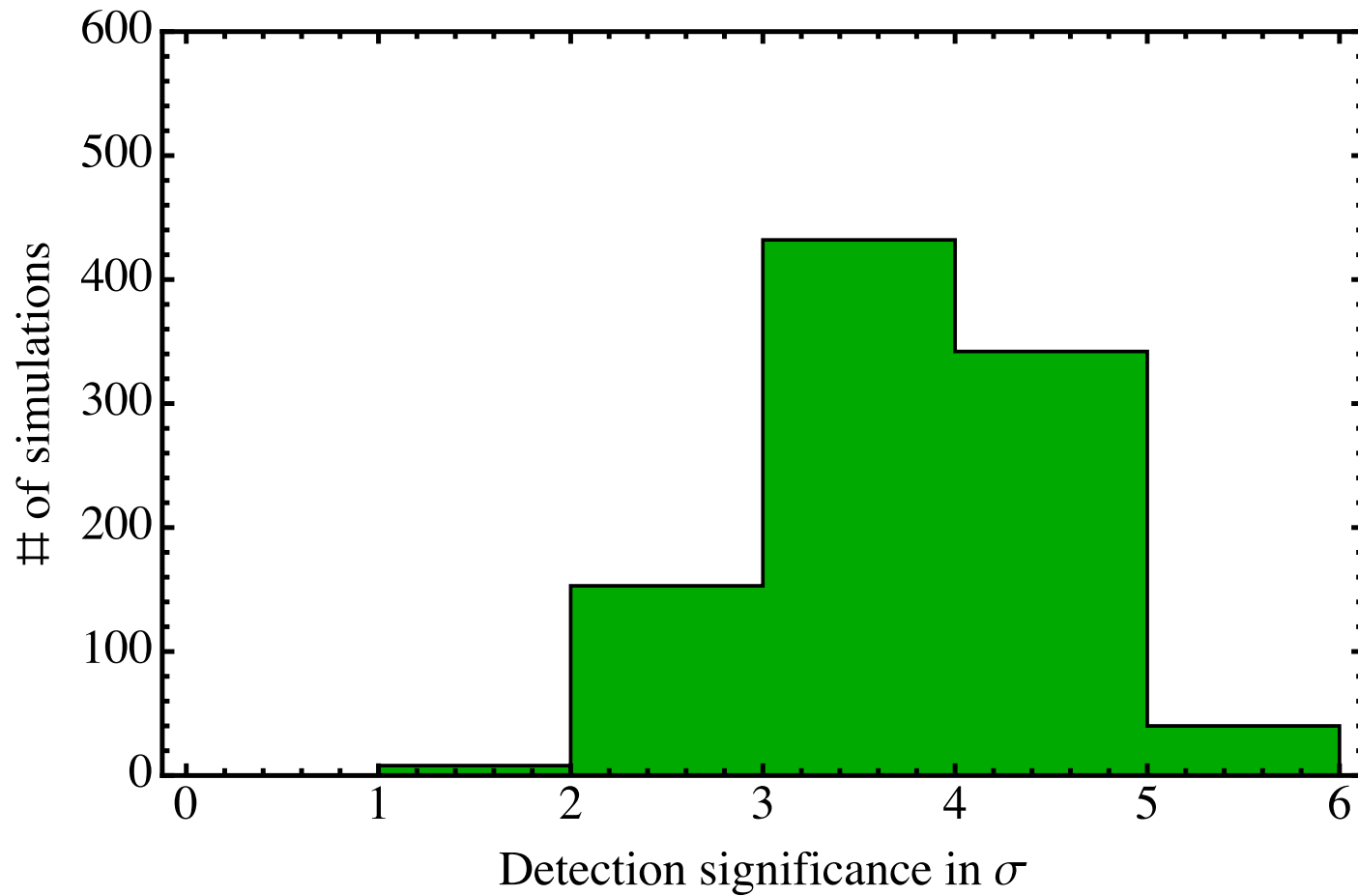
02.03

Distribution for 1000 simulation



02.03

Detection significance for 1000 simulations



Questions

Can we improve the detection significance by going to larger sky fraction?

Should we be impressed by the small foreground residuals?

Larger sky fraction

02c.03

Can we improve the detection significance by going to larger sky fraction?

