A Model of Extragalactic Foregrounds for Unbiased Estimation of Cosmological Parameters from Planck and Other Ground Based Data

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For CINC 2010

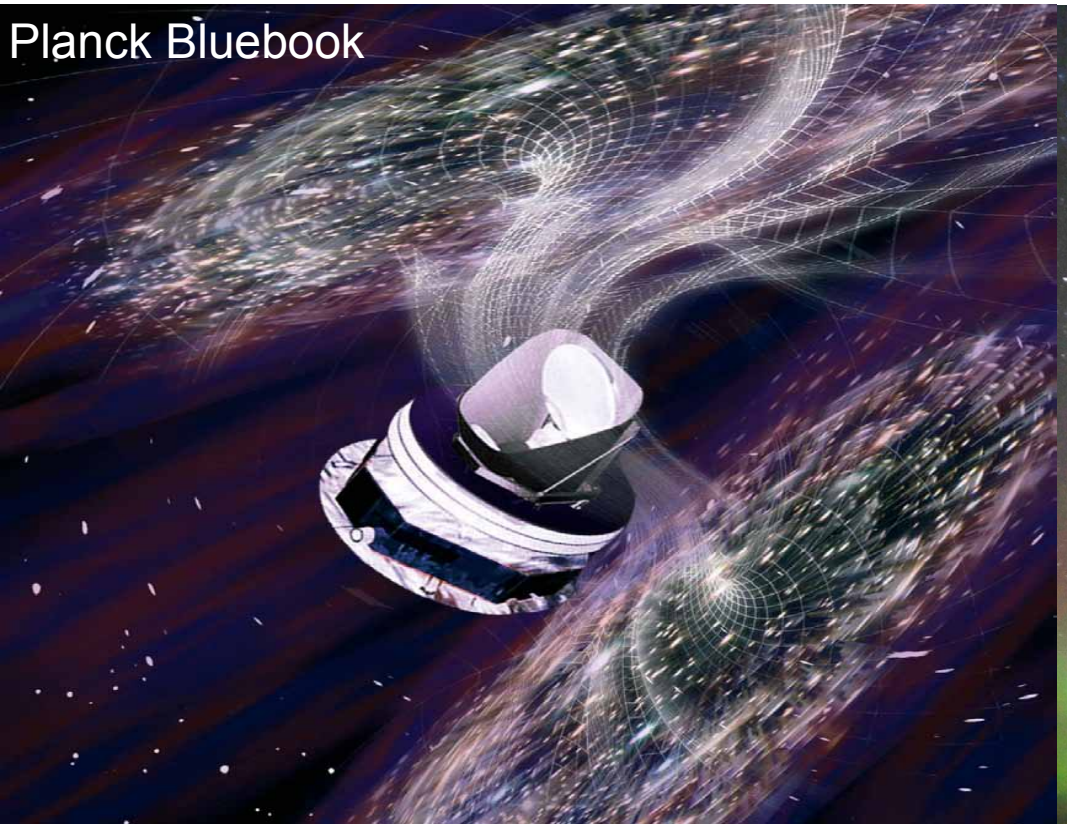
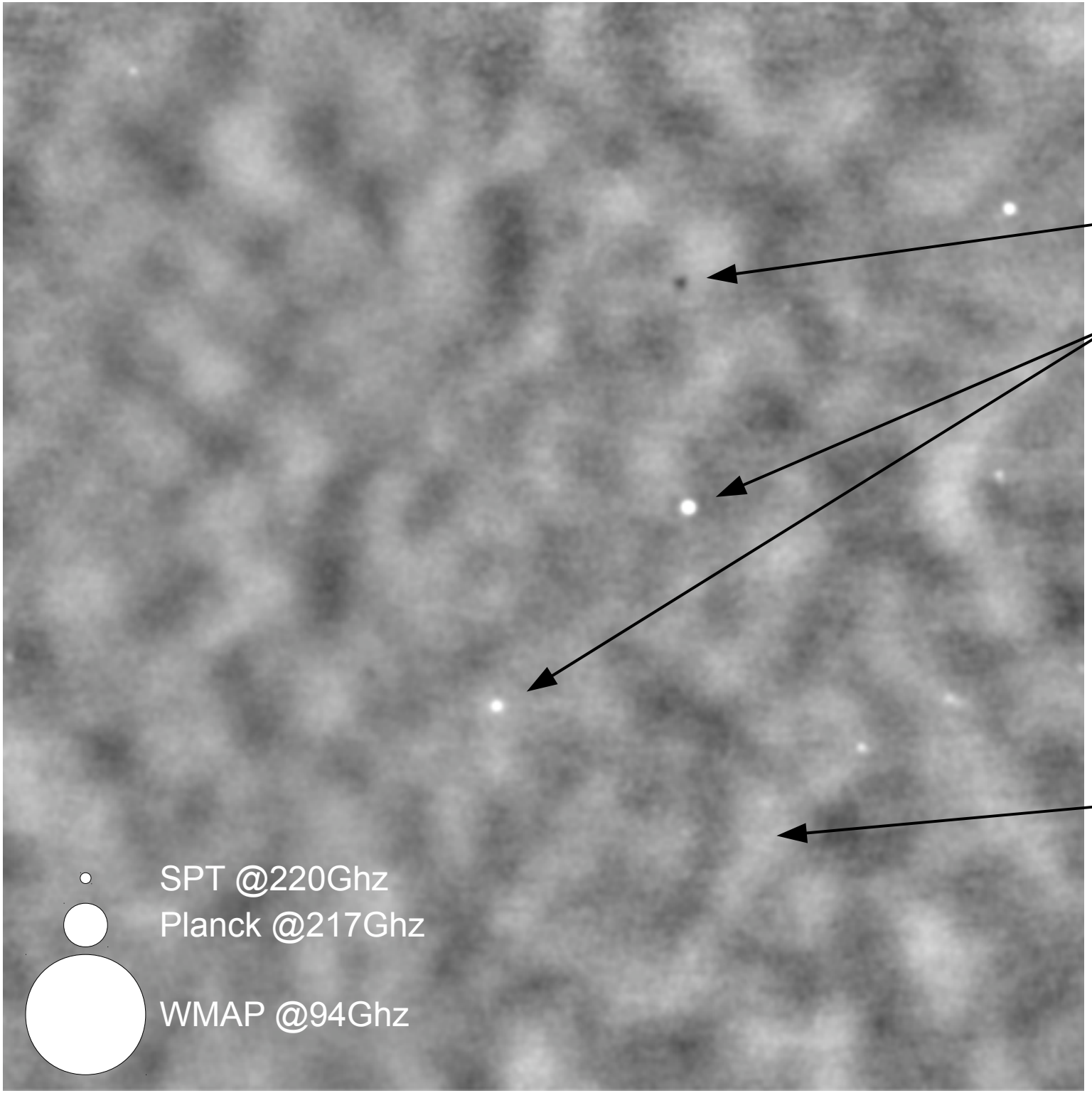
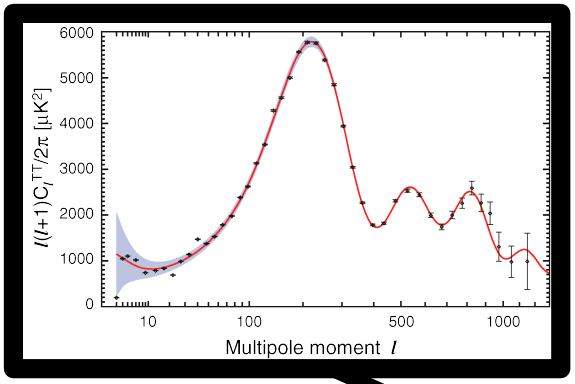
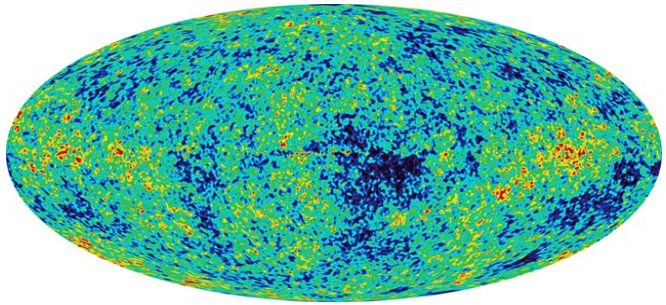

