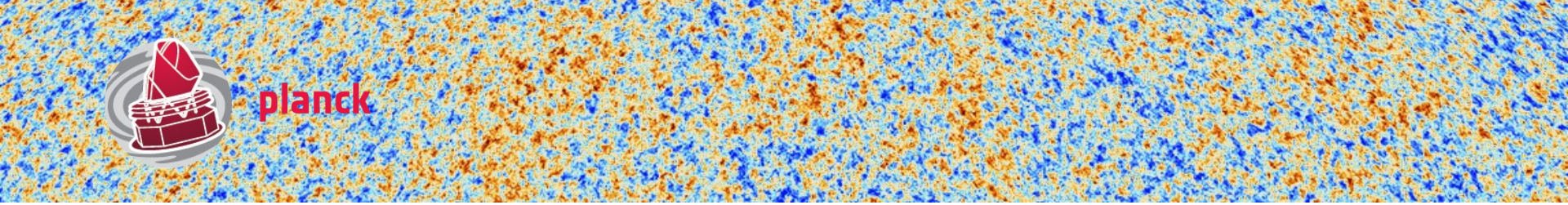
PLANCK 2014

THE MICROWAVE SKY IN TEMPERATURE AND POLARIZATION



Planck view of low frequency foregrounds

Matias Vidal

University of Manchester

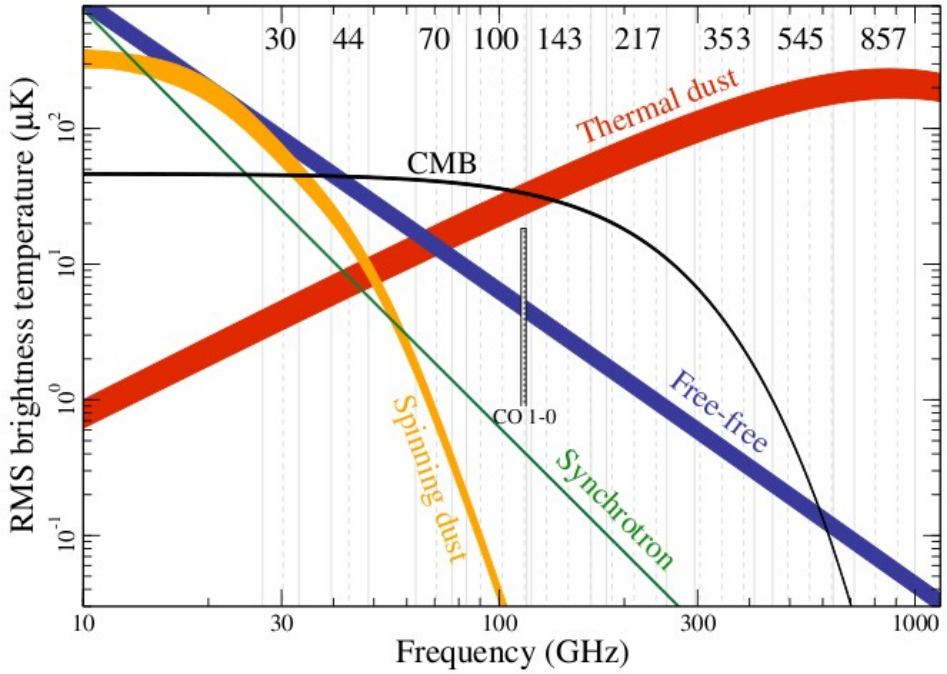
on behalf of the Planck Collaboration

