

# Planck Science at $t + 33$ hours

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# Outline

- Video of launch
- Brief description of the instruments
- Planck compared to WMAP (maps, power spectra, parameters)

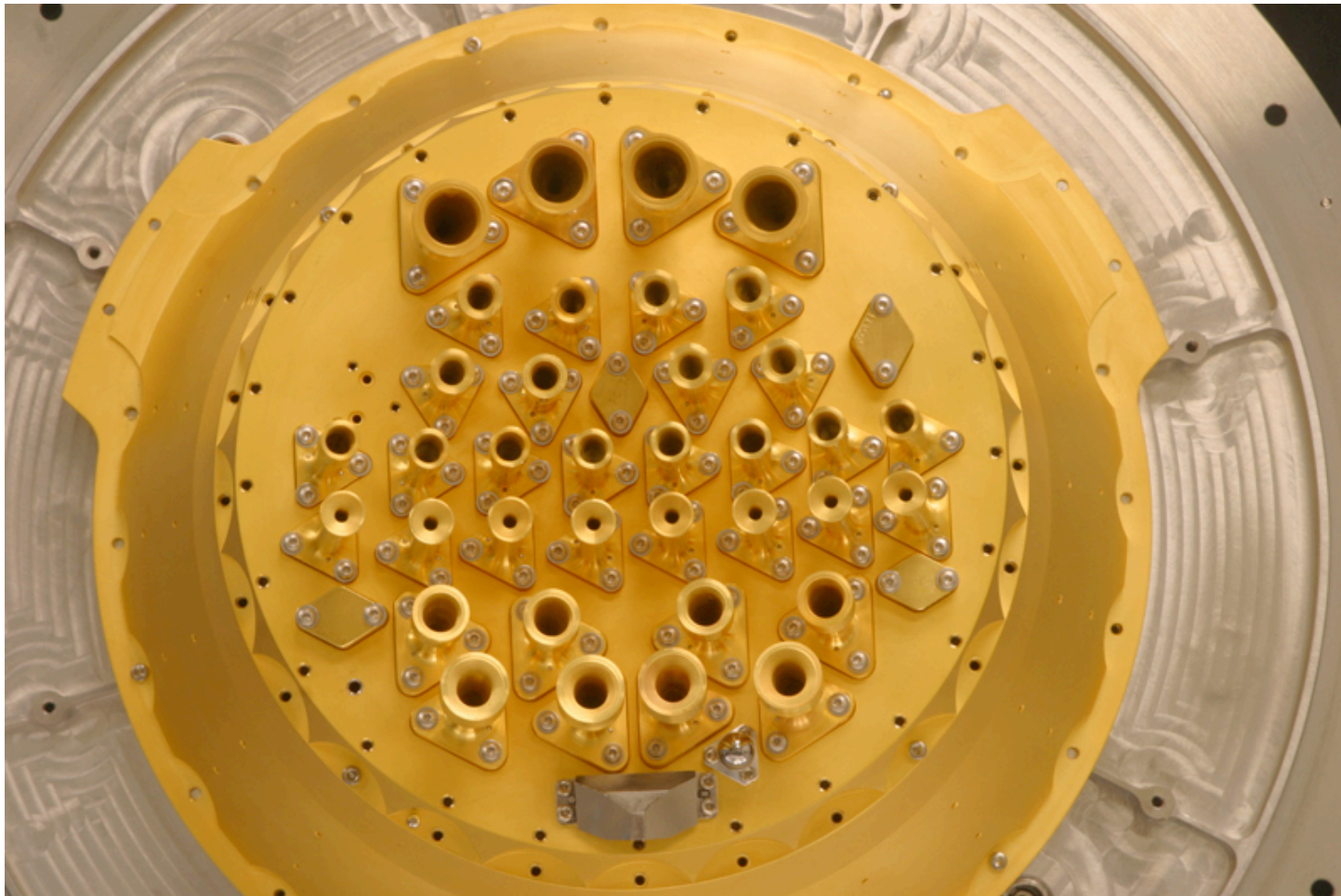
# Launch videos

- [www.videocorner.tv](http://www.videocorner.tv)
- [http://www.esa.int/SPECIALS/herschelplanck/SEM4SJZVNUF\\_0.html](http://www.esa.int/SPECIALS/herschelplanck/SEM4SJZVNUF_0.html)