Planck Bluebook

Photo courtesy of Keith Vanderlinde

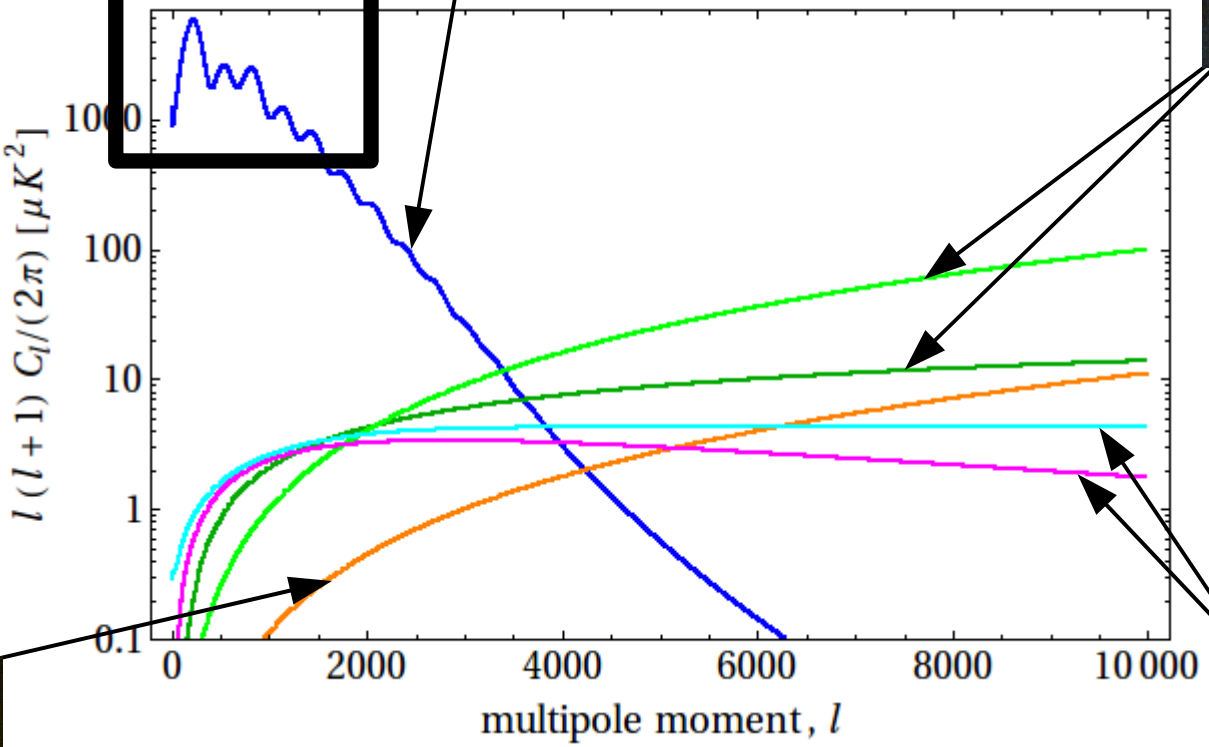


Slide: Joaquin Vieira

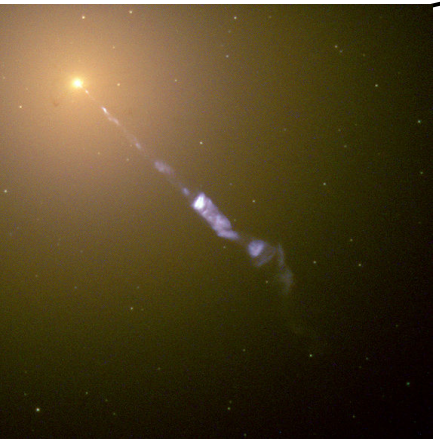


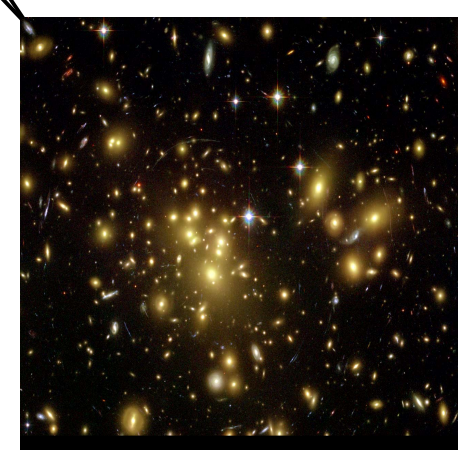


