

XXIII A. Planck Microwave Anisotropy Probe CMB Angular Temp. Power Spectrum (TT)

The Wilkinson Microwave Anisotropy Probe (WMAP) was launched in 2001.

Planck, launched in 2009, images the sky with more than 2.5 times greater resolution than WMAP.

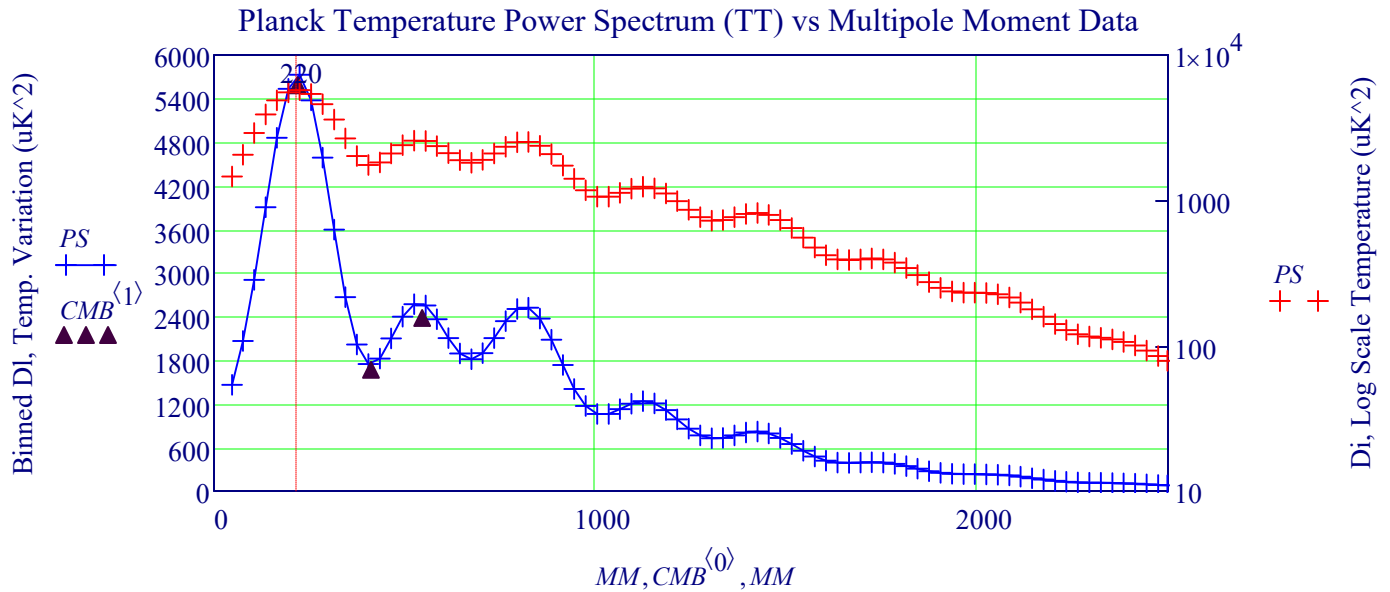
https://irsa.inac.caltech.edu/data/Planck/release_3/ancillary-data/cosmoparams/Planck_tt := READPRN("COM_PowerSpect_CMB-TT-binned_R3.01.txt")

CMB Table Has Peaks & Troughs

See CMB Table Below

CMB Holds a Matrix of Values

$MM := Planck_tt^{(0)}$ $PS := Planck_tt^{(4)}$



Multipole Moment, The Symbol for Multiple Moment is the letter "l"

WMAP: TT AND TE ANGULAR POWER SPECTRUM PEAKS FOR ABOVE SPECTRUM

The Characteristics of the Above Spectrum Reveals the Values Needed to Model BB Cosmology

Baryonic fraction $M_{b+d} = M_{b+d+h} = 0.072$

CMB Peaks and Troughs Table

Quantity	Symbol	ℓ	ΔT_ℓ (μK)	ΔT_ℓ^2 (μK^2)	FULL ℓ	FULL ΔT_ℓ^2 (μK^2)
First TT peak	ℓ_1^{TT}	220.1 ± 0.8	74.7 ± 0.5	5583 ± 73	219.8 ± 0.9	5617 ± 72
First TT trough	$\ell_{1.5}^{\text{TT}}$	411.7 ± 3.5	41.0 ± 0.5	1679 ± 43	410.0 ± 1.6	1647 ± 33
Second TT peak	ℓ_2^{TT}	546 ± 10	48.8 ± 0.9	2381 ± 83	535 ± 2	2523 ± 49
First TE antipeak	ℓ_1^{TE}	137 ± 9	...	-35 ± 9	151.2 ± 1.4	-45 ± 2
Second TE peak	ℓ_2^{TE}	329 ± 19	...	105 ± 18	308.5 ± 1.3	117 ± 2

Based on the the spatial variation of the CMB and the Model Parameters of the Λ -CDM, astrophysicists predicted a Hubble Constant of 67.5 ± 0.5 km/s per megaparsec. This is different from the Hubble Constant value measured from the change of recessional velocity of galaxies with distance.

Python Scripts are available at: VXPhysics.com/Python