



SPIRE / HFI

Cross Calibration Status for Extended Sources

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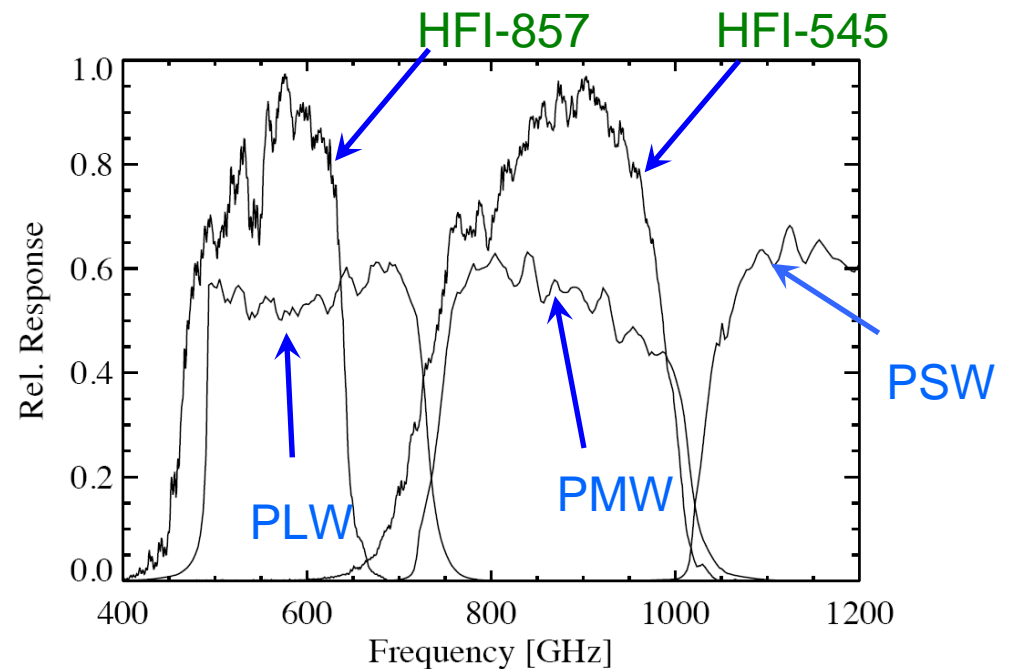
¹ SPIRE ICC, ² NHSC, ³ HSC





FIRAS, HFI, SPIRE

- Herschel-SPIRE 350 μm and 500 μm filters have strong overlaps with Planck-HFI 857GHz and 545GHz respectively
- Planck-HFI use COBE-FIRAS maps (3% accuracy) to flux-calibrate their maps in these two filters in offset and scale.
- The COBE-FIRAS calibration for the overlapping filters is based on two on-board blackbodies operated in space.
- The FIRAS beam is 7 $^{\circ}$, the HFI beam is 5', the SPIRE beams are 25" and 36".