150Ghz×150Ghz

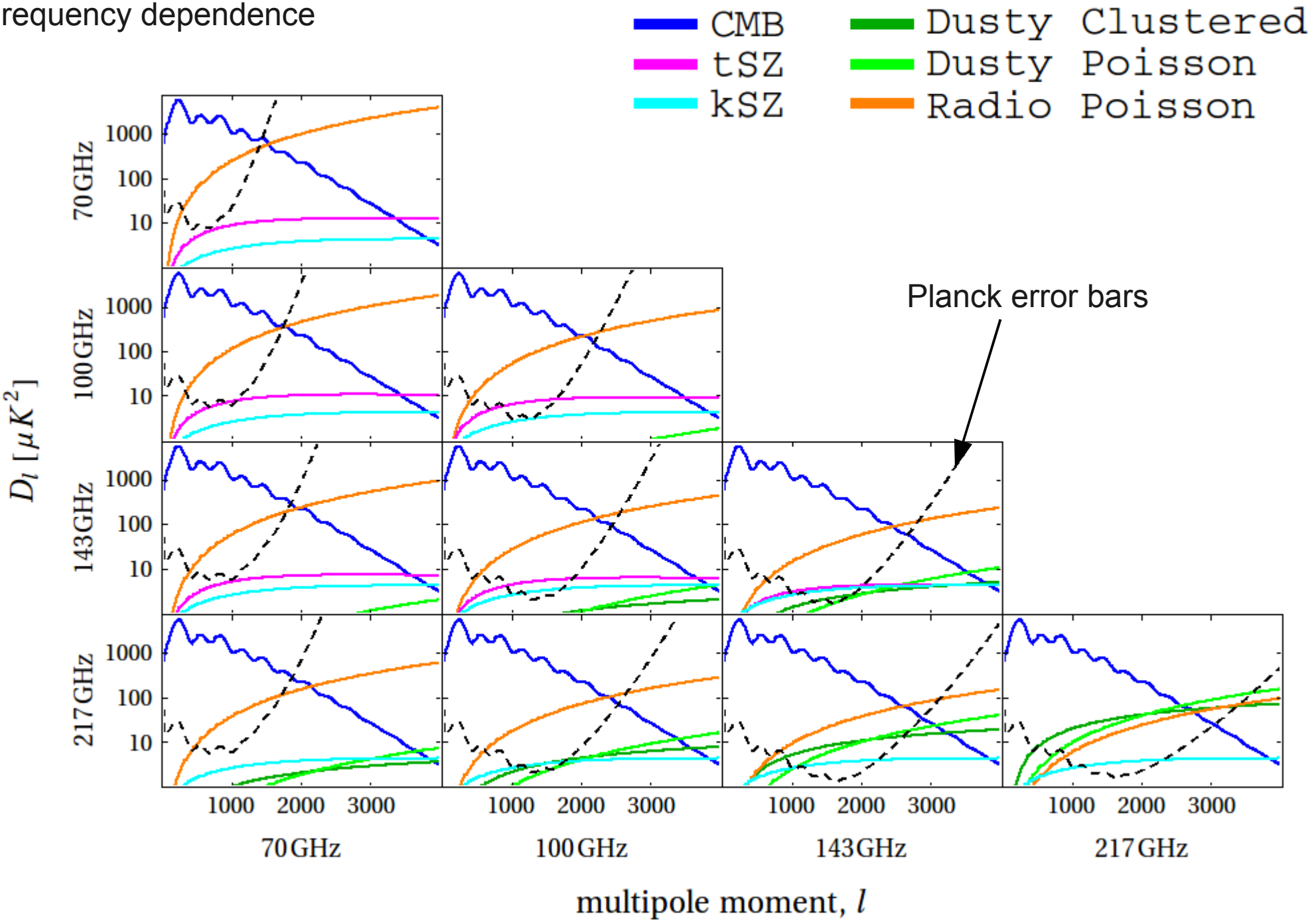


CMB
tSZ
kSZ
Dusty Clustered
Dusty Poisson
Radio Poisson

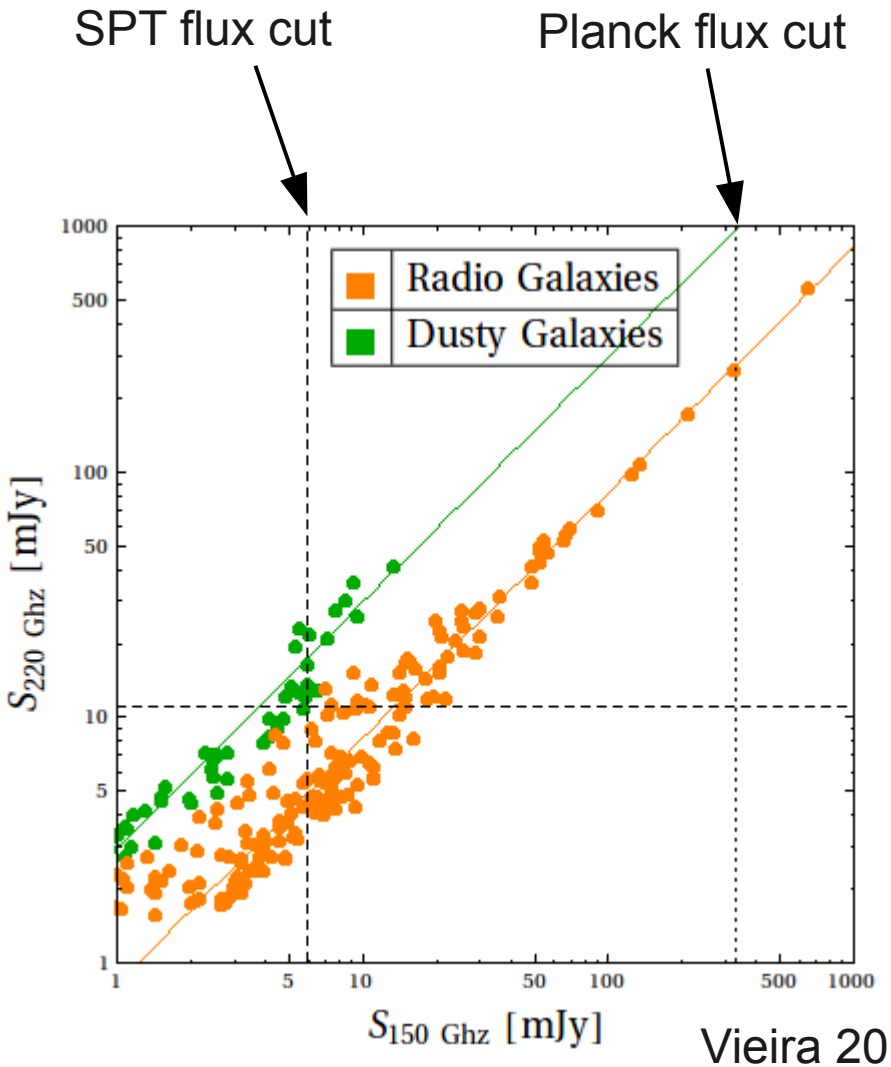




Frequency dependence