# Planck in February 2009

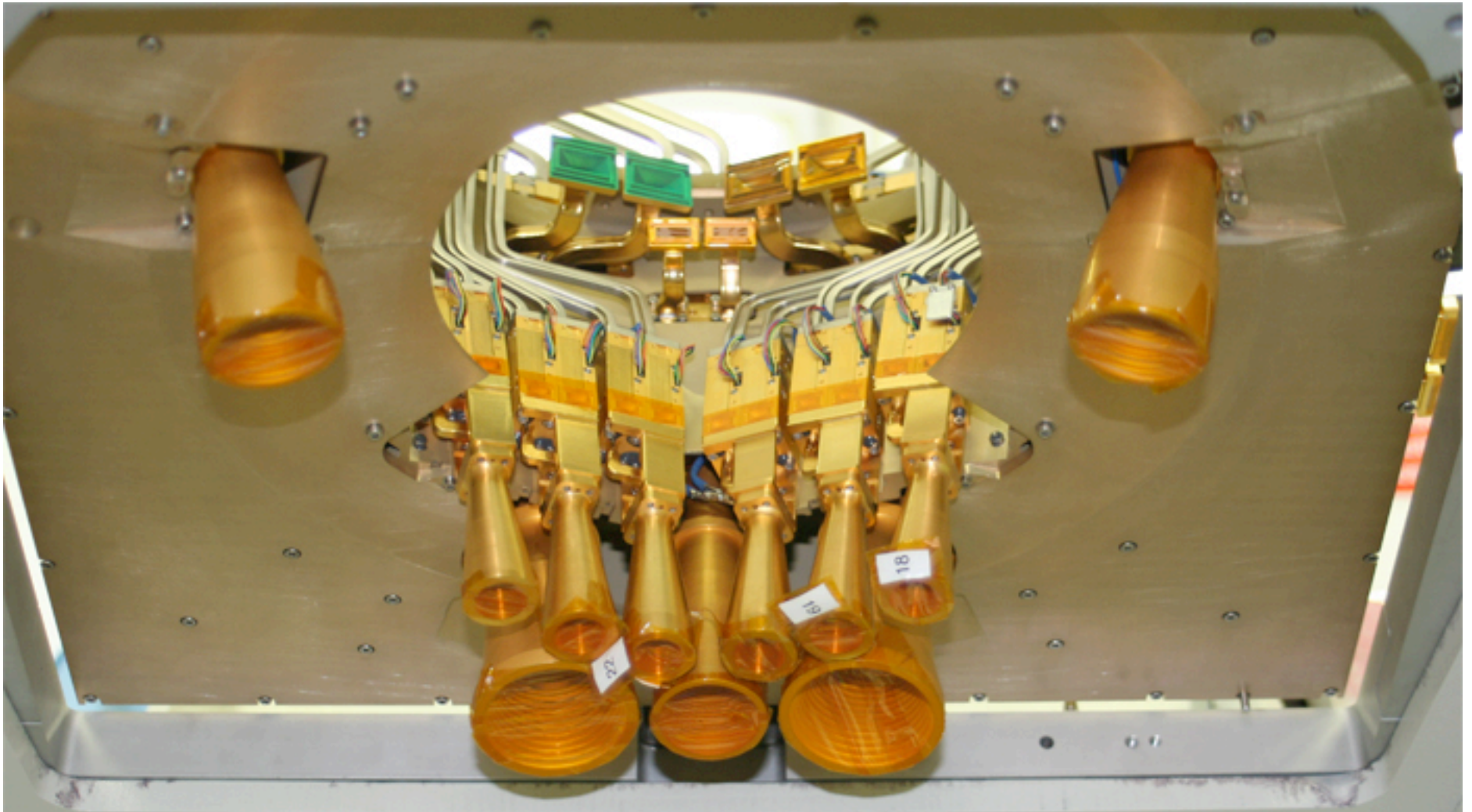


HFI: 100, 143, 217, 350, 540,  
850 GHz





LFI: 30, 44, 70 GHz



# Comparison with WMAP

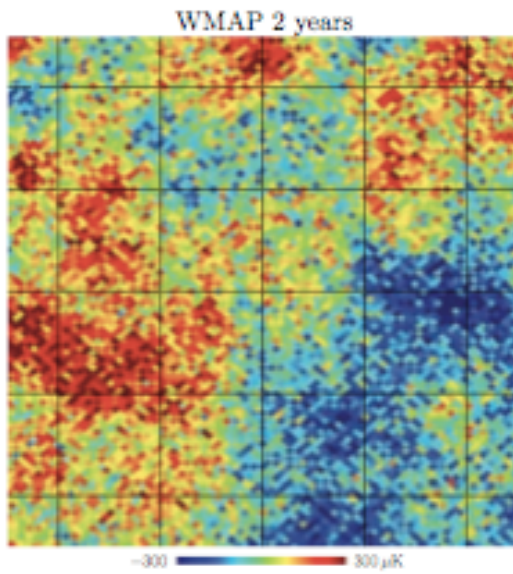
## WMAP

- 22-90 GHz
- 13'
- 300  $\mu\text{K}$ -arcmin (@ 94 GHz)
- 420  $\mu\text{K}$ -arcmin (polarization @ 94 GHz)
- 17,654

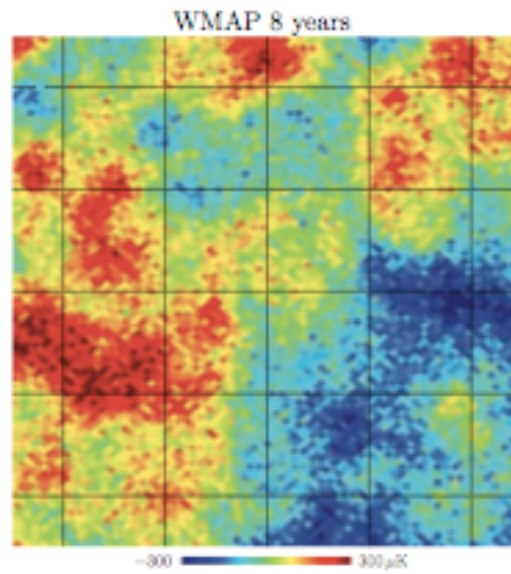
## Planck

- 30-850 GHz
- 5' (@ $\geq$ 217 GHz)
- 40  $\mu\text{K}$ -arcmin (@143 GHz)
- 80  $\mu\text{K}$ -arcmin (polarization @143 GHz)
- 0