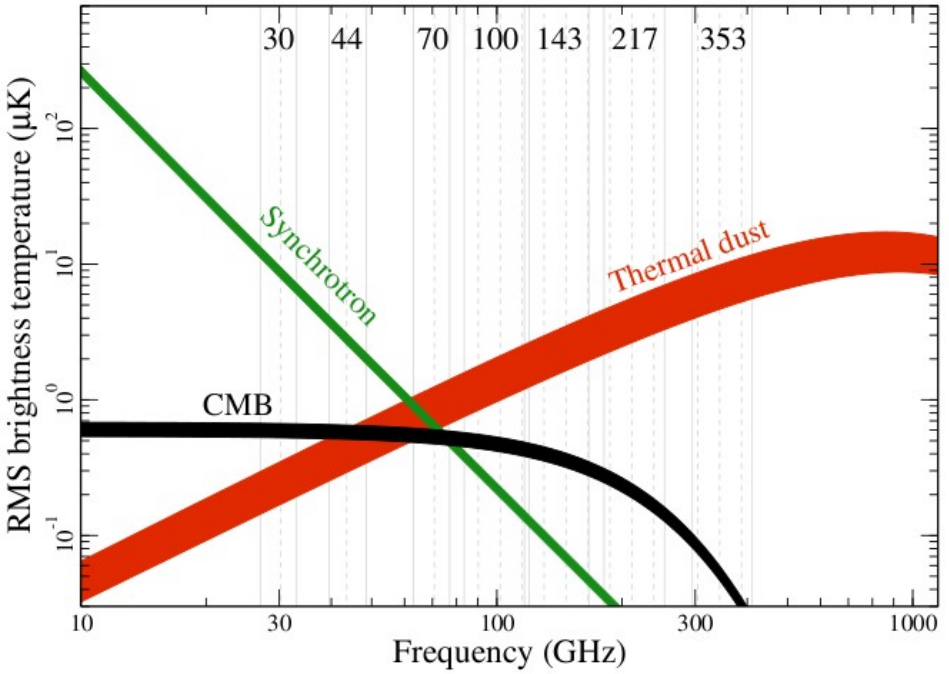
Diffuse Galactic foreground emission

Foregrounds in the 10-100 GHz range:

- Multiple components
- Very difficult to separate without ancillary data

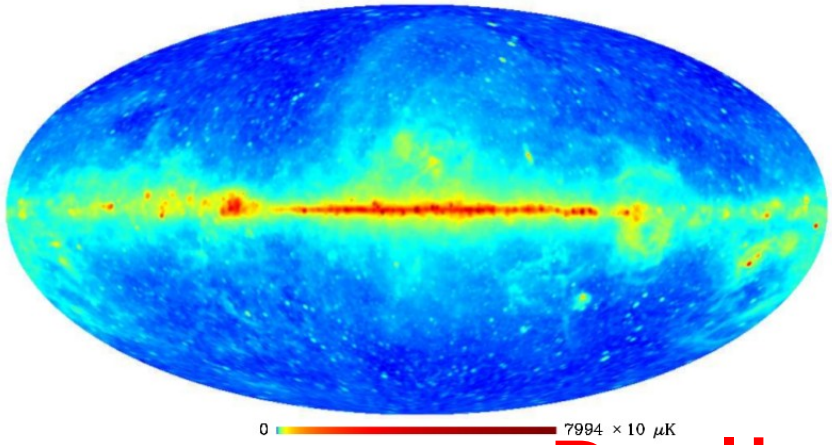
Preliminary!