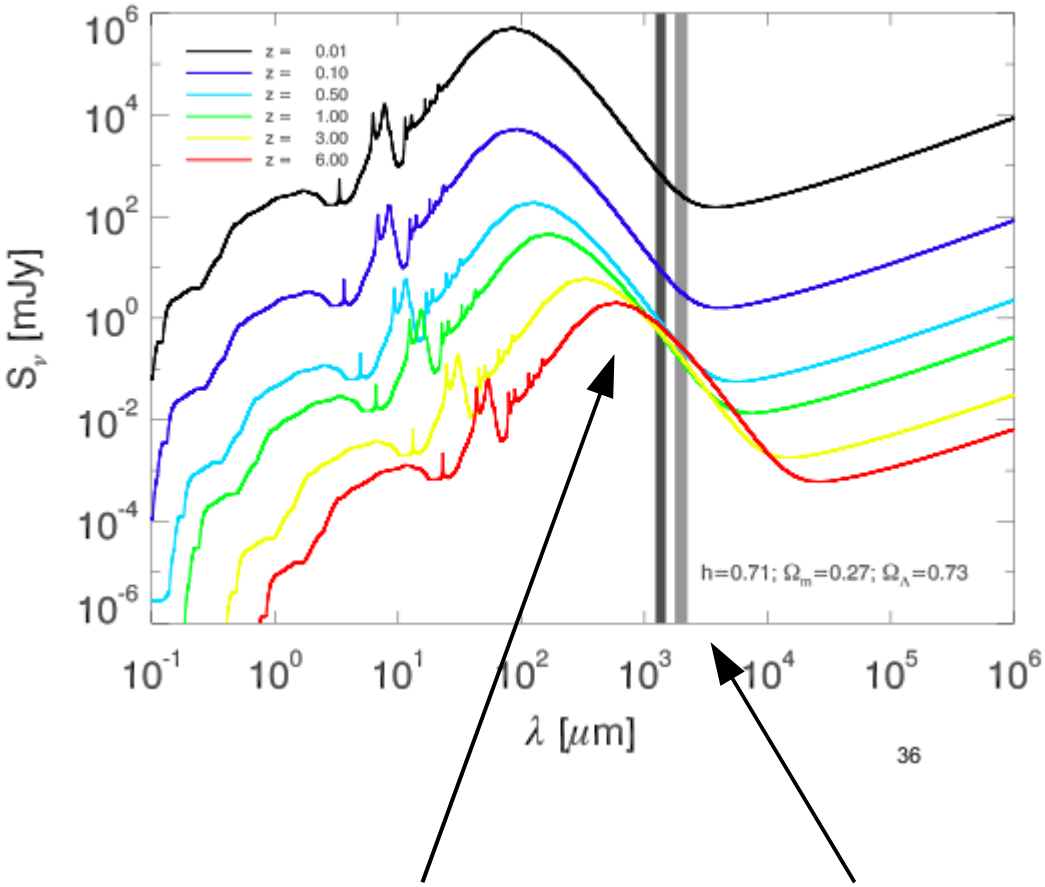


Point source frequency dependence



Vieira 2010 catalog

Typical dusty galaxy spectra

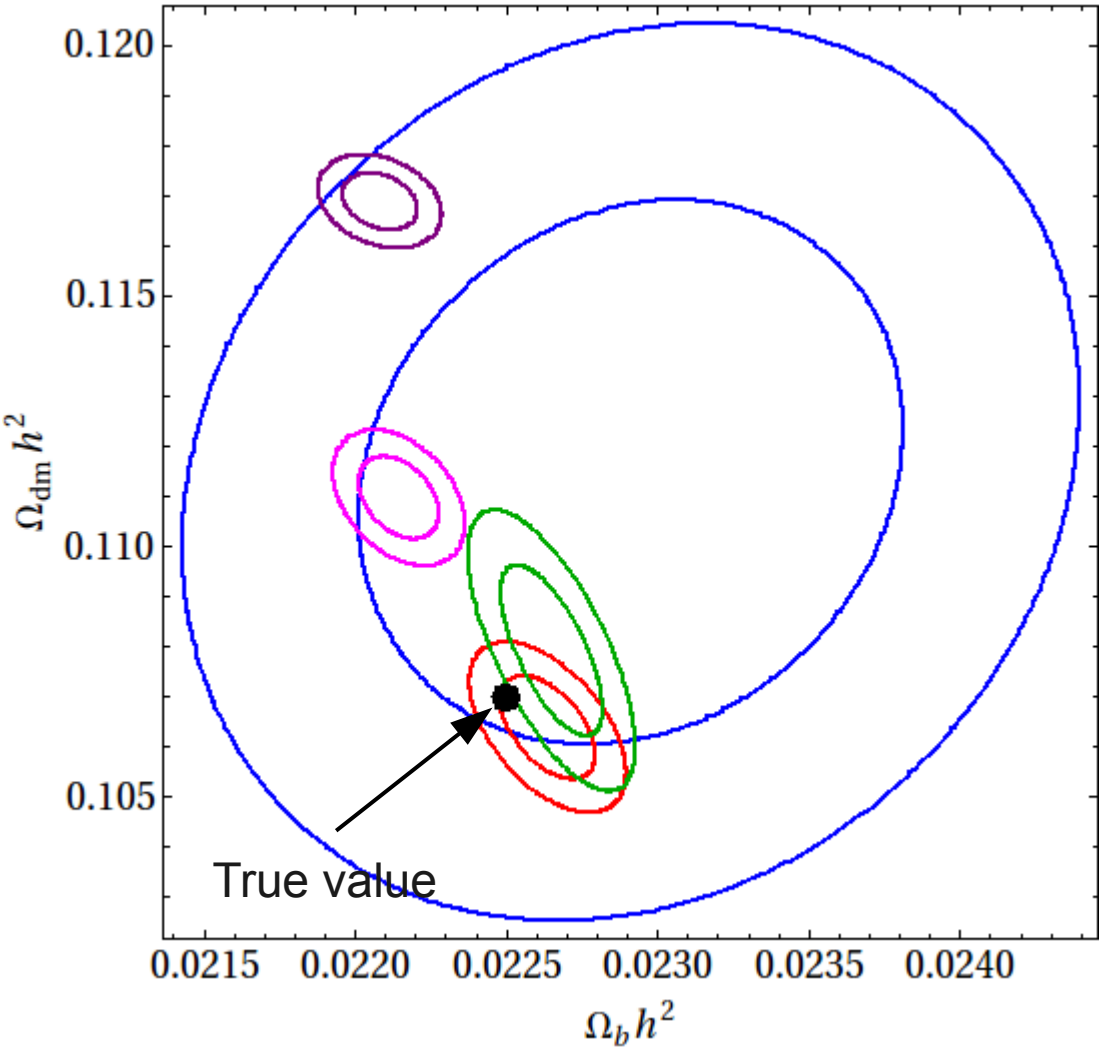


~30K greybody component