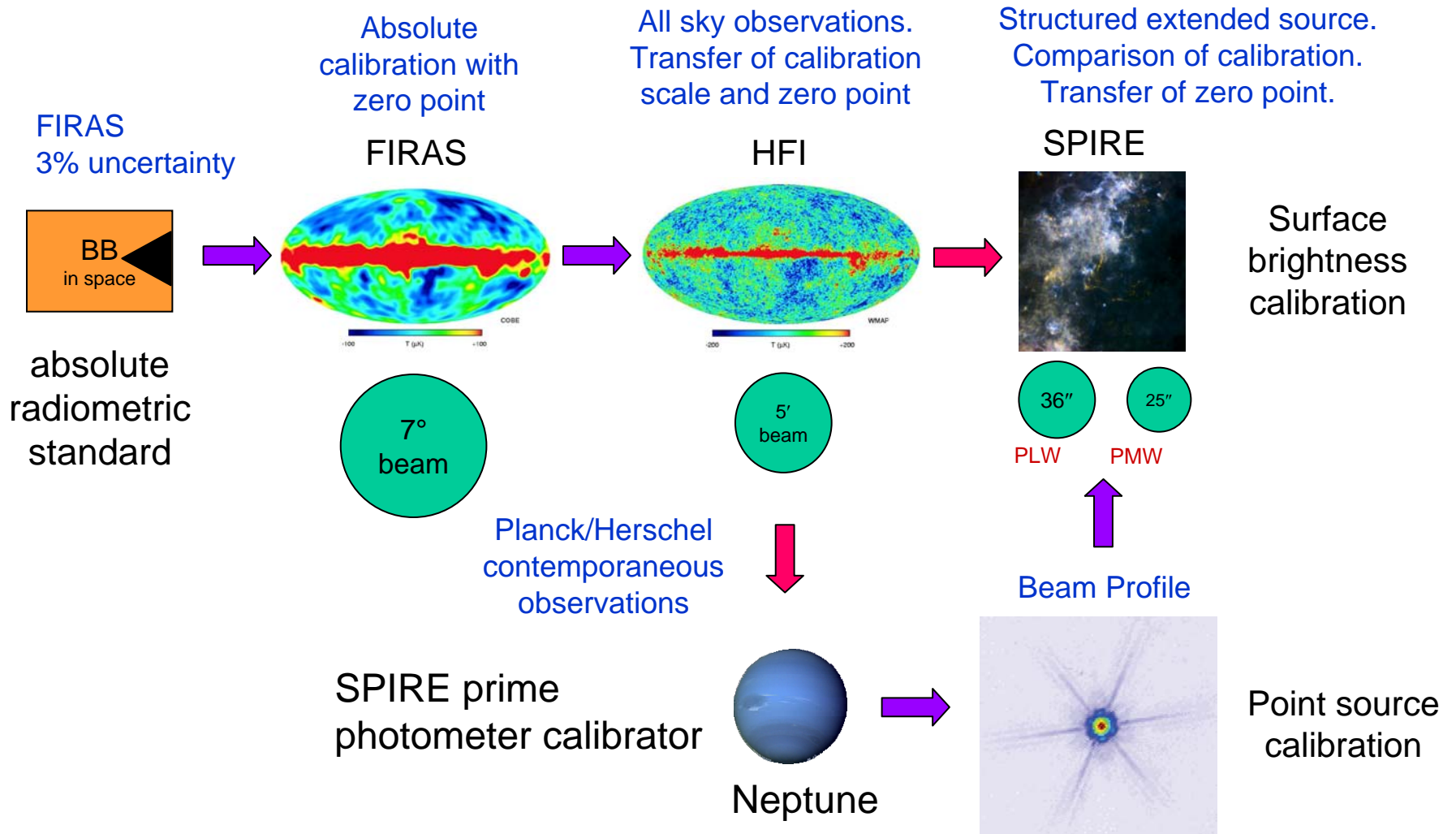


Cross Calibration

- Extended source
 - Calibrate HFI maps in scale and offset using FIRAS maps
 - Convolution with COBE beam
 - Colour correction for FIRAS filter profiles
 - Calibrate SPIRE maps in offset using HFI maps
 - Convolution with HFI beam
 - Colour correction for SPIRE and HFI filter profiles
 - Compare SPIRE maps in scale using HFI maps
 - Neptune radiative model is prime calibrator for SPIRE (+/- 5%)
- Point source
 - Improve Neptune model with FIRAS and LFI longer wavelength data and update SPIRE flux scale calibration
 - Convolution with HFI beam
 - Colour correction with HFI filter profiles
 - Comparison of point sources commonly observed by HFI and SPIRE