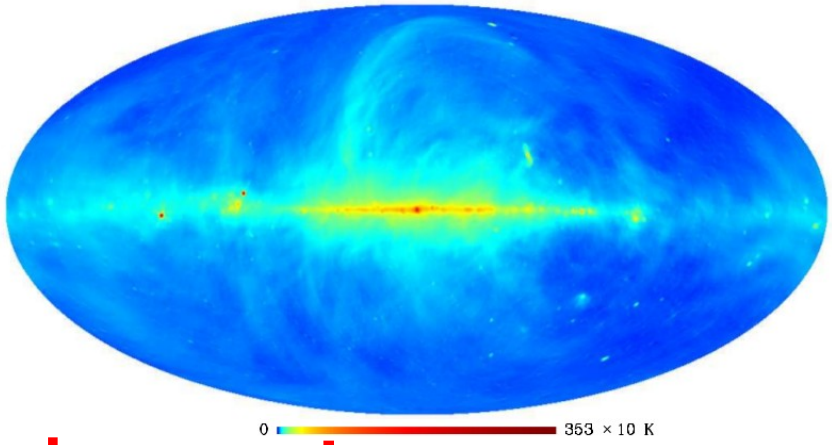




See Wehus talk

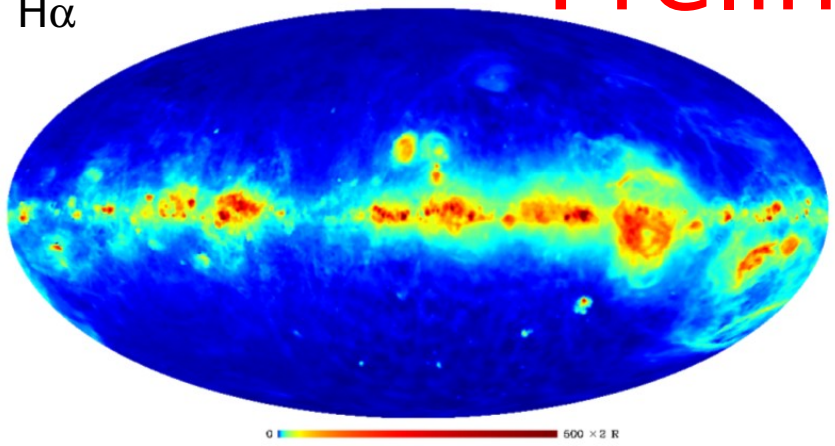
CMB subtracted sky

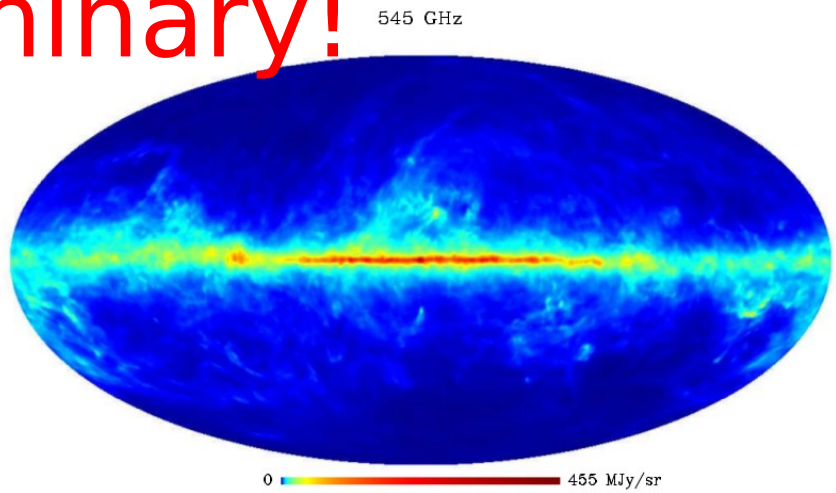




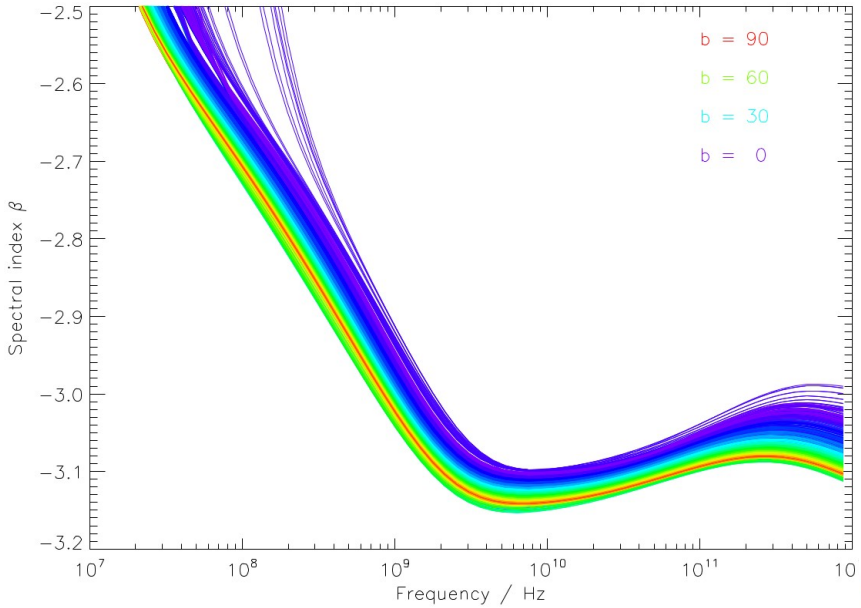
Preliminary!