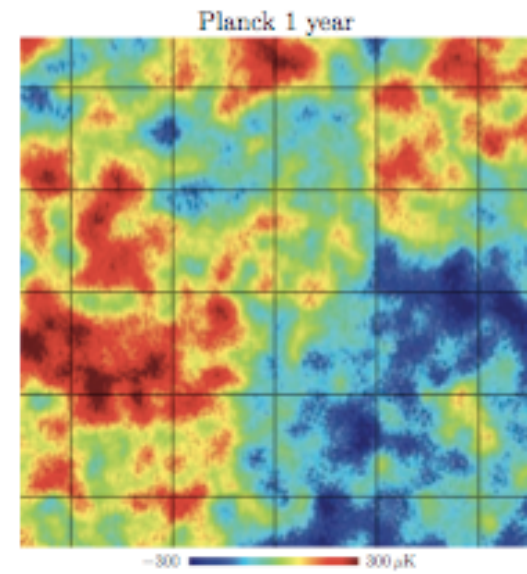
# Temperature Maps



WMAP 2 years

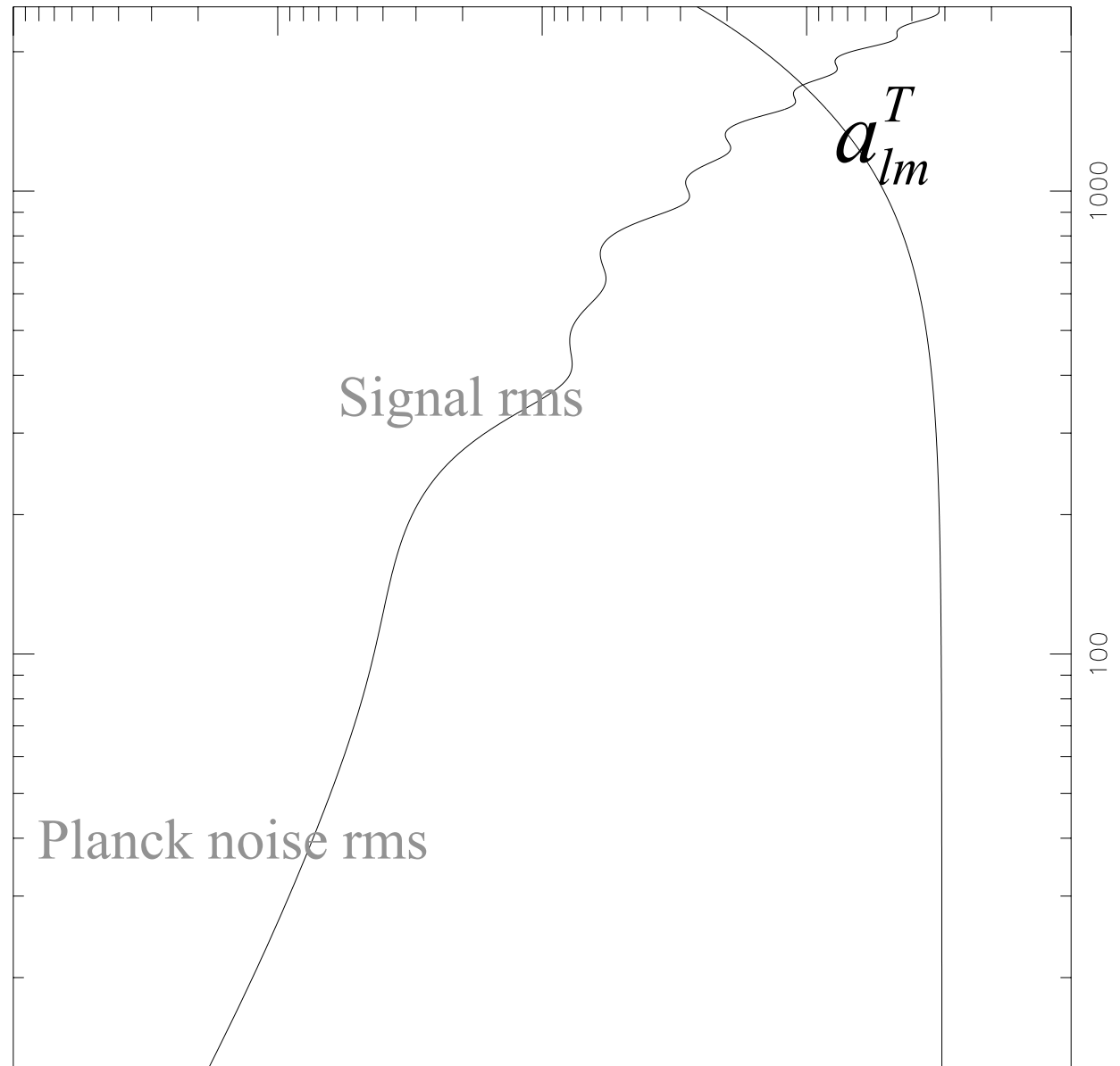


WMAP 8 years

