COrE/PRISM workshop for M4

Planck: lessons learned

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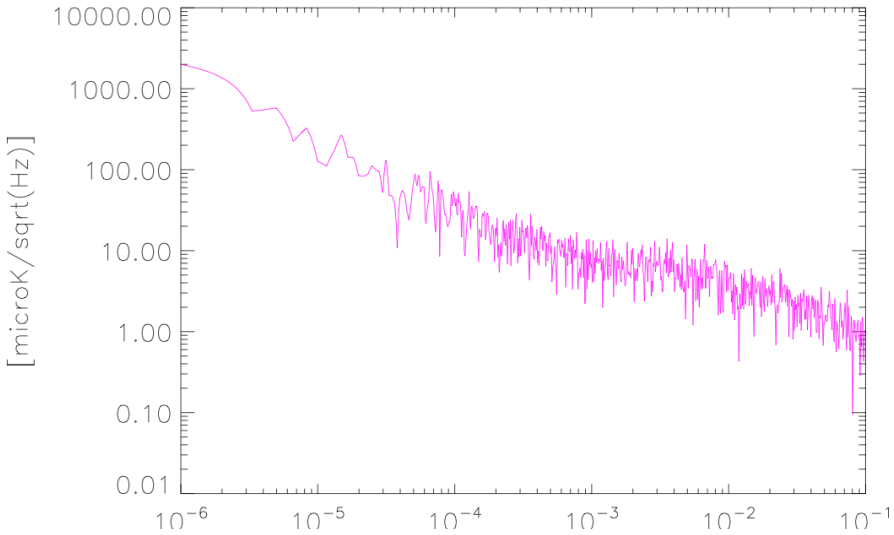
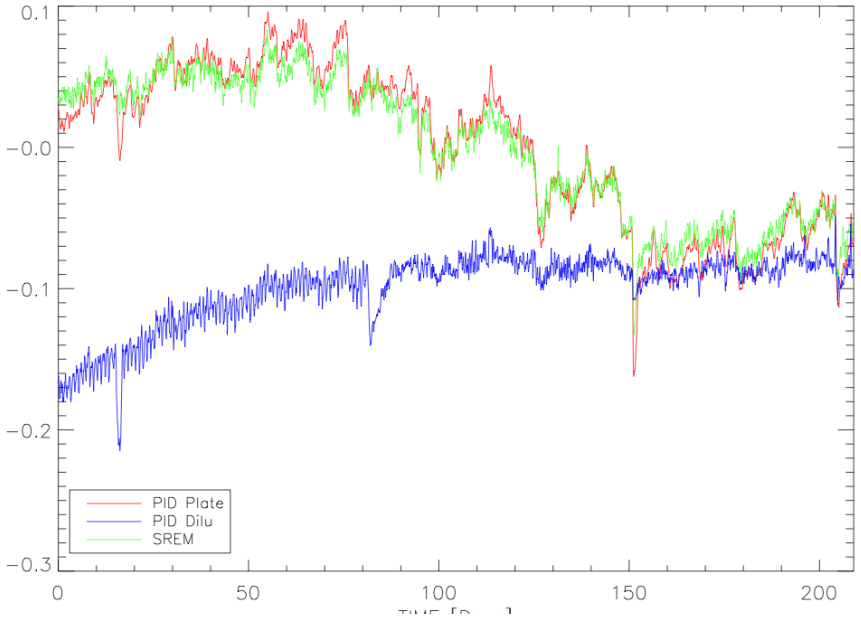
Sensitivity limits