~100-200Ghz

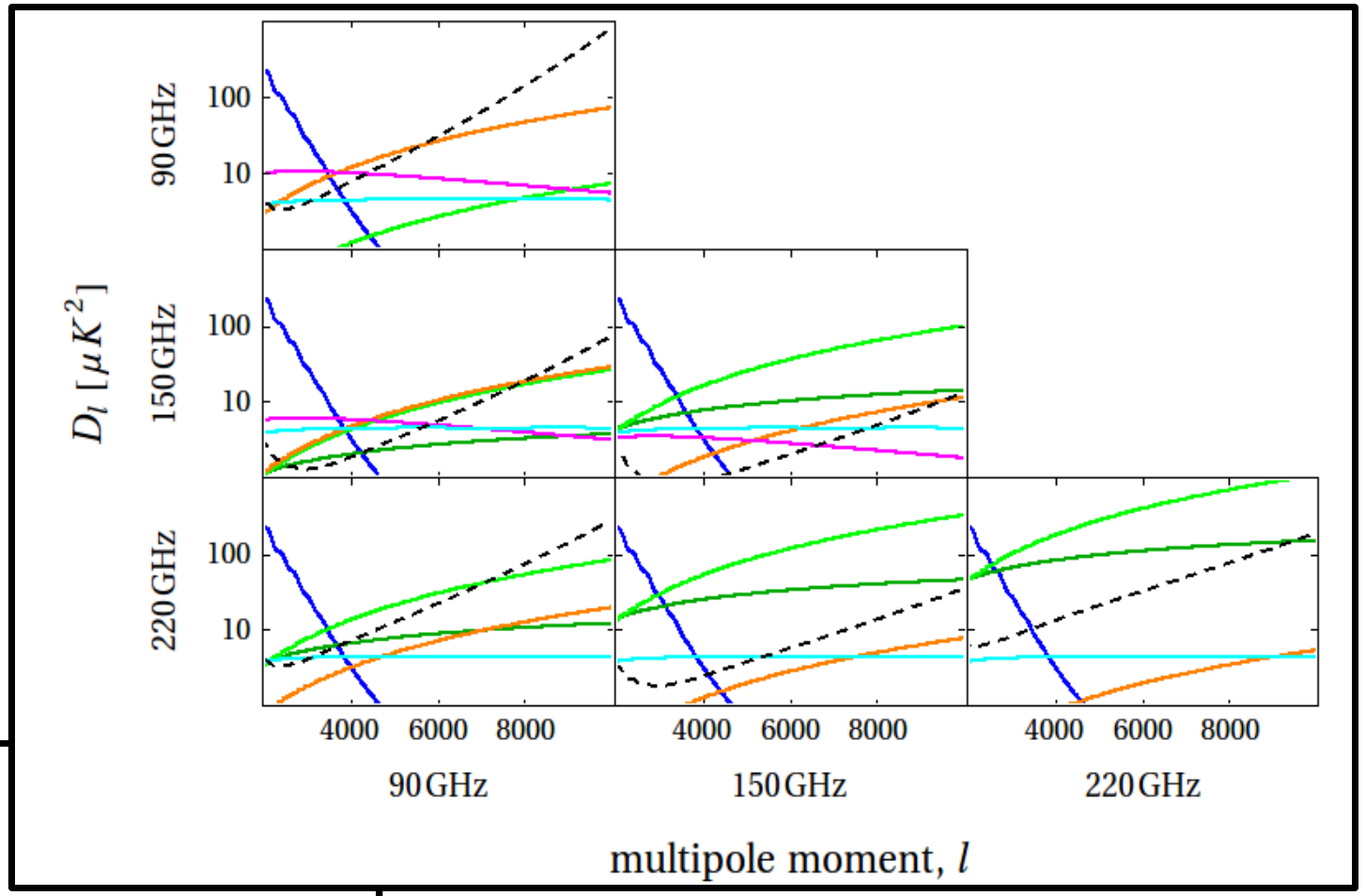
Results

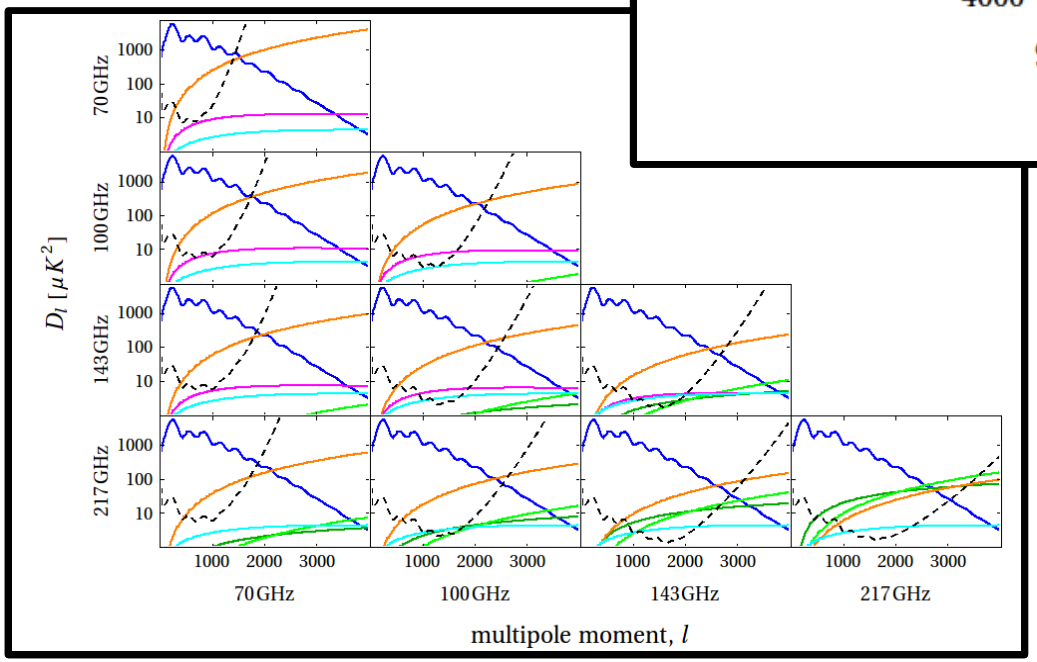
- Significant biases from neglecting to model one of the components, or even from