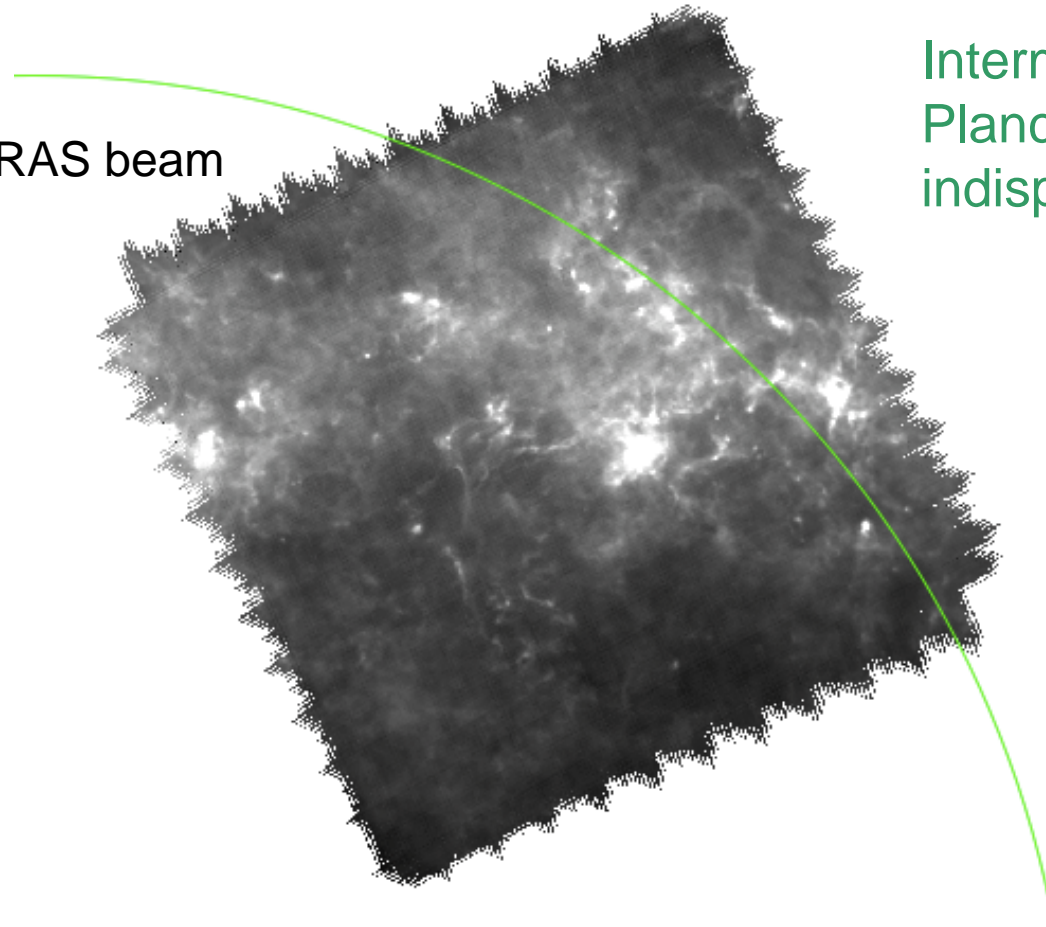
HFI/SPIRE Cross Calibration





Spatial Resolutions

7 deg FIRAS beam

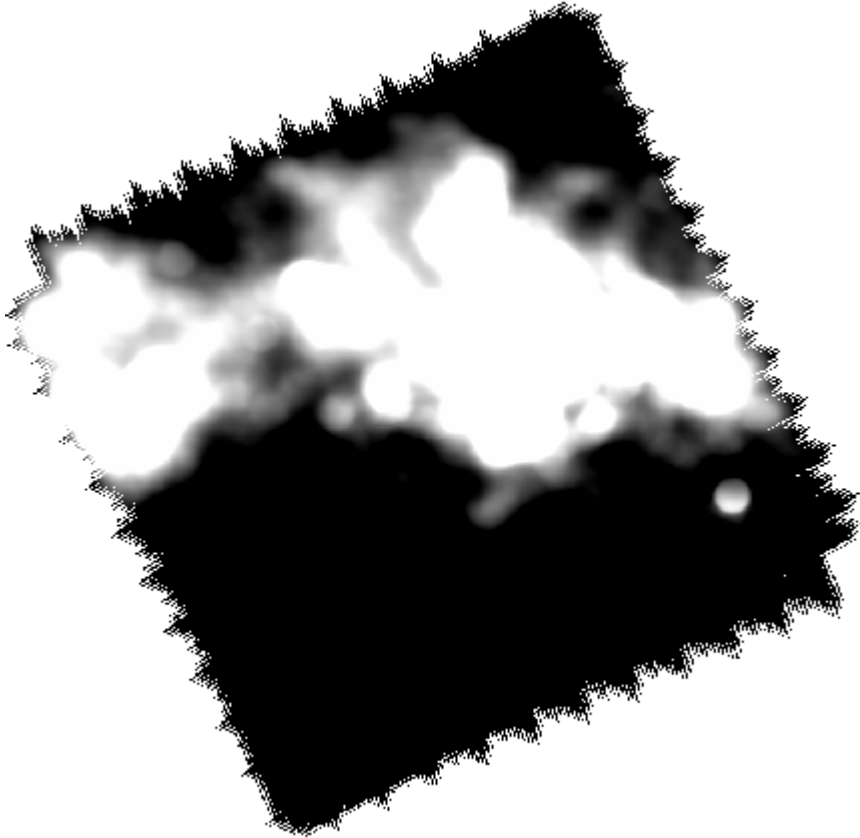


Intermediate step via
Planck-HFI maps is
indispensable.