02c

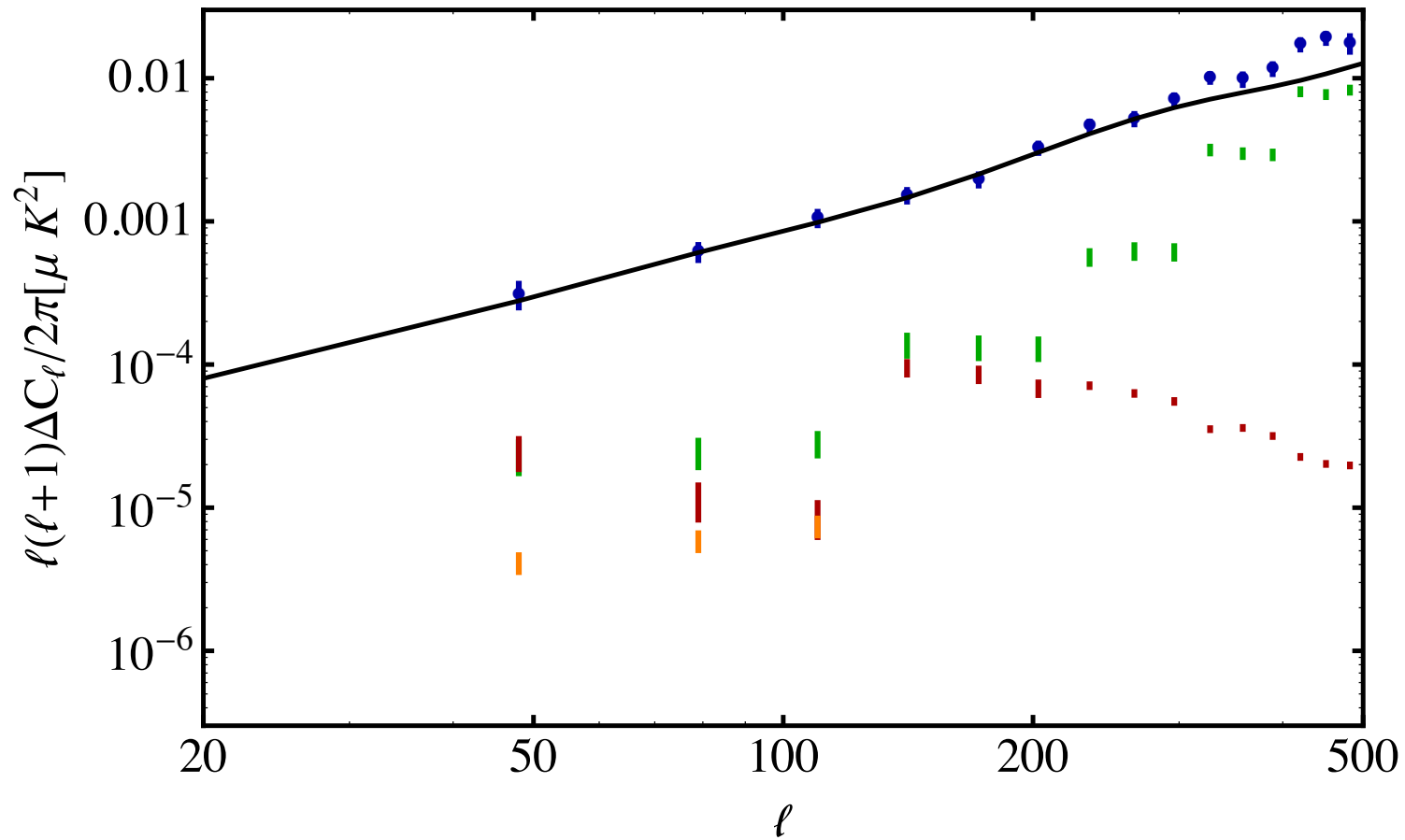
- sky fraction: 10%
- 1,000,000 detector years (150 GHz equiv.)

03

- dust
- synchrotron
- polarized AME

02c.03

Sample simulation ($r=0.003, A_L=0.2$)

