



CMB@60

Torino 28-30 May

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- Planck legacy HFI maps, Sroll1,
 Planck 2013, 2015, 2018 results, Planck collaboration, et al A&A
- Sroll2 HFI (post Planck legacy release) 2019

J.M. Delouis, L. Pagano, et al, A&A 2019, 1901, A38

 Reionization optical depth determination from Planck HFI data, with ten percent accuracy,

L. Pagano, J.M. Delouis, S. Mottet, J.L. Puget, and L. Vibert A&A 2020, 635, A99





- Systematic effects not fully corrected in the 2015 release
 - ADCNL residuals
 - bolometer time transfer function (very long time constants: 5-20 sec)
- $I \rightarrow P$ leakages:
 - calibration mismatch
 - bandpass mismatch
 - polarization efficiency
- end to end simulations including all known systematics and their corrections reproduced all null tests residuals for successive version of the map making



- The solar system dipole has been measured at all HFI frequencies up to 545 GHz
- the condition that all frequencies see the same dipole direction leads to predict a large scale dust SED gradient
- same as observed on frequency maps ratios (v/857)
- this differential measurements confirm the accuracy of the HFI maps monopole adjustments

J.L. Puget, IAS Orsay







- the dipole due to the motion of the solar system w.r.t. the CMB has been measured with unprecedented accuracy
- it is a very powerful tool for intercalibration and testing
- we remove the foregrounds and the CMB anisotropies with 4 different methods
- the absolute calibration of each detector is obtained from the orbital dipole (earth motion around the sun
- we then measure the solar dipole (direction and amplitude) for a set of galactic sky cuts (20 to 90 %)
- finally we compare the results between frequencies

Experiment	Амрlitude [µK _{CMB}]	GALACTIC COORDINATES	
		l [deg]	b [deg]
WMAP ^a	$3355 \pm 8 \\ 3364.5 \pm 2.0$	263.99 ± 0.14 264.00 ± 0.03	$\begin{array}{r} 48.26 \ \pm 0.03 \\ 48.24 \ \pm 0.02 \end{array}$
LFI 2018 ^c	3364.4 ± 3.1 3362.08 ± 0.86	263.998 ± 0.051 264.021 ± 0.011	$\begin{array}{c} 48.265 \pm 0.015 \\ 48.253 \pm 0.005 \end{array}$
<i>Planck</i> 2018 ^d	3362.08 ± 0.86	264.021 ± 0.011	48.253 ± 0.005



LFI and HFI Solar dipole direction and amplitude











HFI a-posteriori intercalibration (2018)

- in CMB channels we expect S/N 10⁵ on the dipoles
 - 100 GHz rms 5. 10⁻⁶
 - 143 GHz rms 8. 10⁻⁶
 - 217 GHz rms 2. 10⁻⁵
- and we get it !
- 353 GHz rms 2. 10⁻⁴

- Residual solar dipole per survey
- 353 GHz show residuals due to very long time constants









- angles (global rotations)
- polar efficiency PSB
- maps built with PSBs only
- over-fitting time constants



Sroll2 (systematic effects residuals)



PLANCK



100 and 143 GHz auto + cross spectra, f_sky 66%







spectra 100x143



2018 : blue Sroll2-this paper: green

• Total in red cosmic variance: blue signal: green





Tau as a function of time

Thanks for your attention