Hα

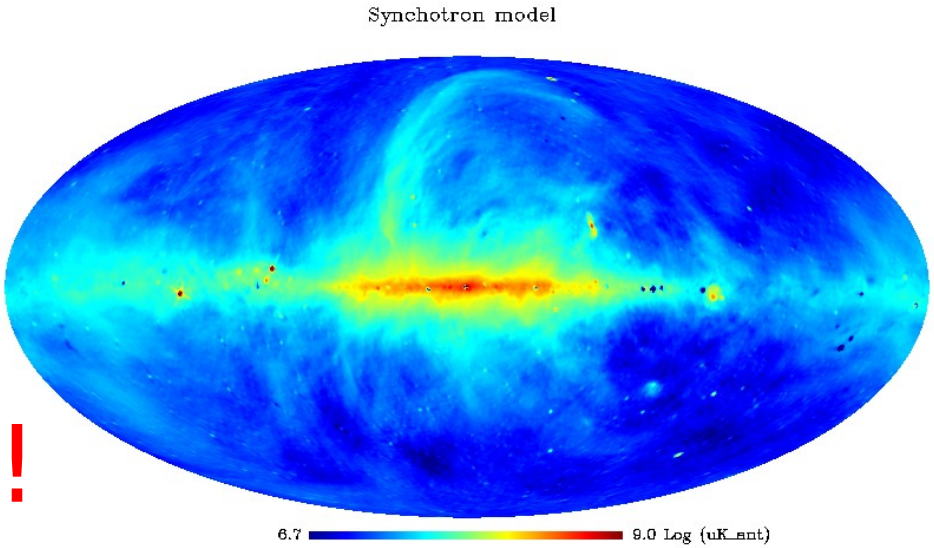




Synchrotron

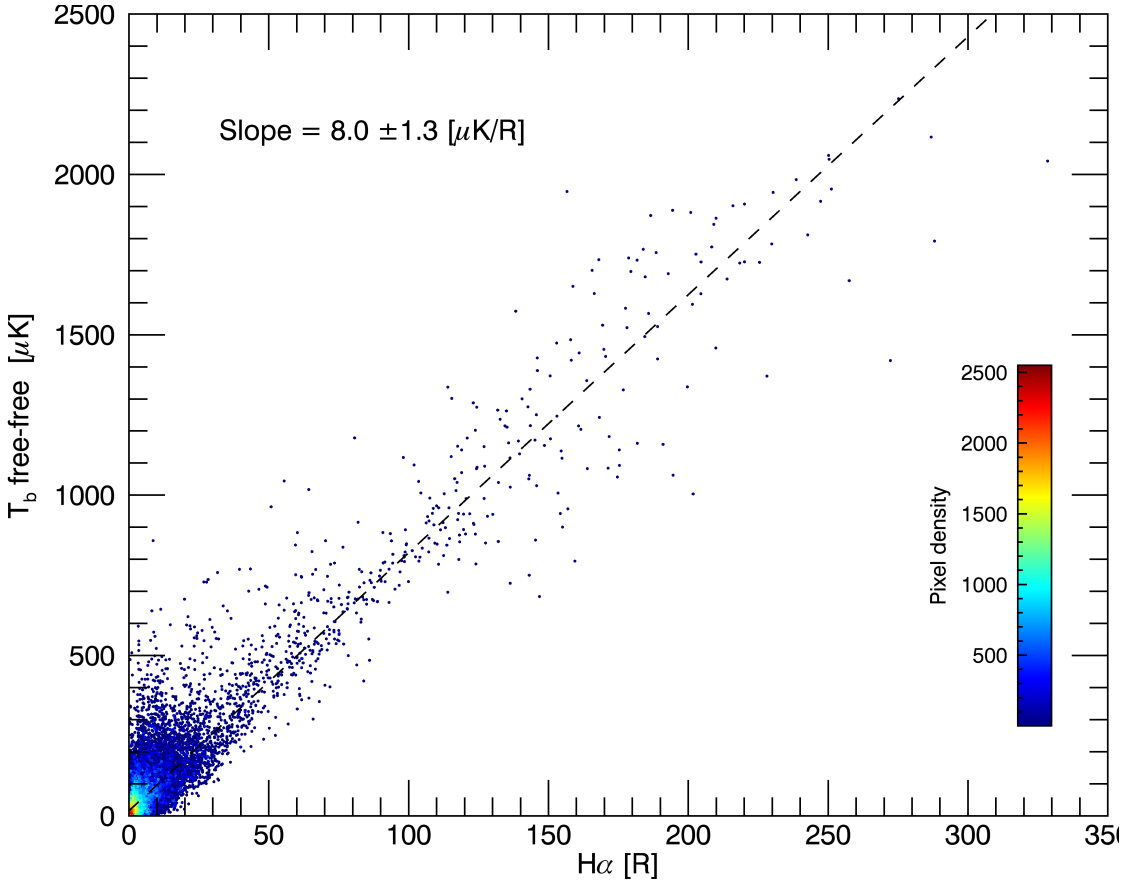


- Galprop synchrotron model (Orlando & Strong 2013) + 408 MHz map.
- Smooth spectral variations

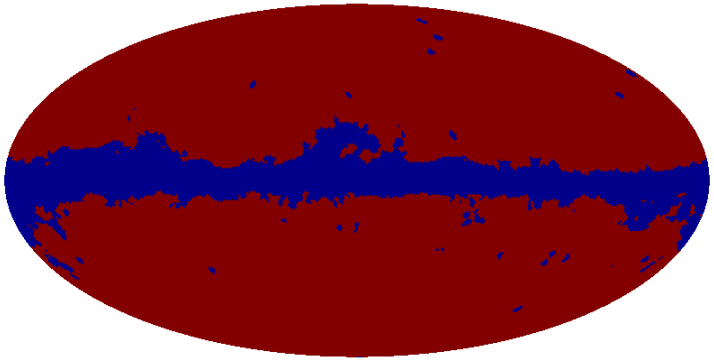


Preliminary!

Free-free