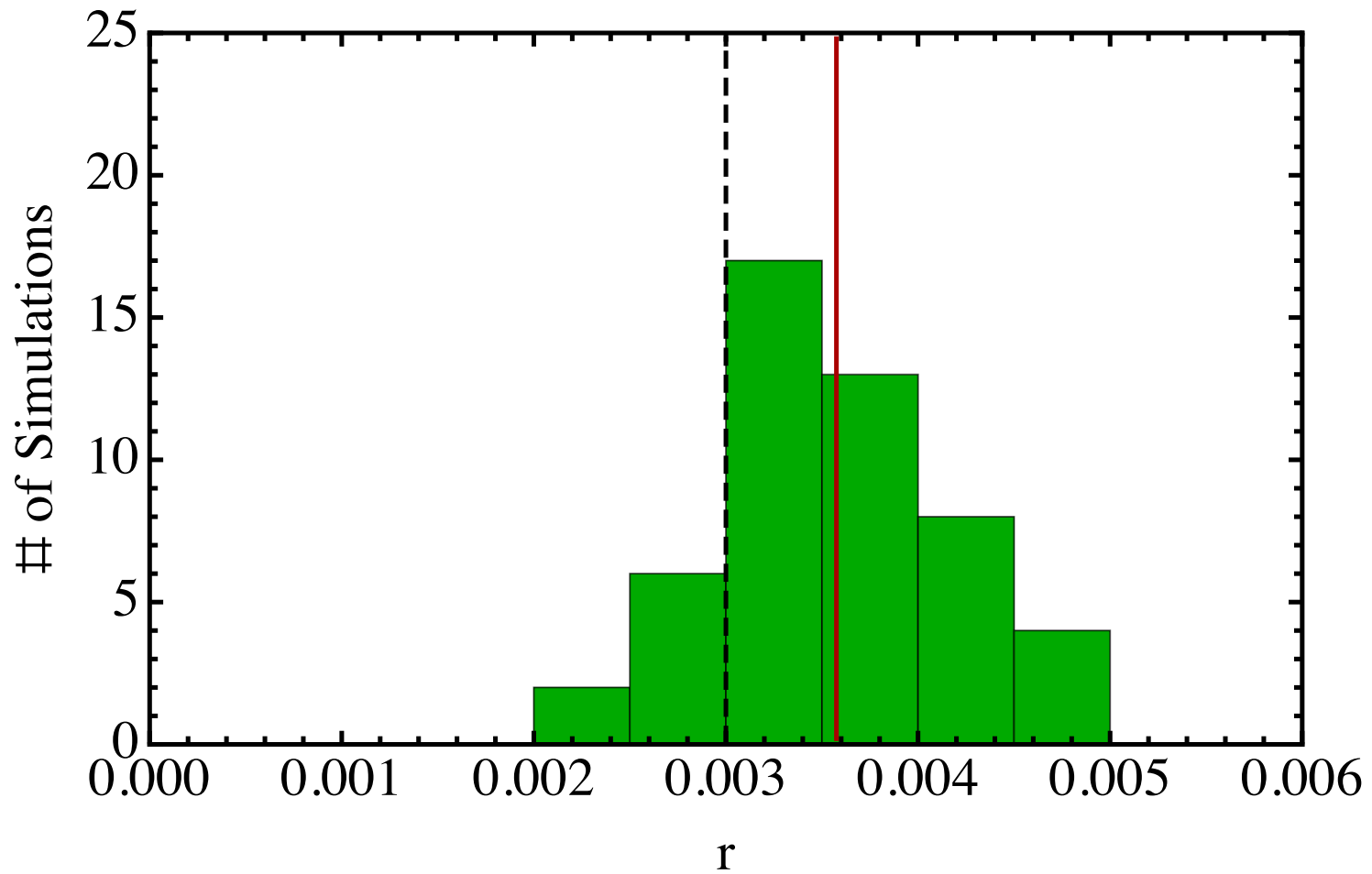


Larger foreground residuals (as expected)

02c.03

Distribution for 100 simulations (Clem)