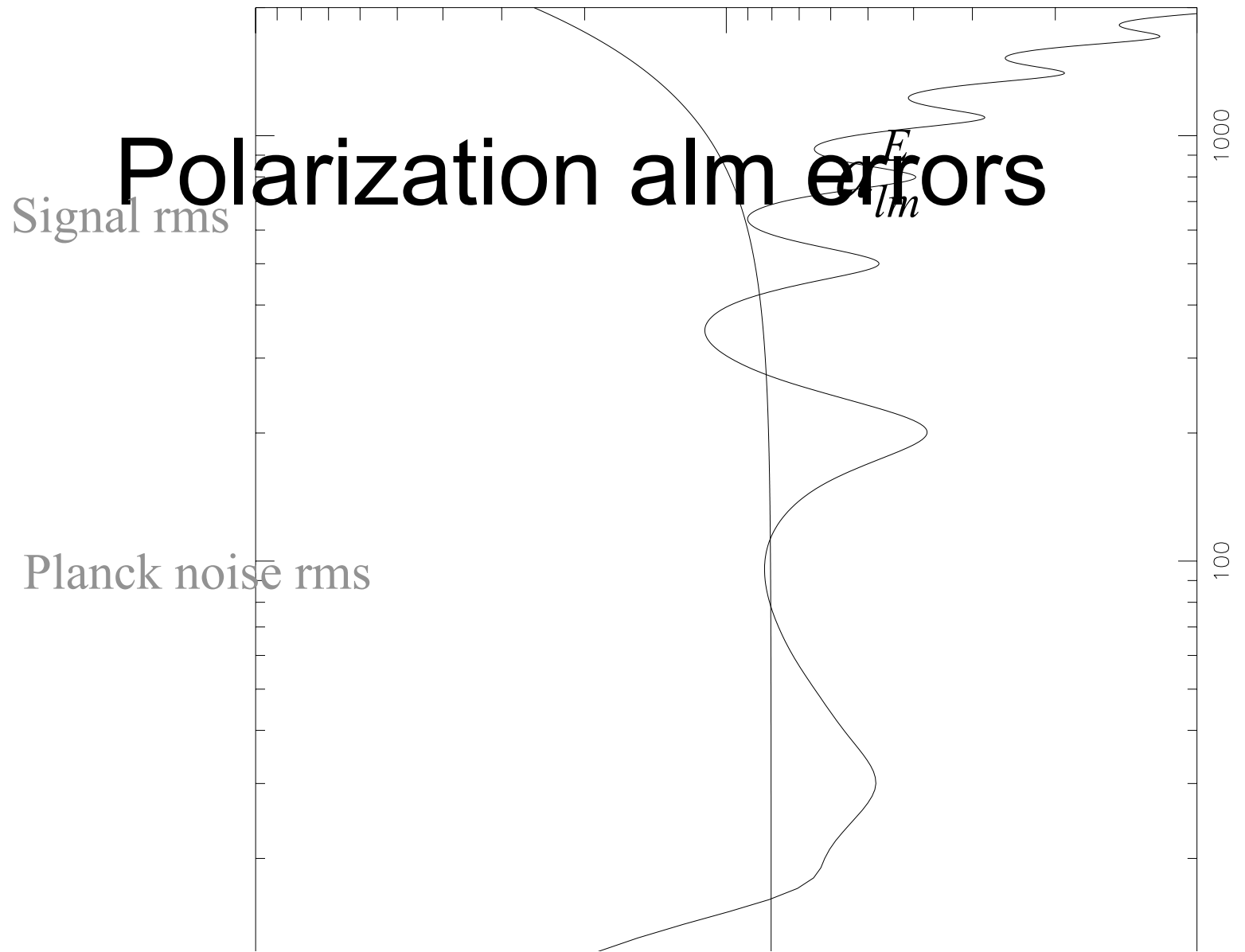


Planck 1 year



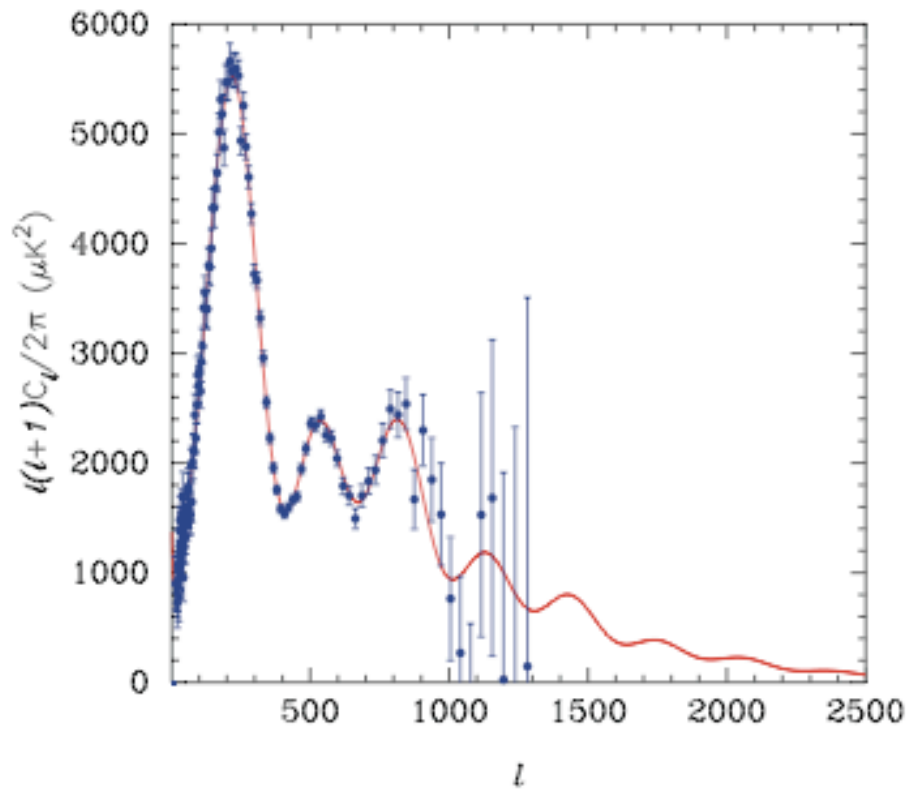


Planck map noise and signal (CMB) rms in spherical harmonic space



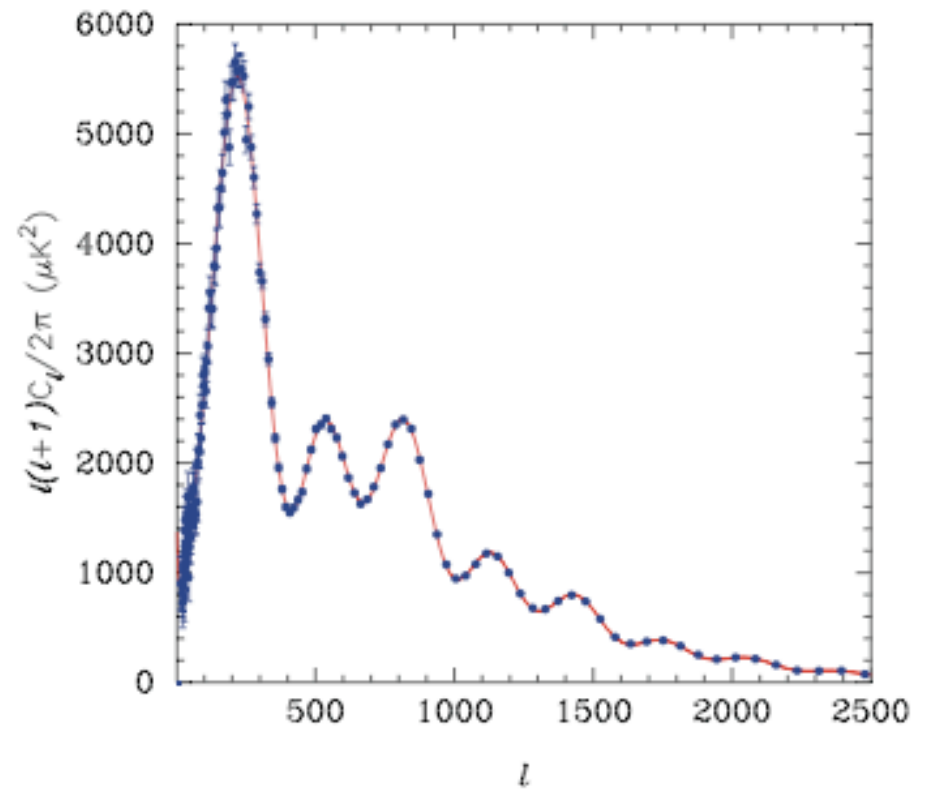
Planck polarization maps signal and noise rms