- Good correspondence between Commander and Hα at high Galactic latitudes
- The low slope value indicates an excess of Hα compatible with dust scattering at the a level $<25\%\ (2\sigma)$.



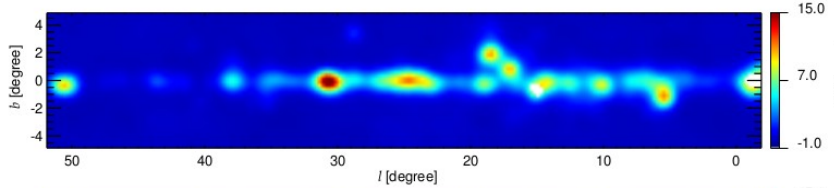
Preliminary!

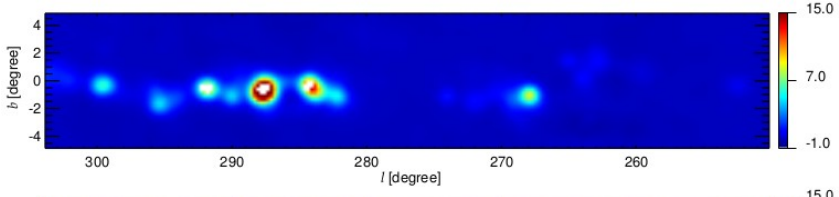
Free-free on the plane

Preliminary!