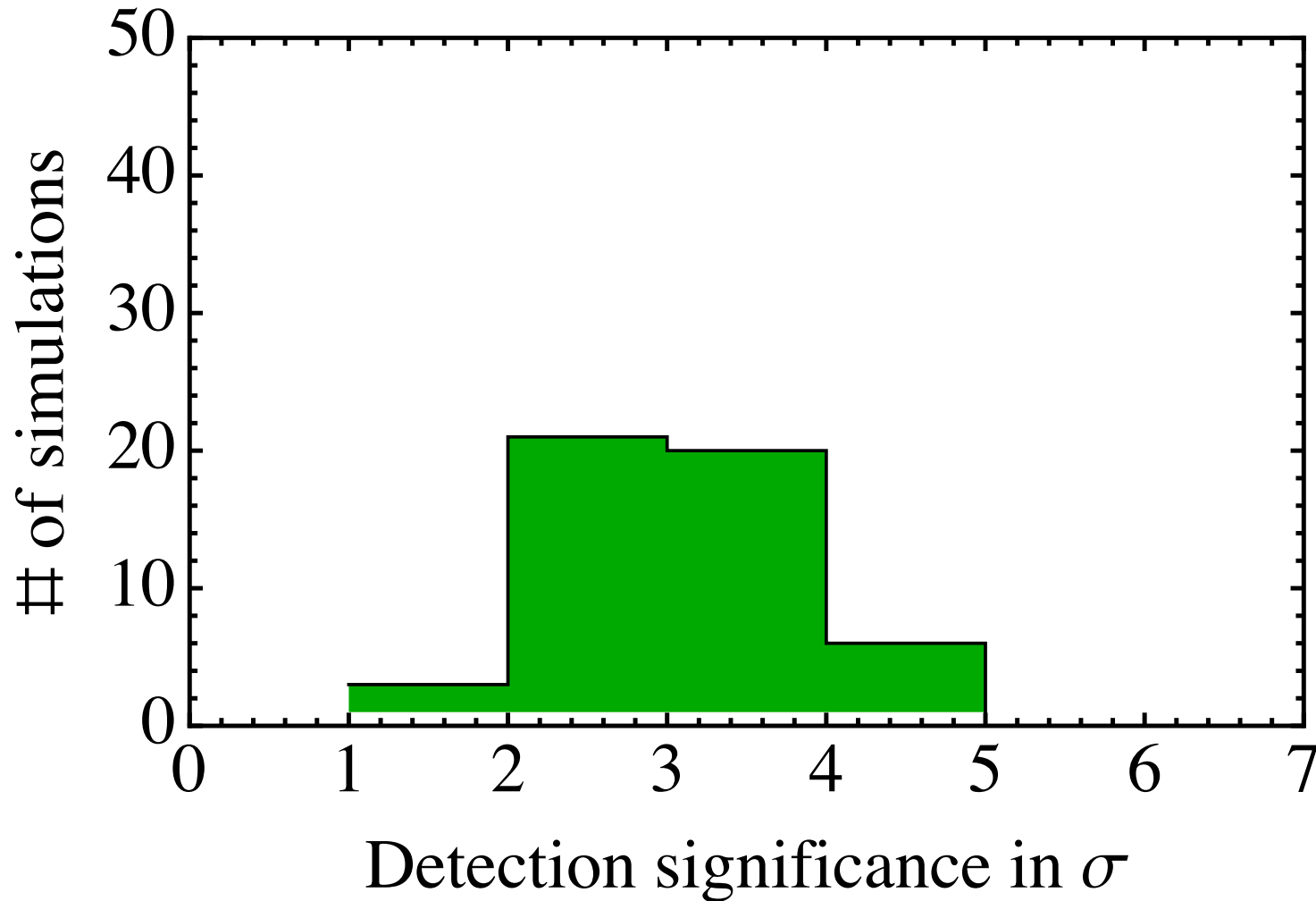
$$A_L=0.1$$



02c.03

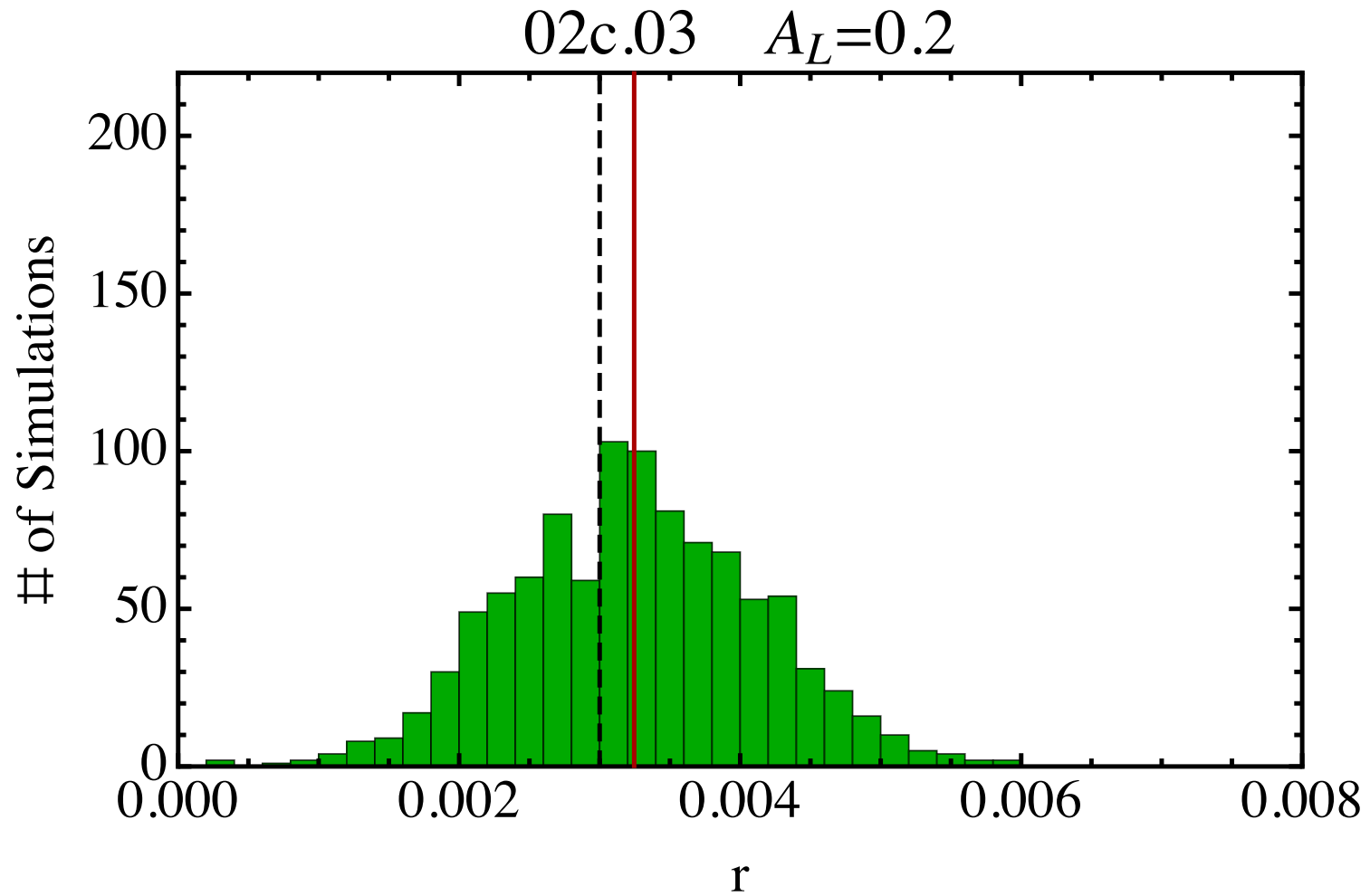
Detection significance for 100 simulations (Clem)