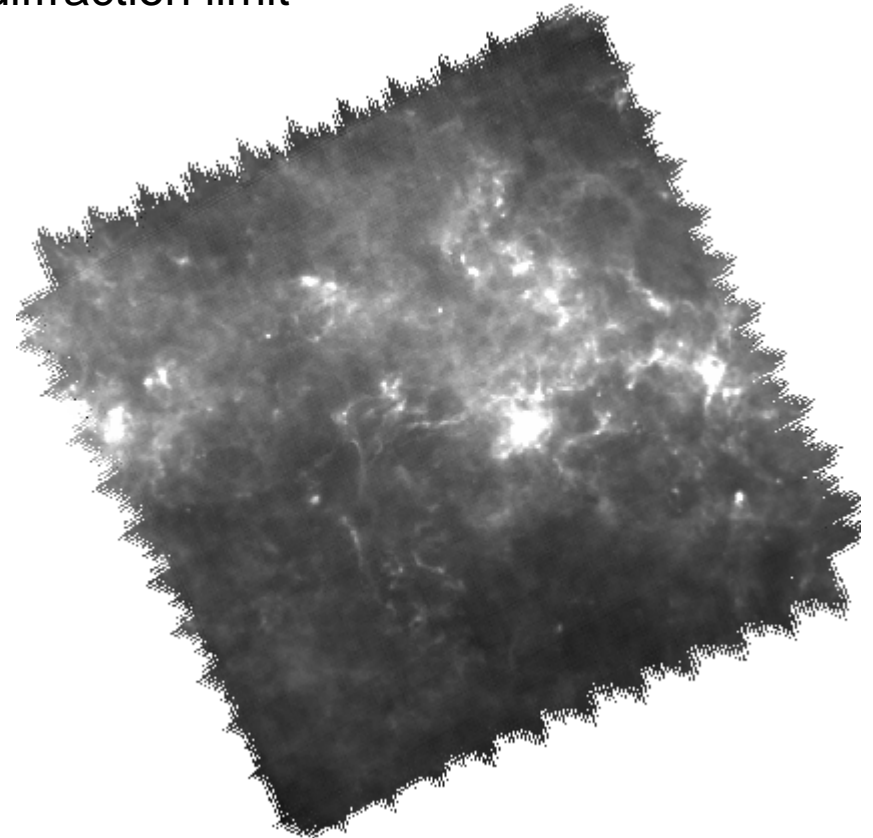


Spatial Resolutions

HFI (~4' beam),
multimode feedhorn

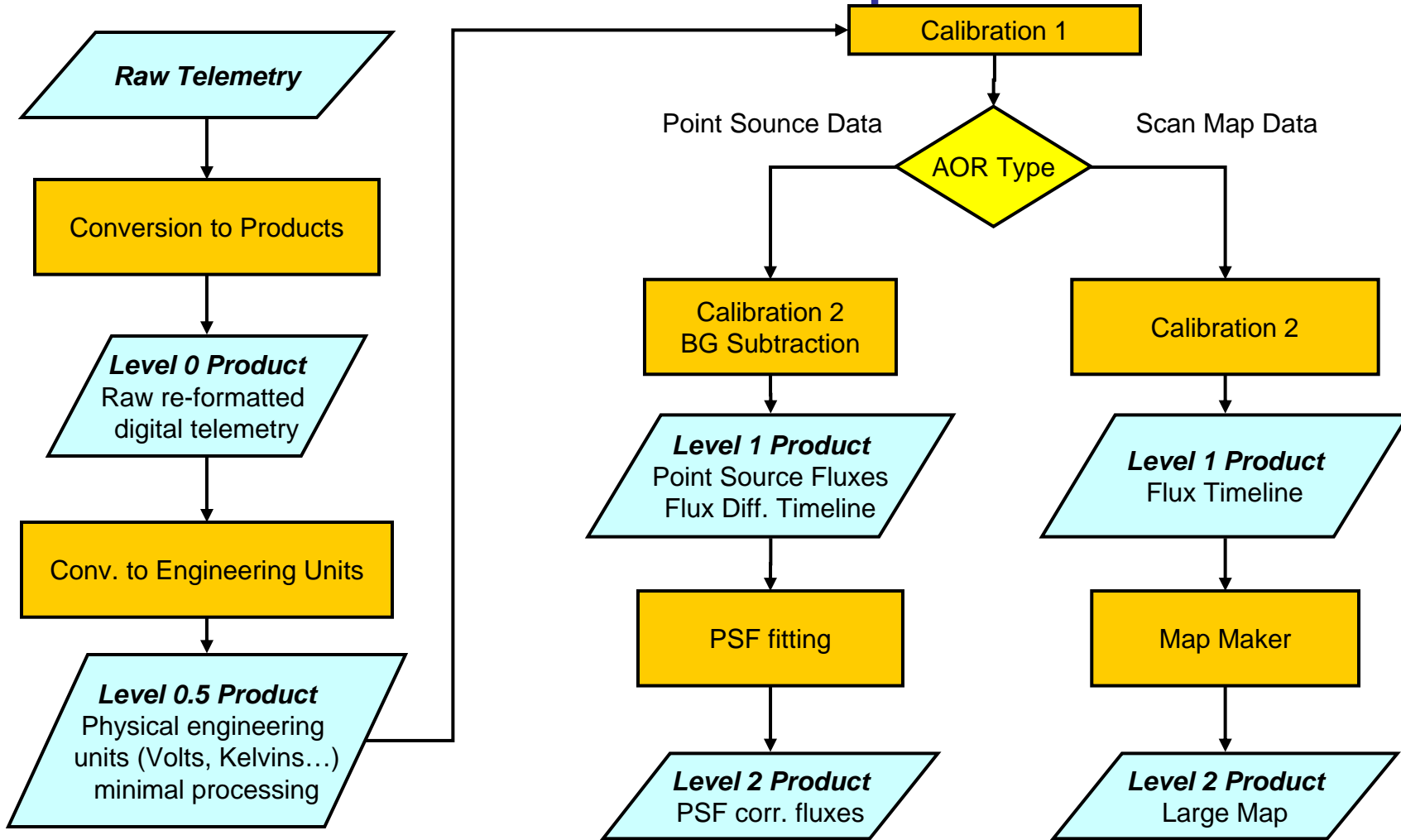


PLW (36.6" beam),
monomode feedhorn
diffraction limit



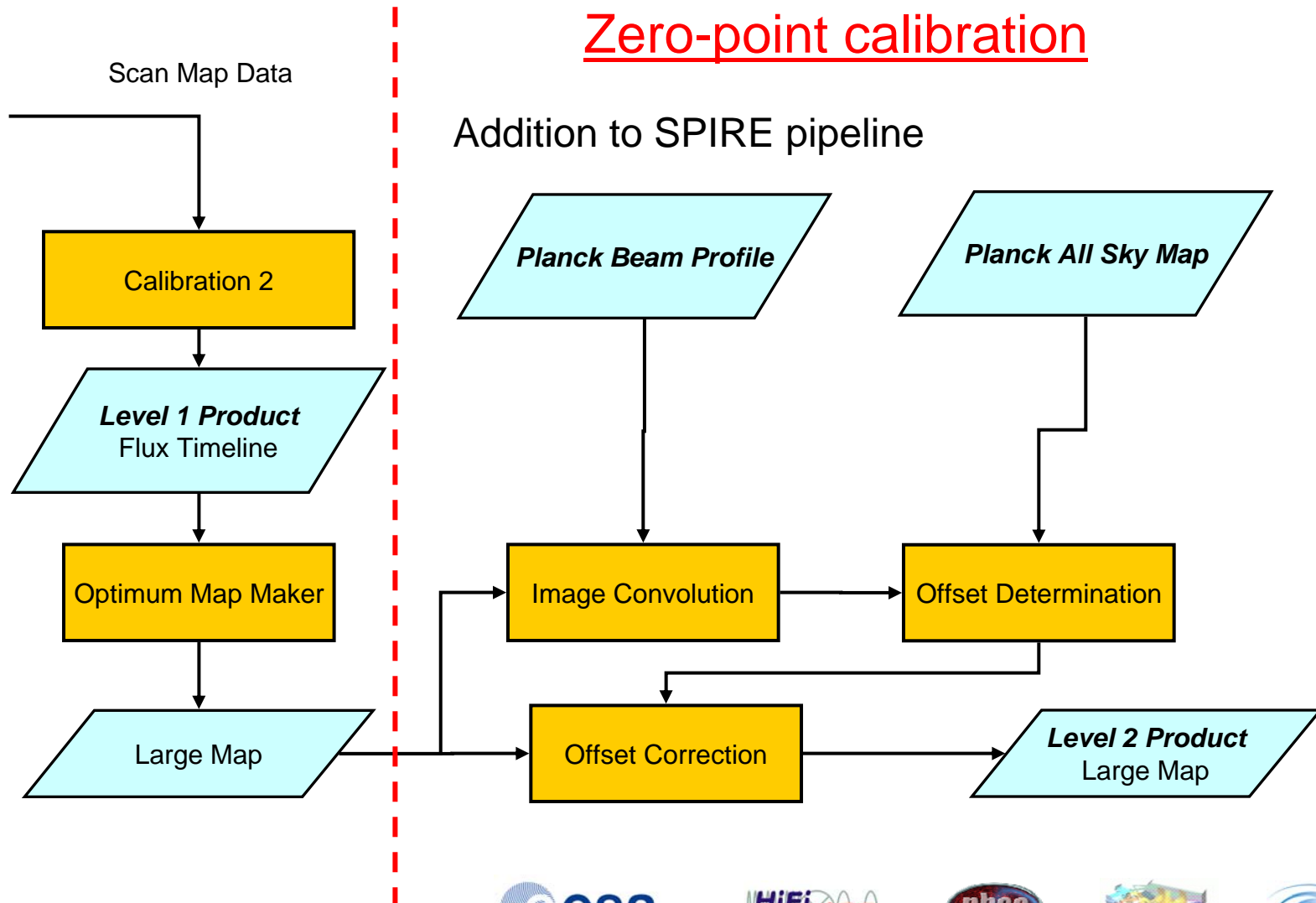


SPIRE Photometer Pipeline Structure





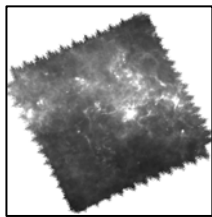
Proposed Change to SPIRE Pipeline





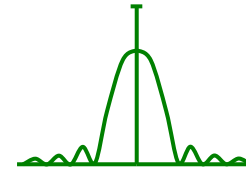
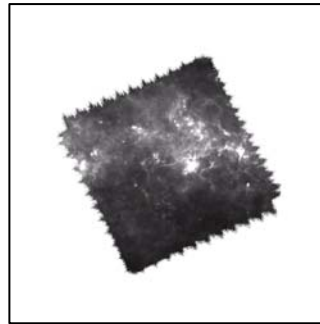
Comparison in Detail I