WMAP



WMAP 4 years

PLANCK

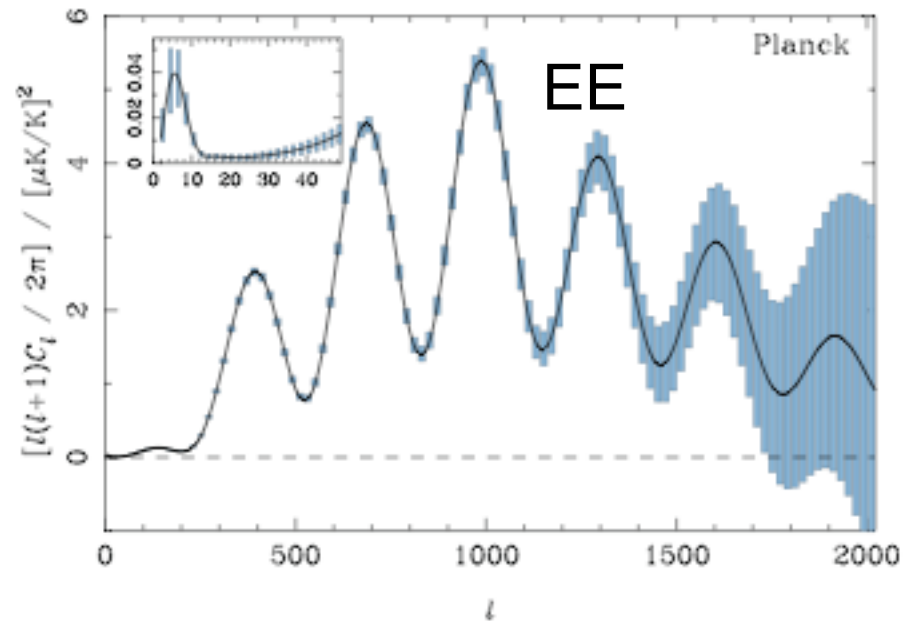
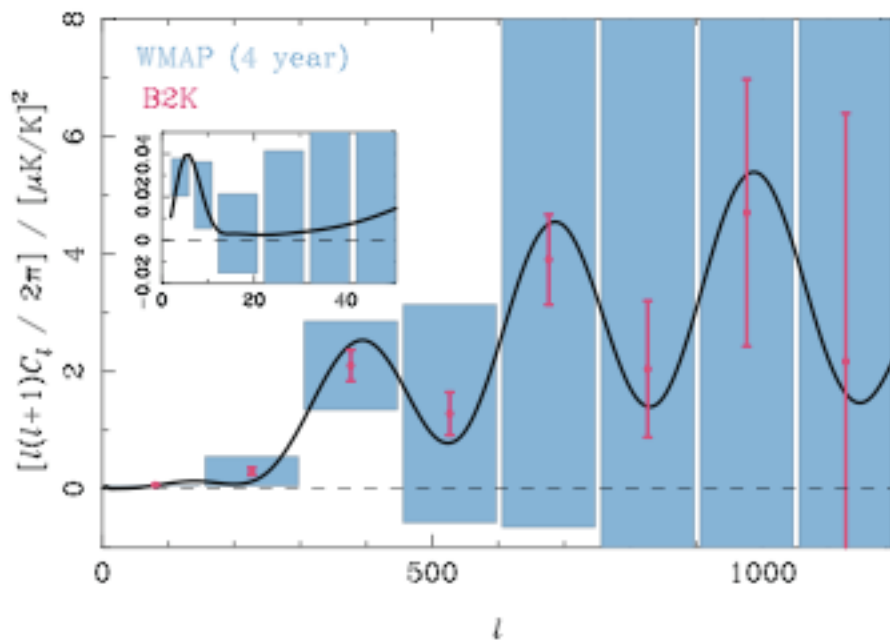
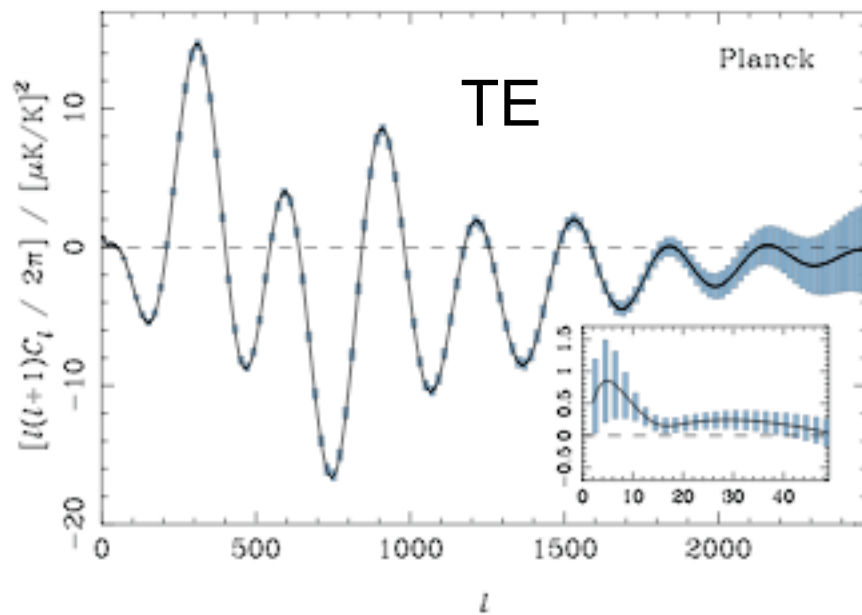
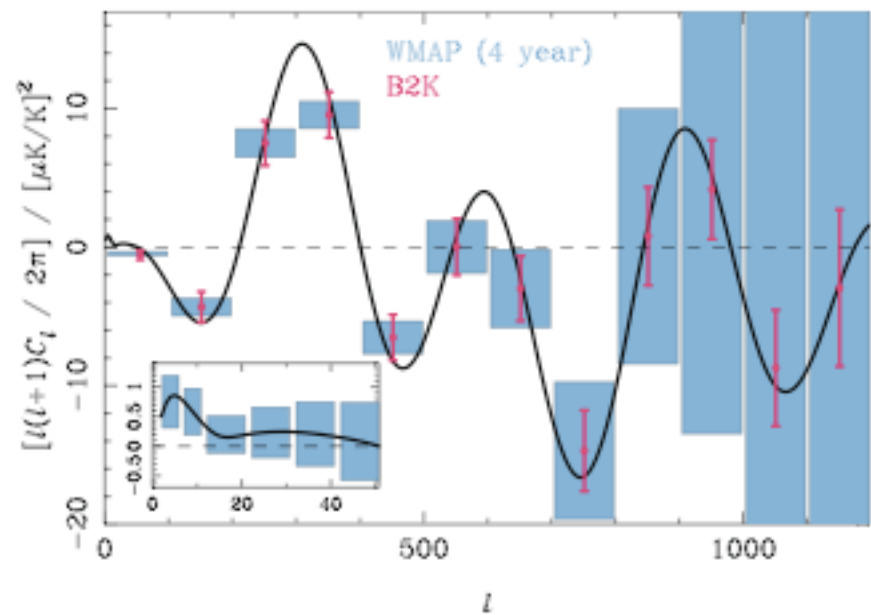