02c.03 $A_L=0.2$



02c.03

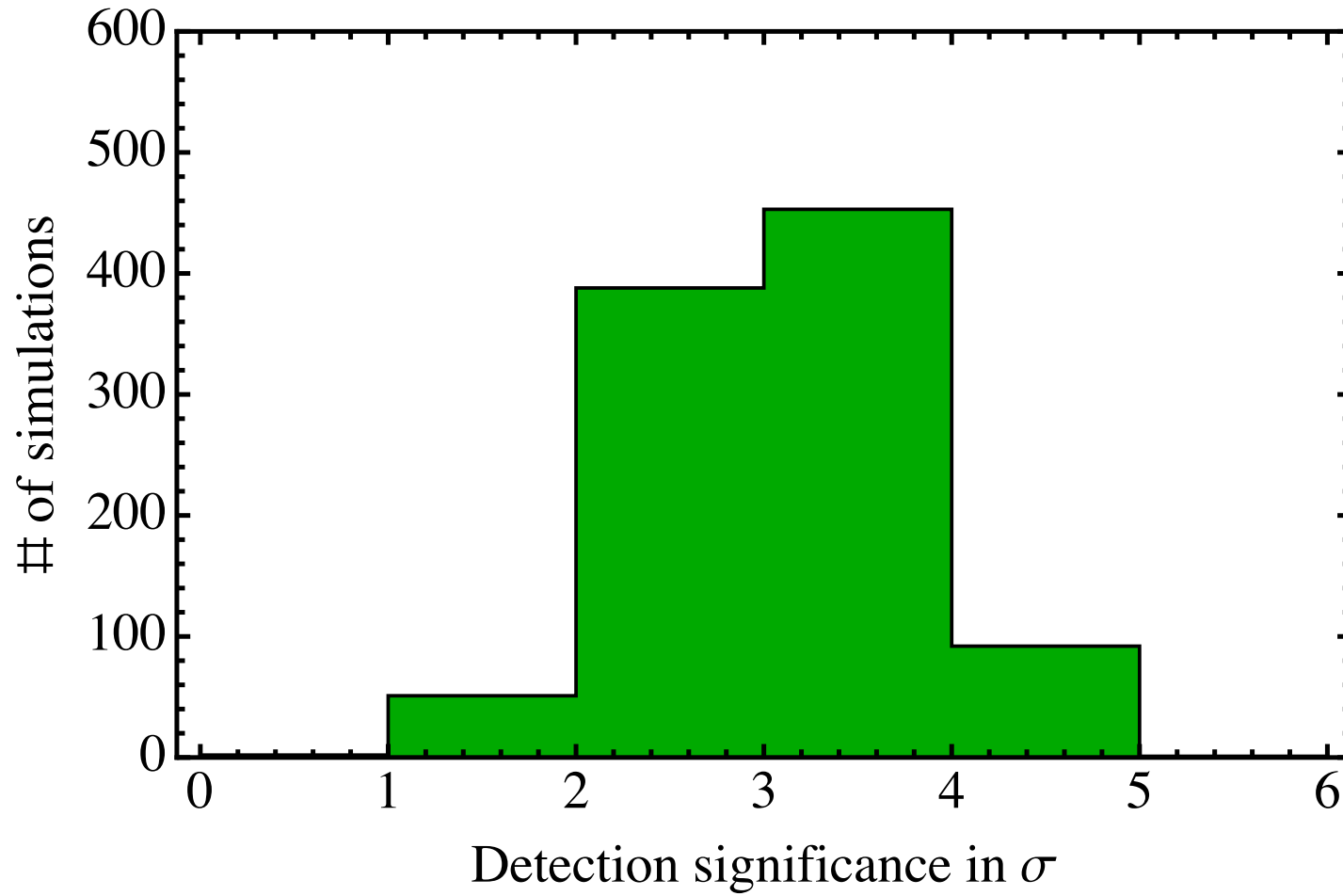
Distribution for 1000 simulations



02c.03

Detection significance for 1000 simulations

02c.03 $A_L=0.2$



02c.03

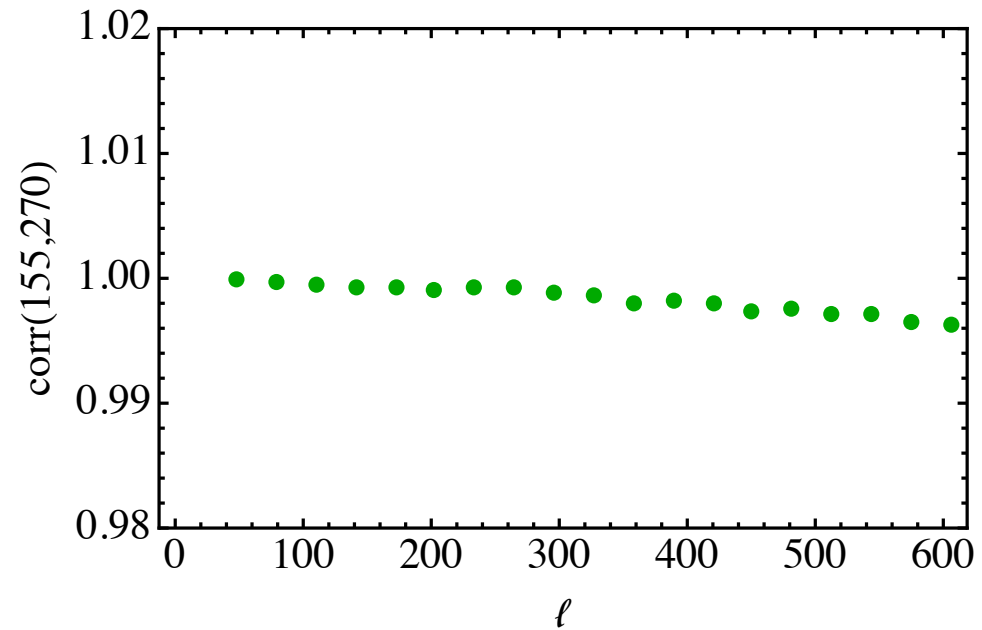