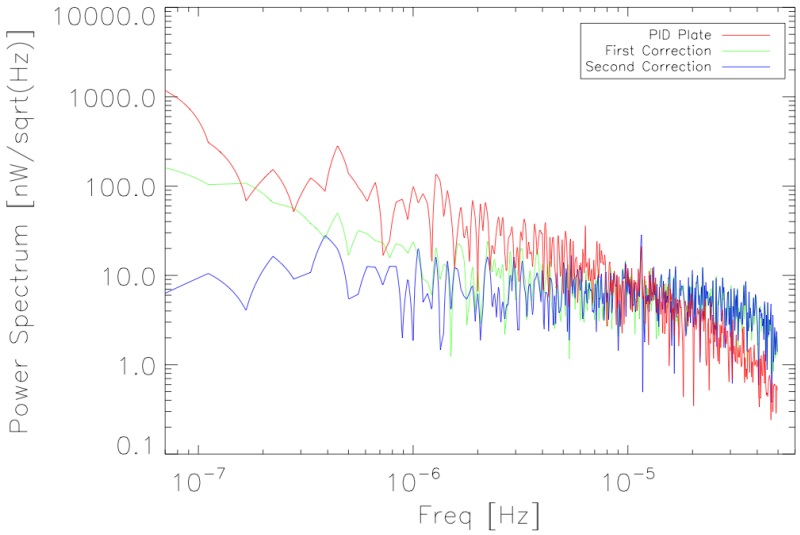
- Planck is the first CMB mission to be limited by
  - foregrounds for intensity
  - systematics for polarization
- Planck noise level in maps is as expected
- foregrounds:
  - 4 diffuse galactic, 2 polarized
  - 4 extragalactic CIB, radio sources, thermal SZ
- systematic effects were not all predicted
- they have gone down by a factor 20 (in power spectrum) from the first release data and the 2014 one (extrapolation about 2 $10^{-3}\,\mu K^2$ at l=80 thus noise limited for primordial B modes at l=80)

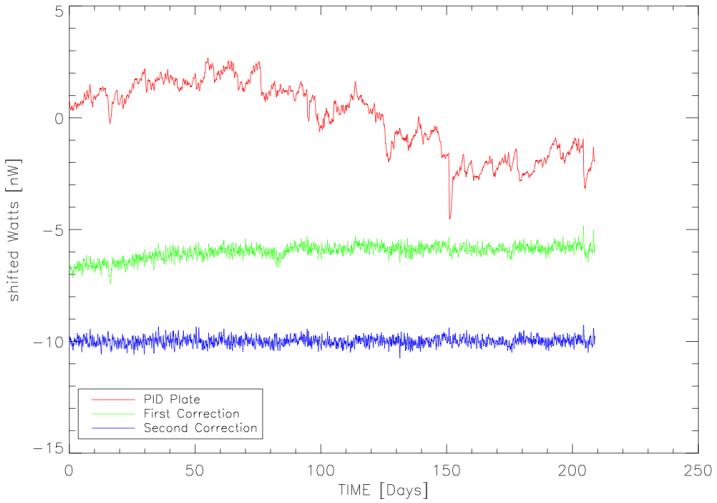
systematic effects

- temperature variation of detector cryo stage
- ADC non linearity (could have been measured on the ground)
- optical beams (main beams and spillover/far side lobes)
- time transfer function (complicated for classical bolometers)
- CR glitches and high energy CR showers
  - the CR rate is variable over all time scales
  - these induce
    - spurious signals
    - potential gain variation
    - correlated noise between detectors
    -


10000.00
1000.00
100.00
10.00
1.00
0.10
0.01
[microK/sqrt(Hz)]
10^-6
10^-5
10^-4
10^-3
10^-2
10^-1


0.1
-0.0
-0.1
-0.2
-0.3
PID Plate
PID Dilu
SREM
0
50
100
150
200


10000.0
1000.0
100.0
10.0
1.0
0.1
Power Spectrum [nW/sqrt(Hz)]
PID Plate
First Correction
Second Correction
10^-7
10^-6
10^-5
Freq [Hz]


5
0
-5
-10
-15
shifted Watts [nW]
PID Plate
First Correction
Second Correction
0
50
100
150
200
250
TIME [Days]