just getting the details wrong

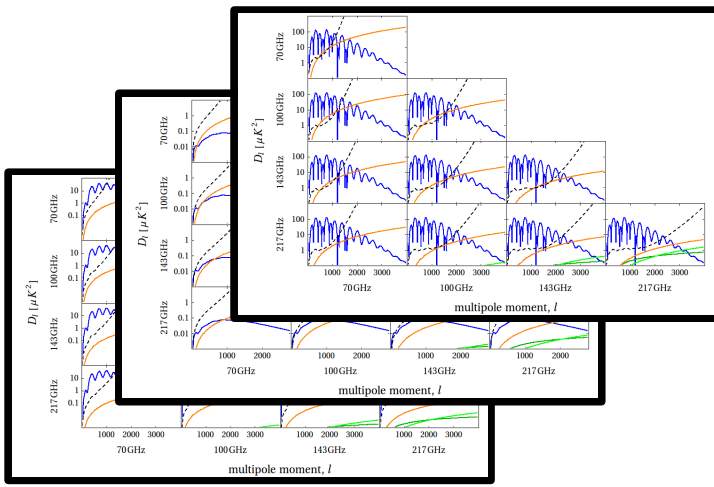


	WMAP7
	Wrong Dusty Clustering Shape
	Ignore tSZ
	Ignore tSZ/Dusty correlation
	Ignore Dusty Clustering Completely