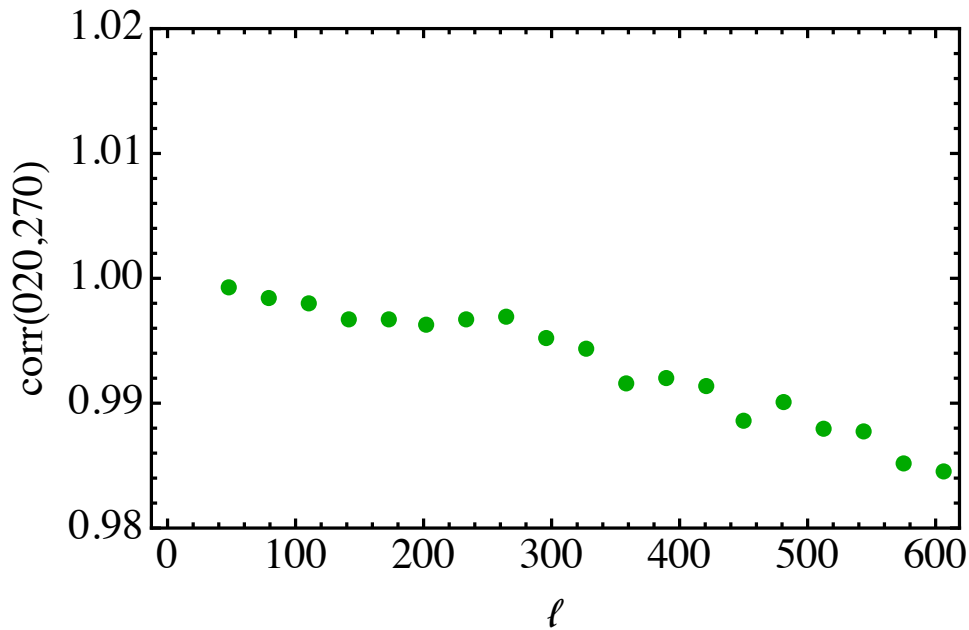
02 experimental configuration not currently sensitive enough to expect a *detection* of $r=0.003$

Currently exploring what it takes to detect $r=0.003$.