PMW or PLW



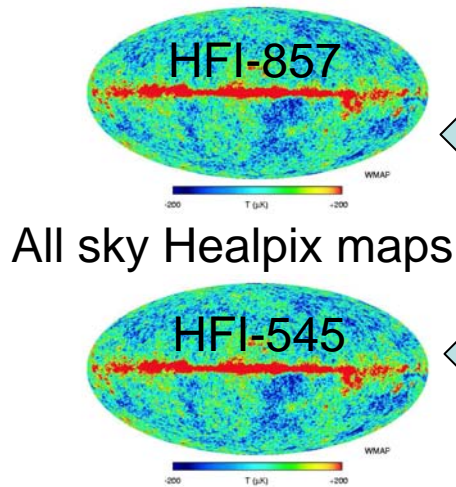
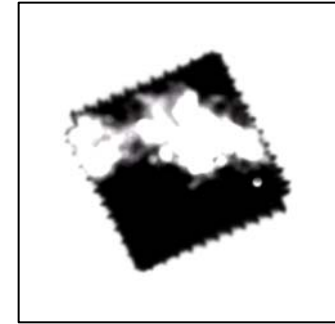
SPIRE

Expand
Map

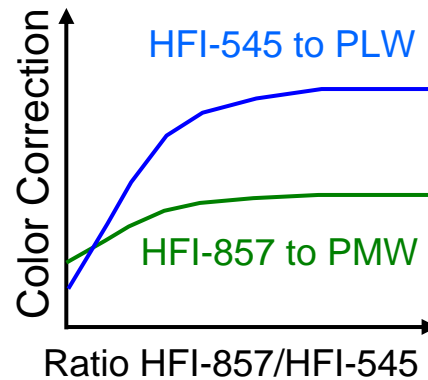


Convolve

Convolved
SPIRE map



Ratio
map

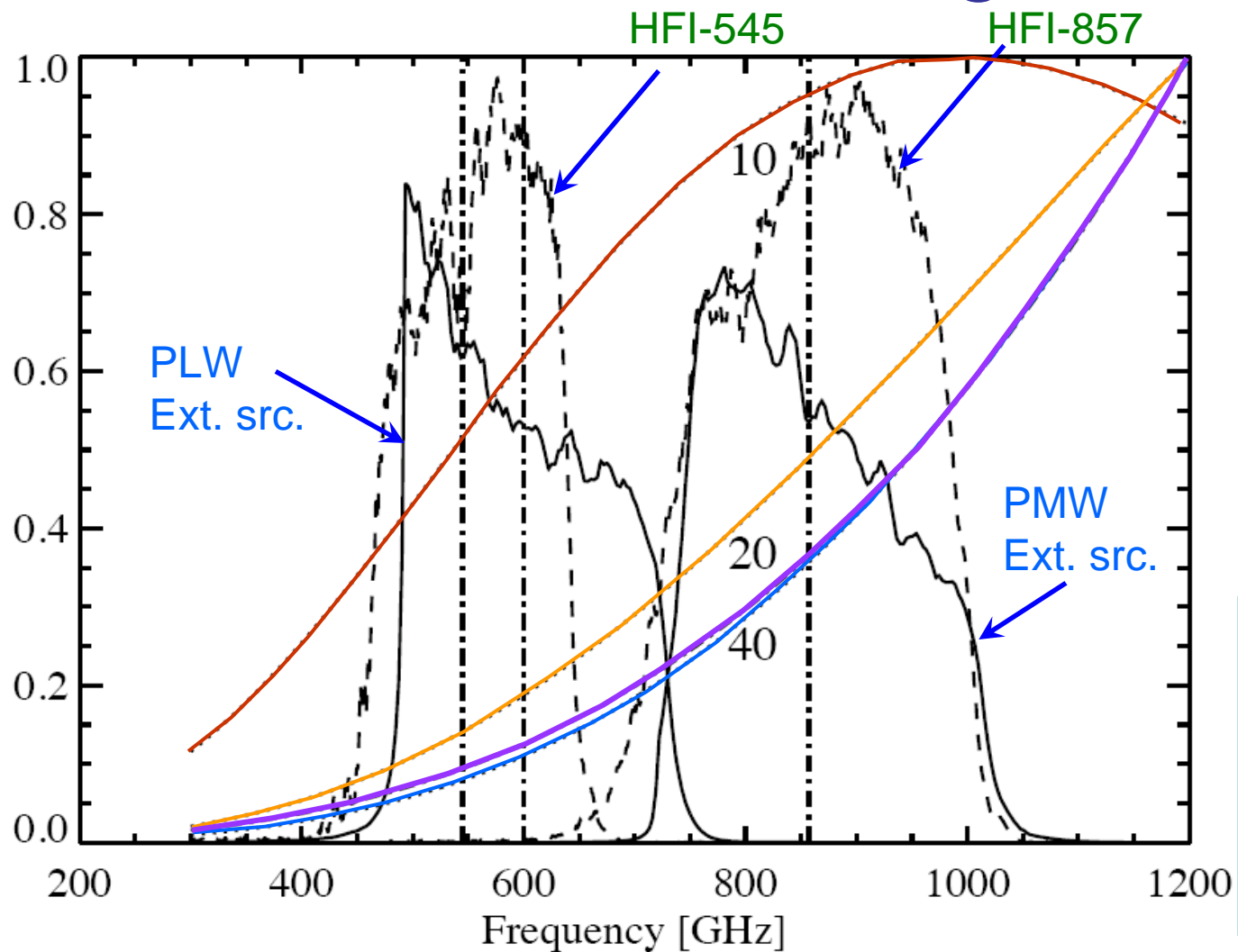


Color corrected
HFI map





Filterbands and Backgrounds