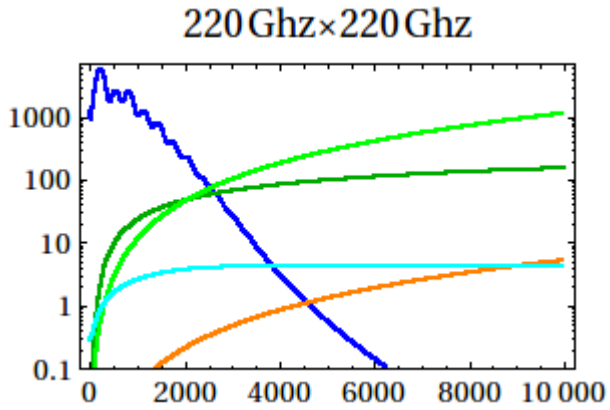
Adding SPT & Data Reduction

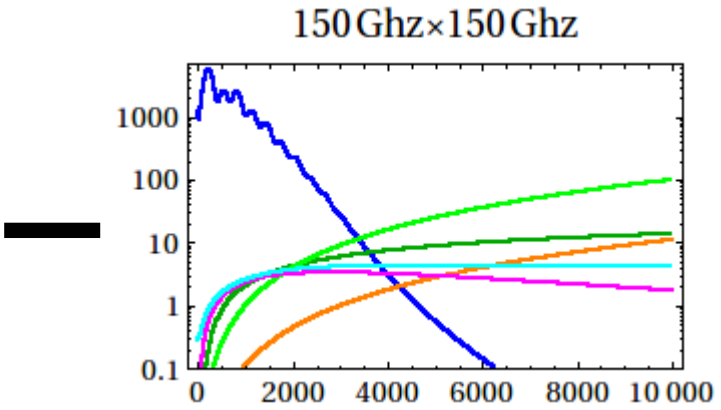


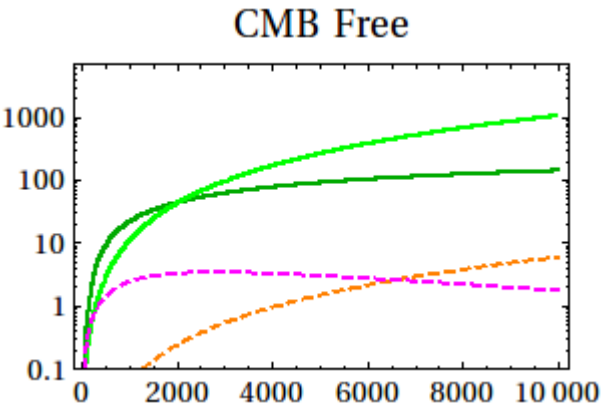


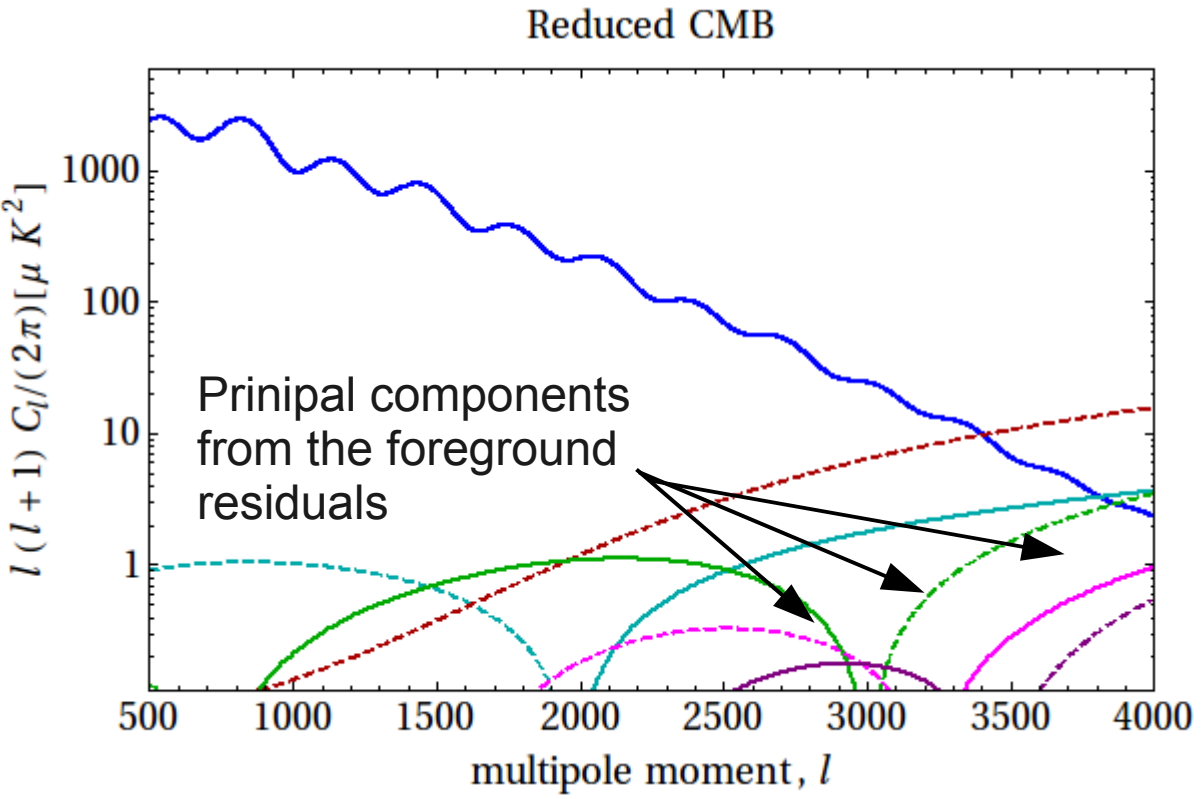


Intermediate Step





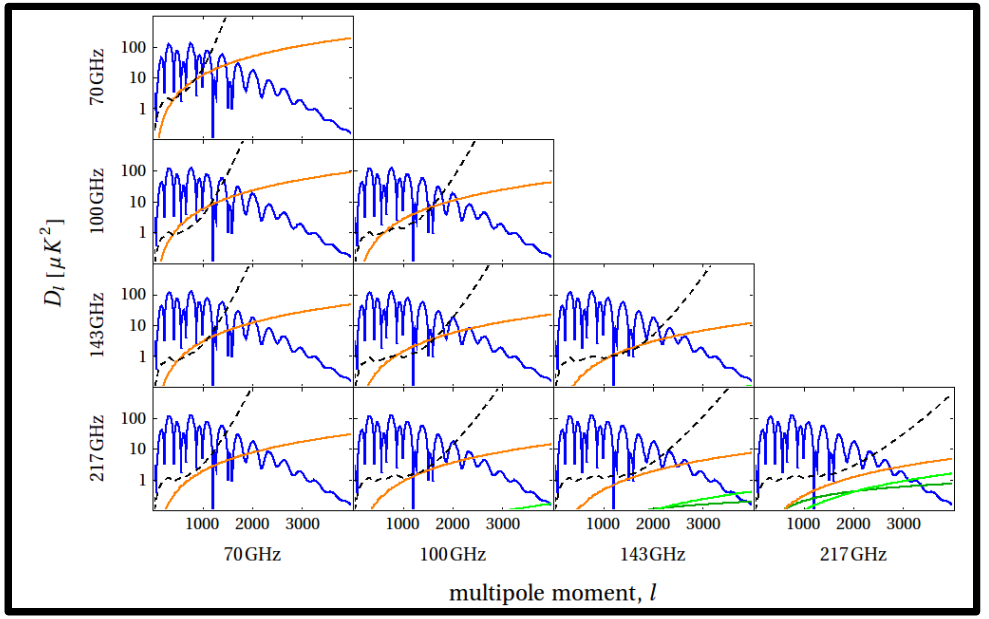


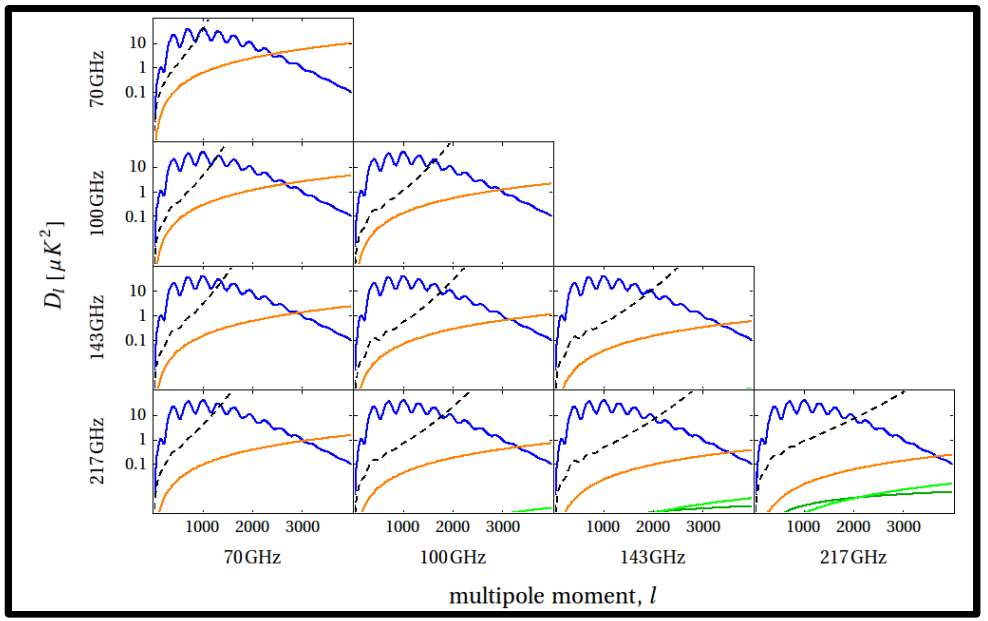


- Create a bunch of CMB free differenced spectra and use them to constrain the foregrounds
- Create an “inverse variance weighted” CMB estimate and subtract the mean foregrounds from step 1.
- Marginalize over residual foregrounds using several PC's

Conclusion

- We've developed a multifrequency high-ell foreground model informed by ground based data (e.g. SPT) which can be used to remove foregrounds in Planck.