Dust models

Decorrelation

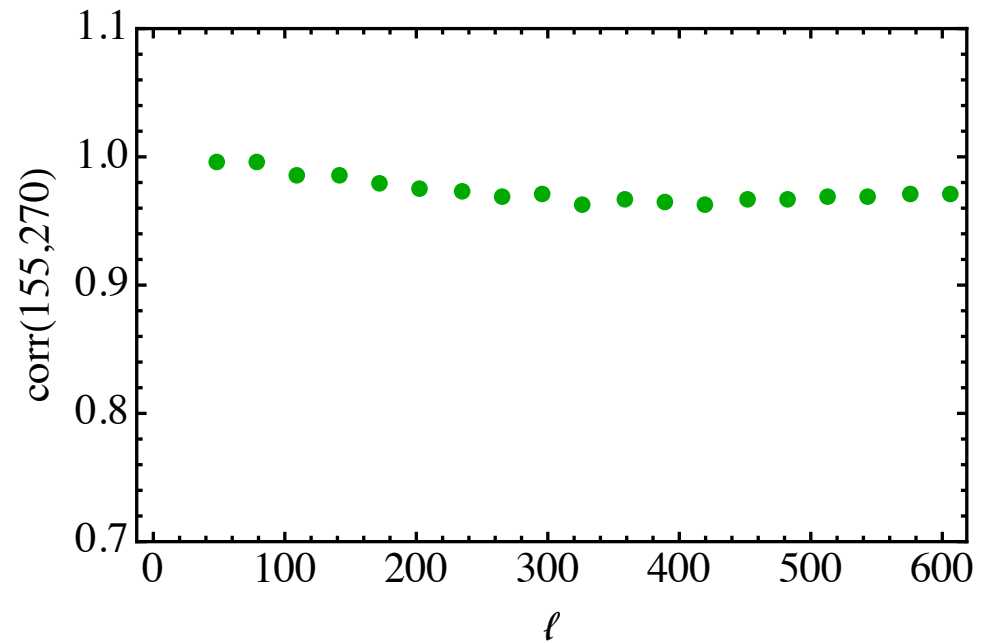
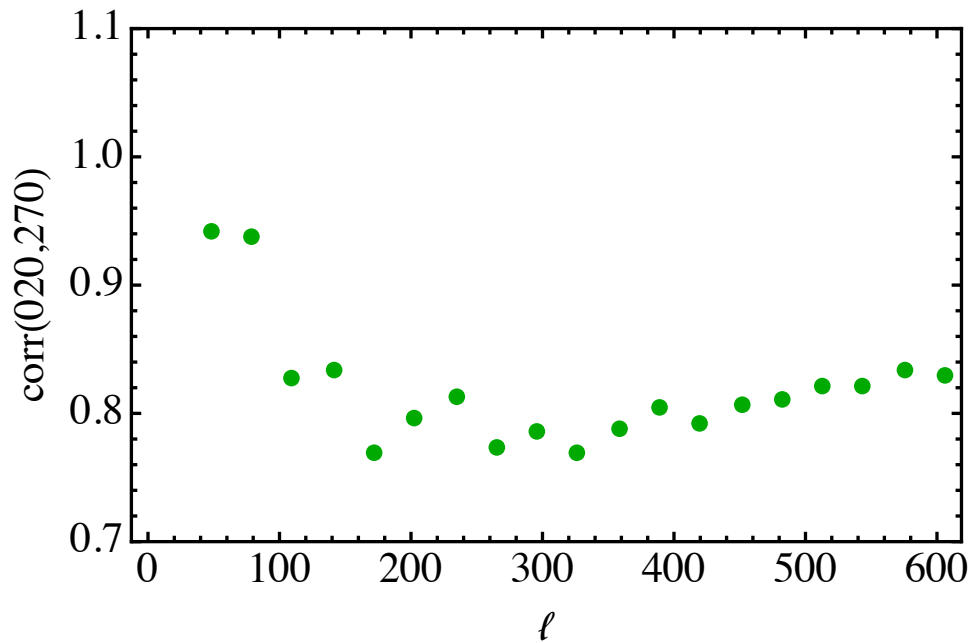
Should we be impressed by the small foreground residuals?



Some decorrelation included due to spatially varying spectral index, but perhaps smaller than expected/allowed by Planck data.

04

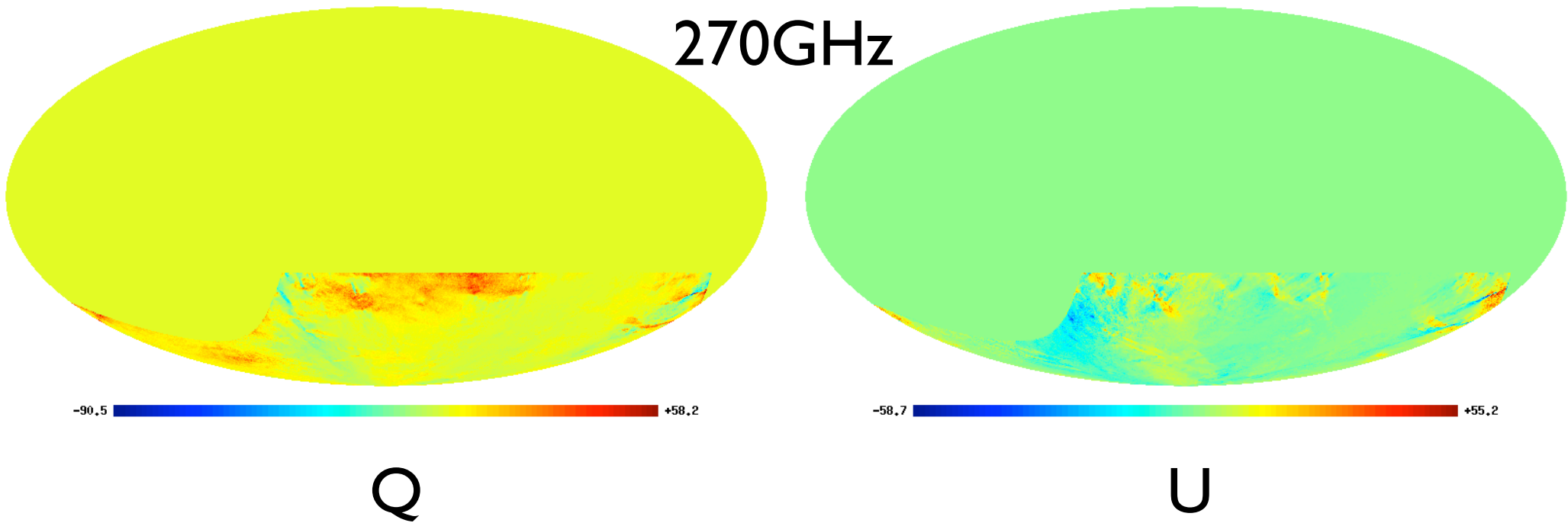
Included dust model based on GASS-HI data by Tuhin Ghosh, et al.