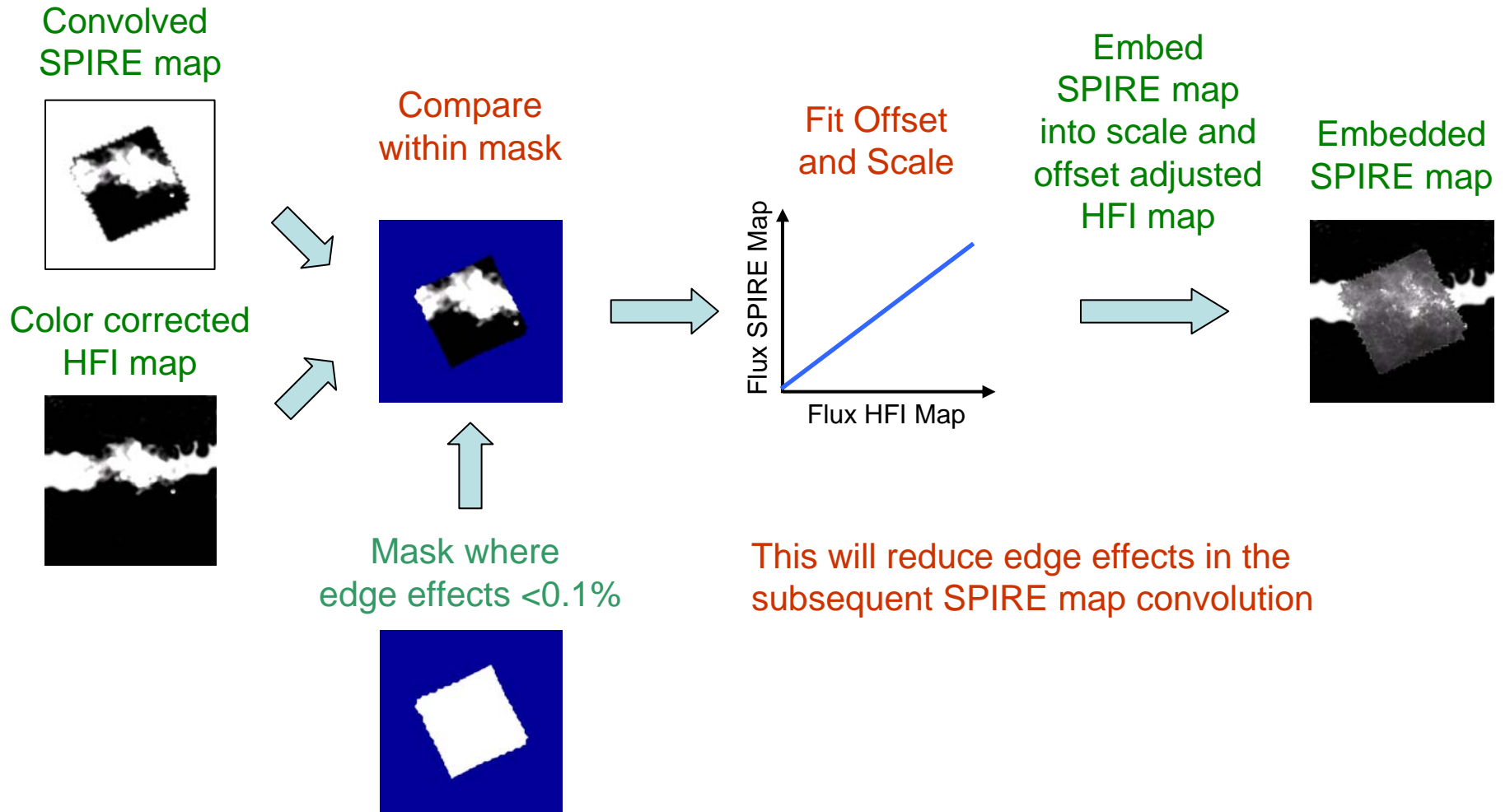
Backgr.
 10K
 20K
 40K
 Powerlaw

SPIRE filters scaled with λ^2 for extended sources to account for λ dependent beam size.

Backgrounds with dust temperatures above 20K can be modeled by a powerlaw, but typical Cirrus temperatures are lower.