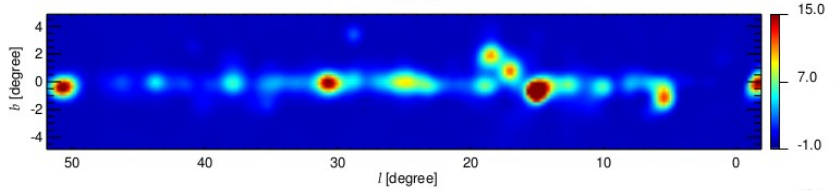
Good morphological agreement of Commander solution with RRL

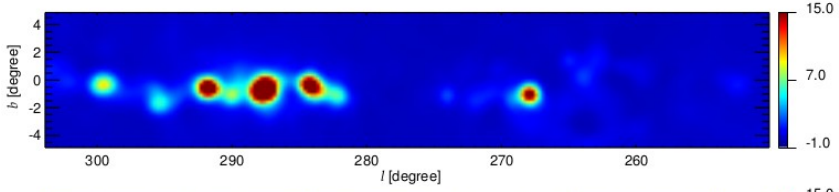
RRL



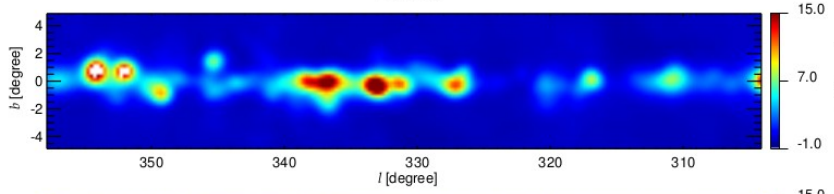


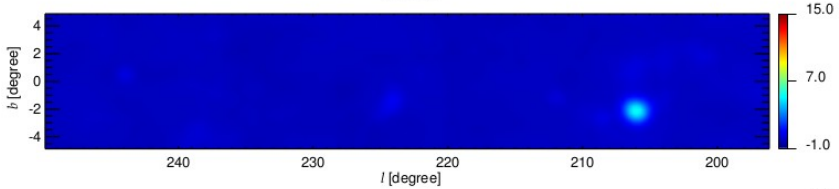
Commander