Significantly larger decorrelation between frequencies

04

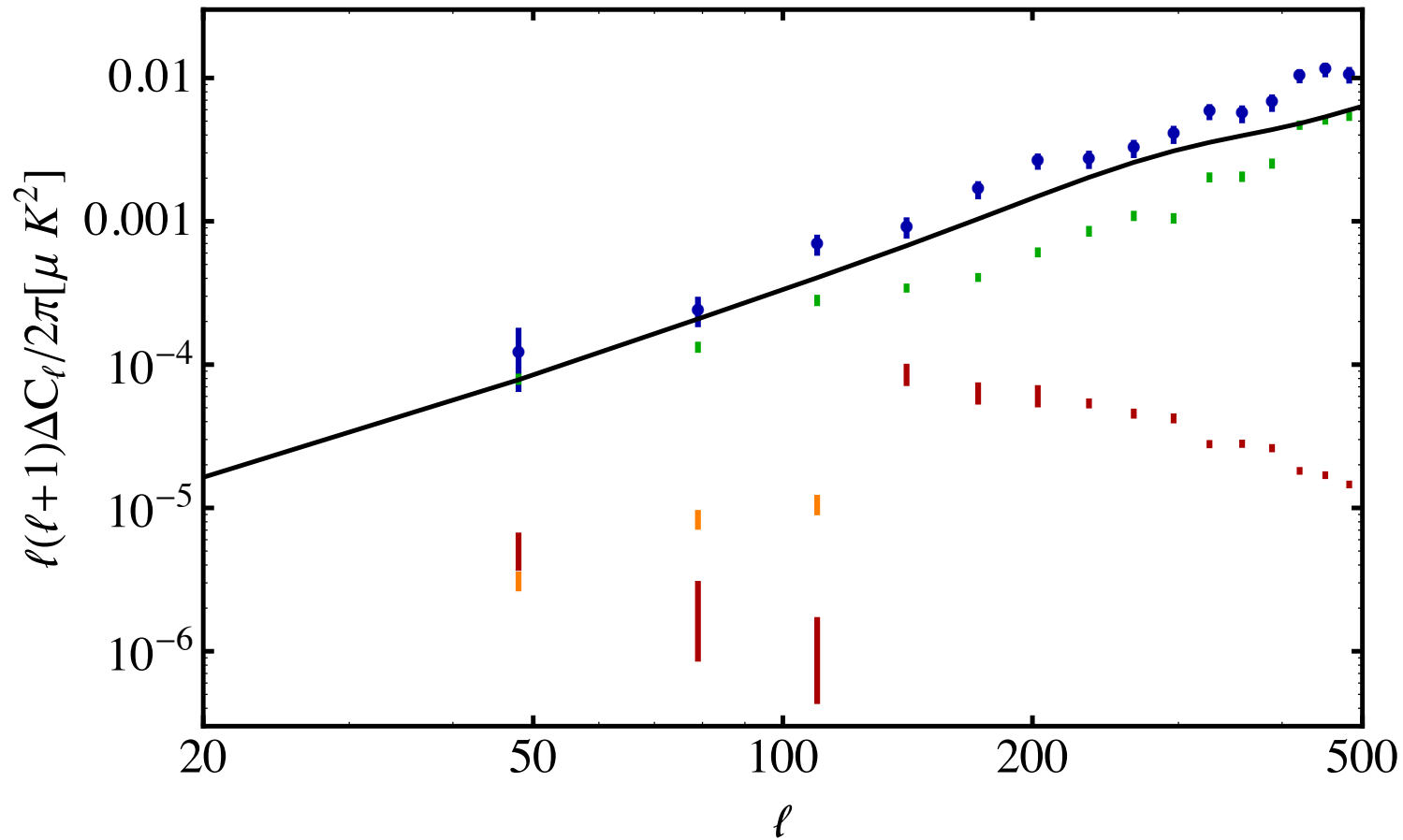
Combined with same synchrotron and AME models as before



(Limited sky fraction)

02.04

Sample simulation ($r=0, A_L=0.1$)



Dust residual comparable to signal

Summary

Moving forward, we should understand

- realistic level of decorrelation or find a way to parameterize our ignorance
- synchrotron at least at comparable level
- limitations in noiseless limit
- sensitivity required to detect $r=0.003$