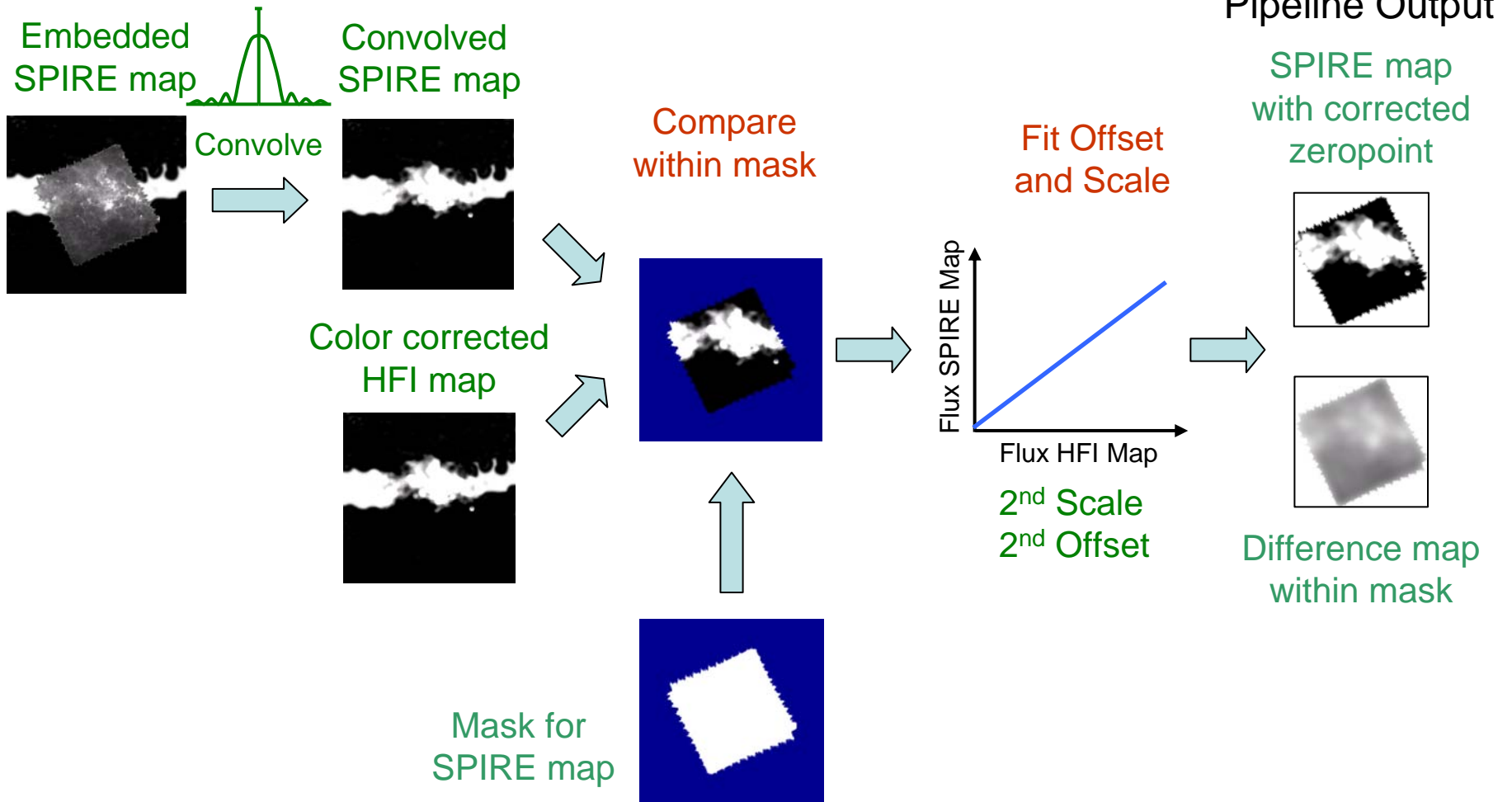


Comparison in Detail II





Comparison in Detail III





Data for Comparison

| SPIRE Map | | | | | | | | | |
|-----------|---------------------|-------------|-----|-----|-------------|----------|--|------|------|
| Obs-ID | Map Center Position | | | | | Size [°] | | Name | Mode |
| 500072E4 | 09 41 39.61 | +70 17 26.0 | 2.3 | 1.7 | Ursa Major | PARALLEL | | | |
| 50001837 | 12 18 26.93 | -63 00 47.0 | 3.0 | 3.0 | GP 299_0 | POF5 | | | |
| 50002E1B | 13 18 05.90 | -62 51 23.5 | 3.4 | 3.5 | Field 305_0 | PARALLEL | | | |
| 50002E19 | 12 58 49.16 | -63 06 17.3 | 3.4 | 3.5 | Field 303_0 | PARALLEL | | | |
| 500068BE | 16 49 29.66 | -44 25 56.9 | 3.5 | 3.6 | Field 341_0 | PARALLEL | | | |
| 500068BC | 16 57 18.12 | -42 45 05.7 | 3.5 | 3.6 | Field 343_0 | PARALLEL | | | |

- Six maps have so far been compared with the HFI maps.
- They cover a wide range of dynamic ranges from faint Cirrus to the galactic plane.
- For now only relatively large maps were used.



Status

- Comparisons of SPIRE and HFI maps are ongoing.
- Preliminary results and report are being reviewed internally.
- Focal points of scrutiny are color correction and beam profiles of both, HFI and SPIRE, and projection of HEALPIX format.
- 23 Feb meeting at ESAC to discuss preliminary results.
- Next steps: Implement algorithm into HIPE and raise the necessary SCRs.