- Convinced you of the importance of foregrounds.
- We're working on an analysis method which separates the foreground modeling from cosmological parameter estimation.
- Very soon the first year Planck power spectra will be ready, and we're eager to test our model


$D_l\ [\mu K^2]$
70GHz
100GHz
143GHz
217GHz
100
10
1
1000 2000 3000
multipole moment, l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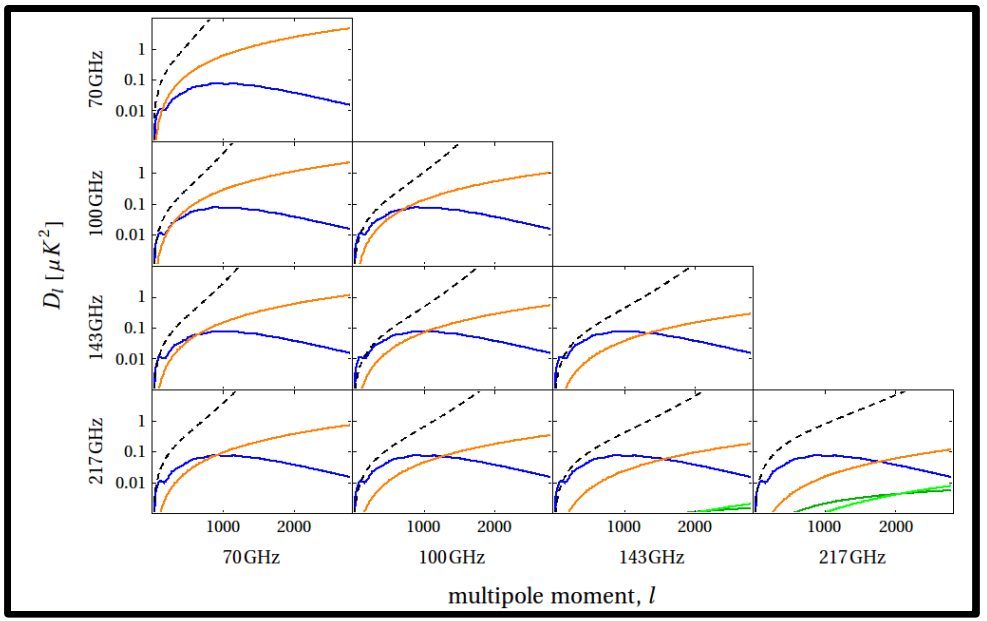
multipole moment, l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1
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0.01
1000 2000
multipole moment, l