Planck 1 year

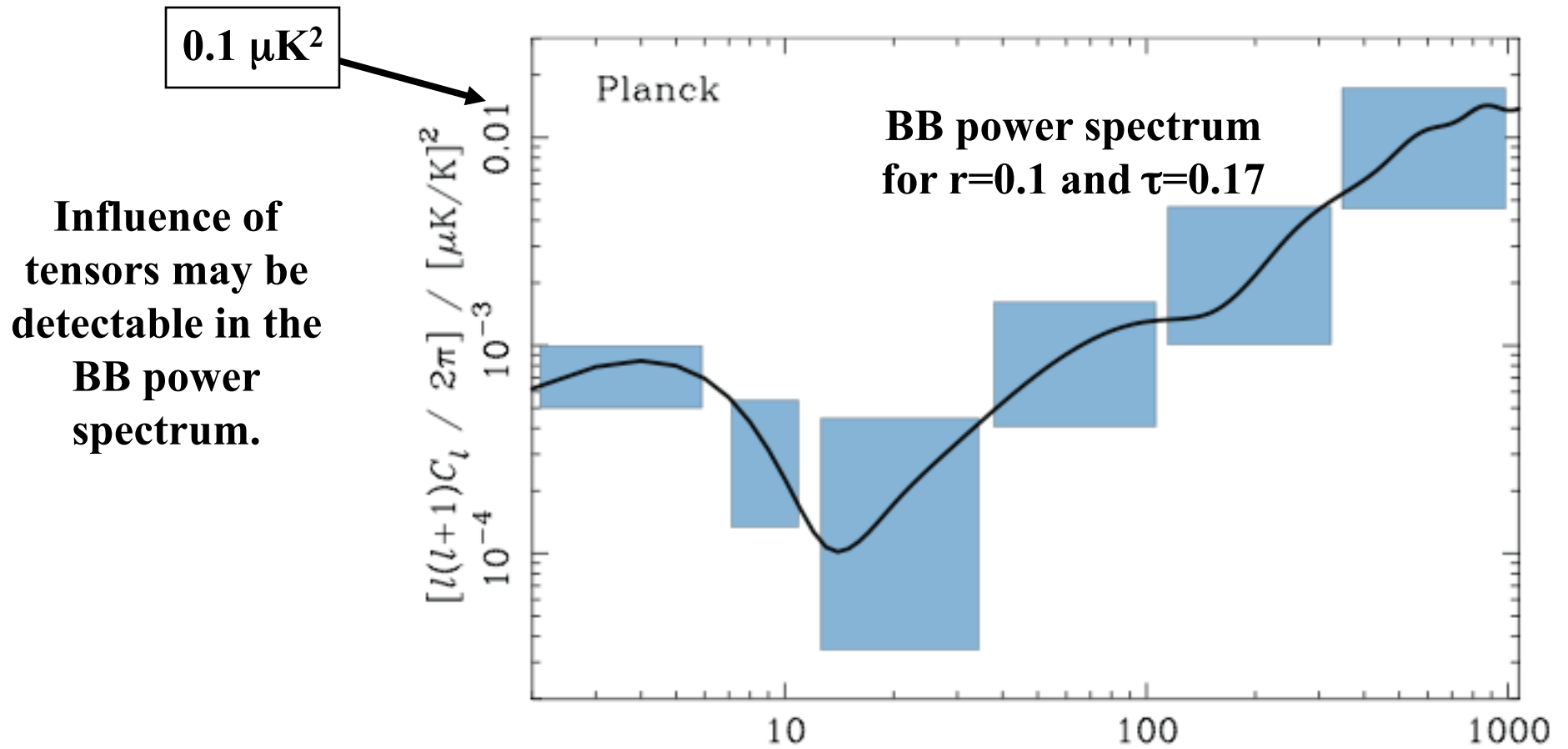
WMAP 4 years

Planck 1 year

Planck Bluebook

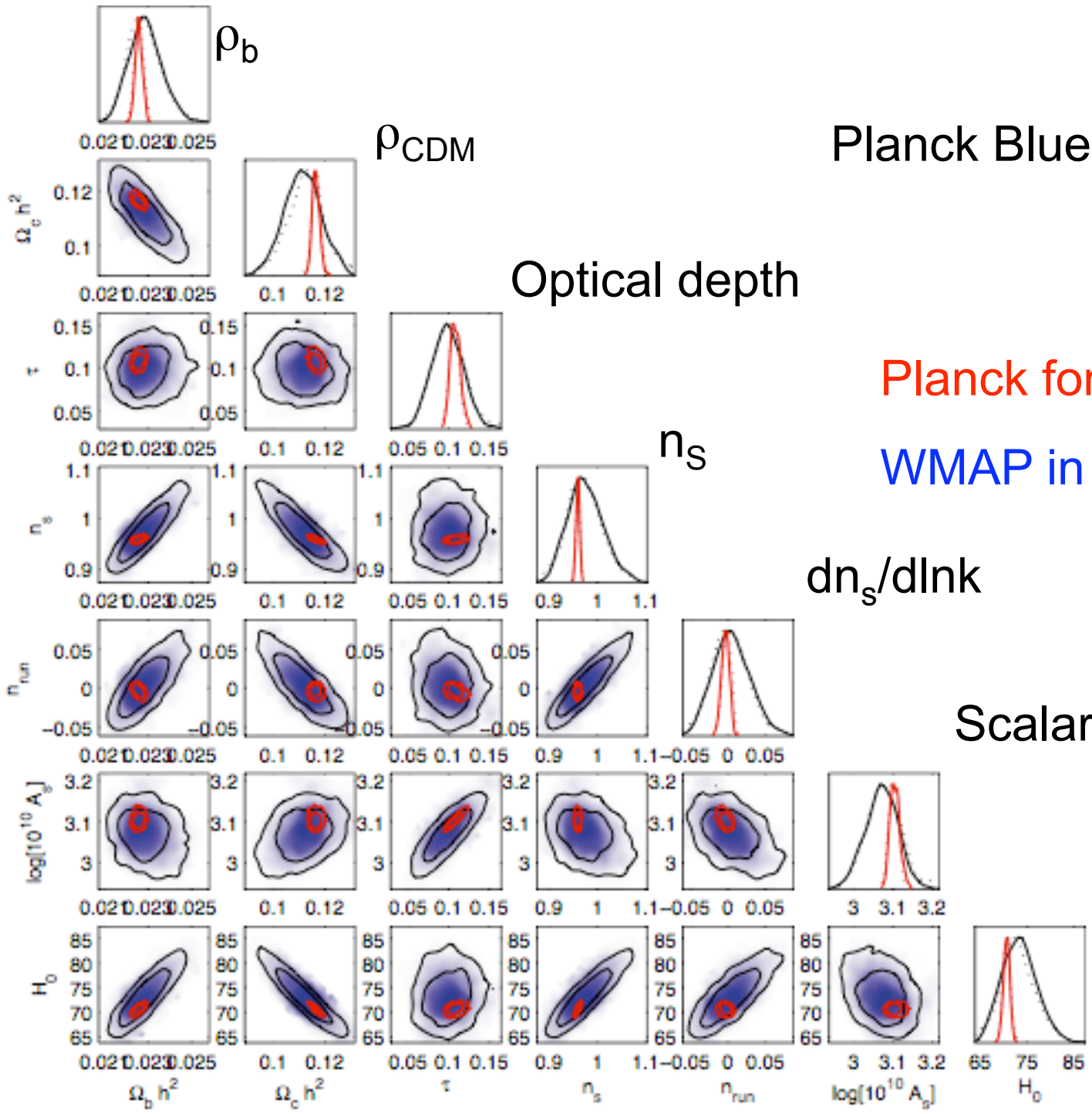


# BB Power Spectrum



**Planck Bluebook**





Planck Bluebook

Optical depth

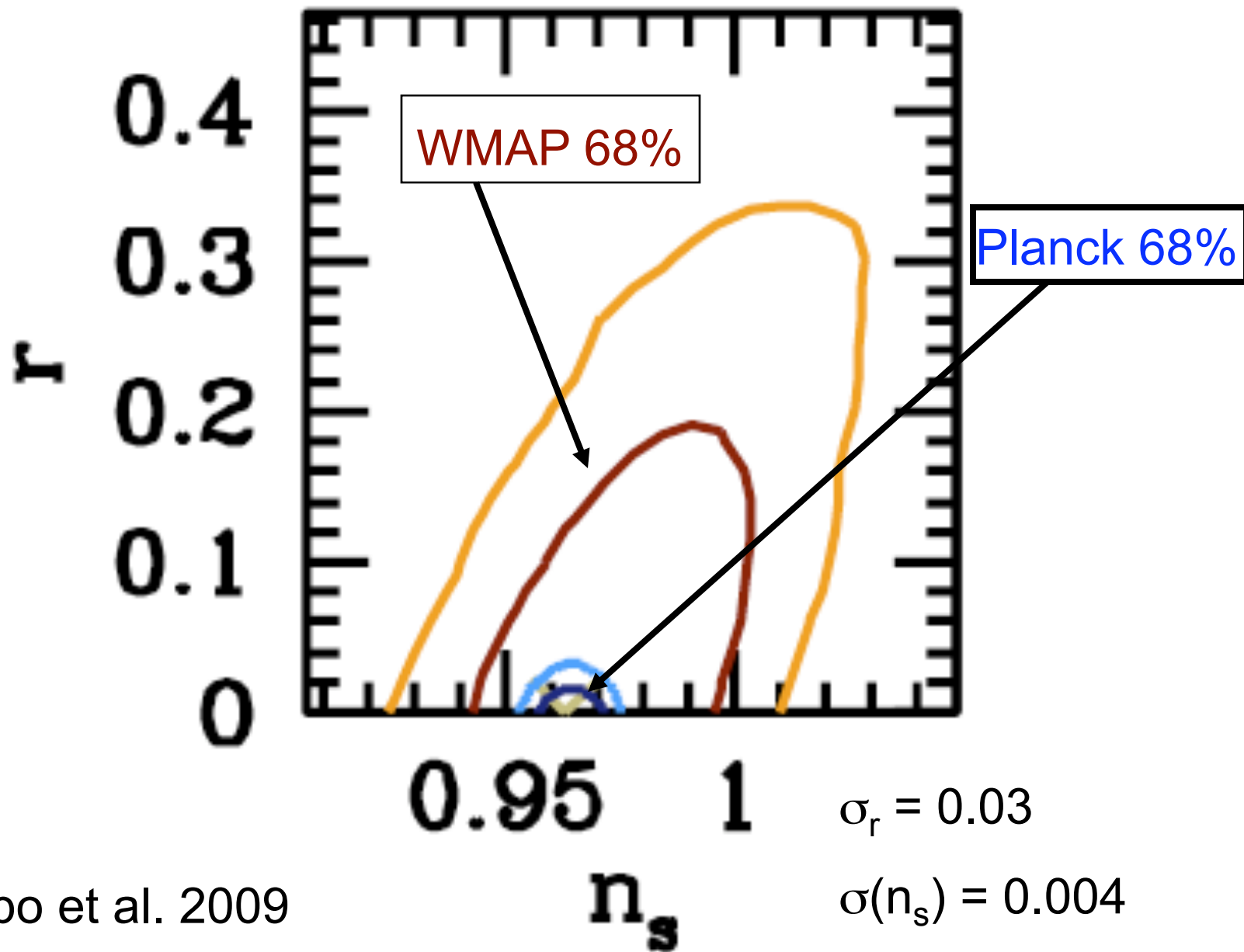
Planck forecast in red

WMAP in blue

$dn_s/d\ln k$

Scalar amplitude

$H_0$



Colombo et al. 2009

# Conclusions

- Planck science will be enabled by low-noise, up to 5'-resolution CMB maps at a large number and range of frequencies.
- Planck will allow for a qualitative advance in parameter estimation and strong tests of standard cosmological model (subdominant isocurvature modes, primordial non-Gaussianity, ...)
- Greater control of foregrounds -- important for ruling out non-CMB sources of the unexpected.