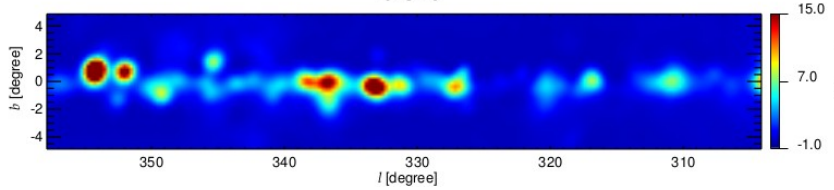


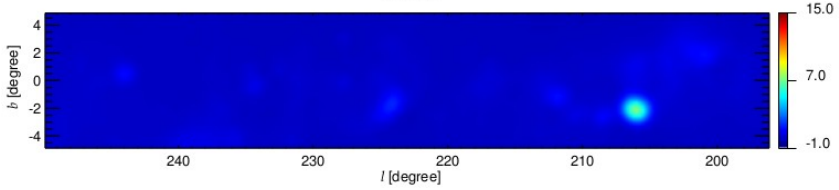
RRL





Commander

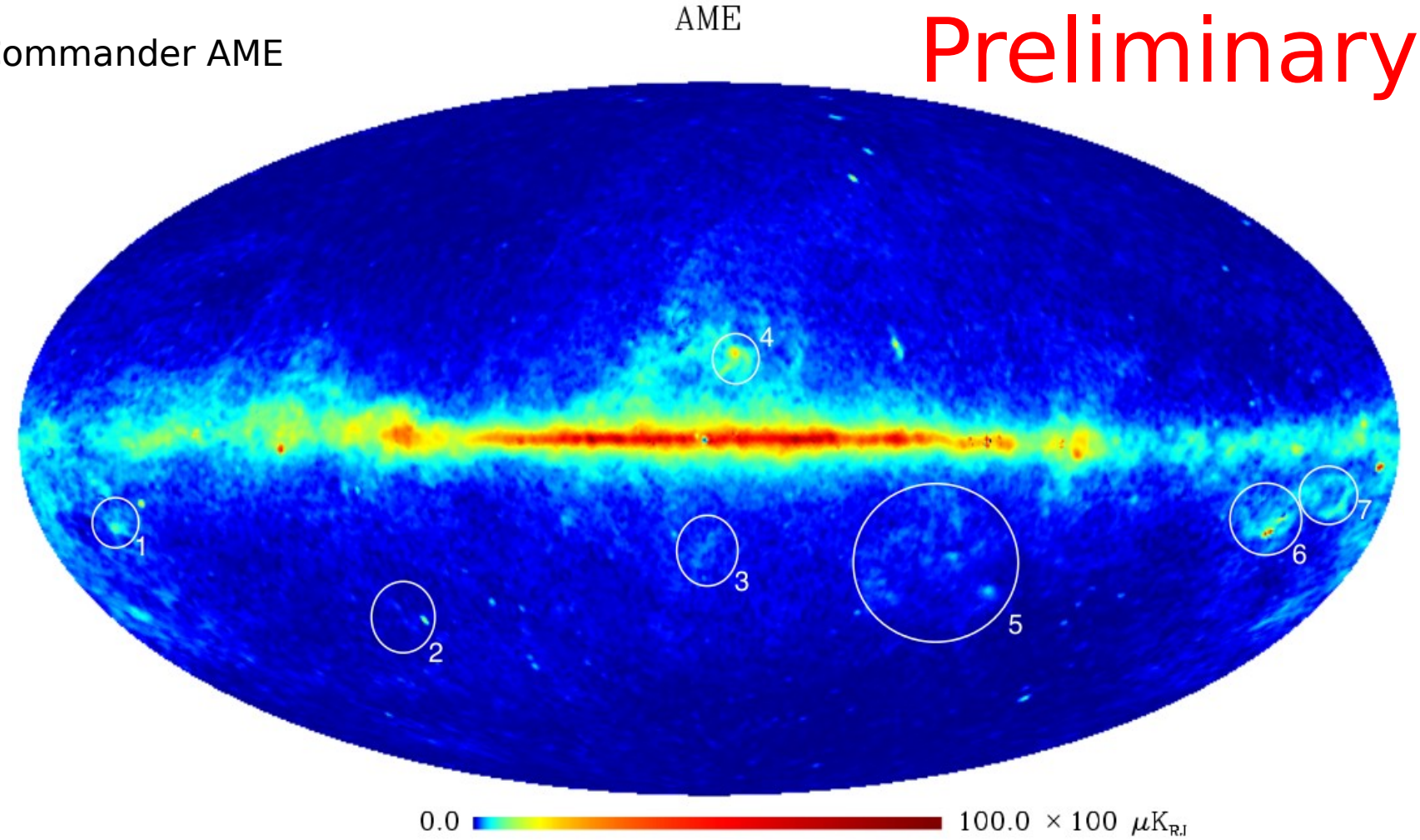




Parkes RRL survey, Alves et al. 2015. arXiv:1411.4497

New AME regions

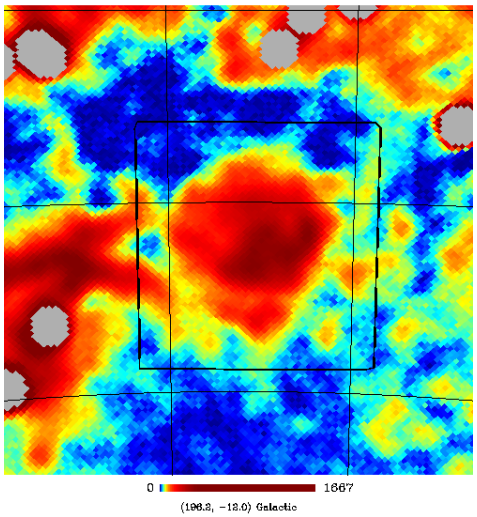
Commander AME



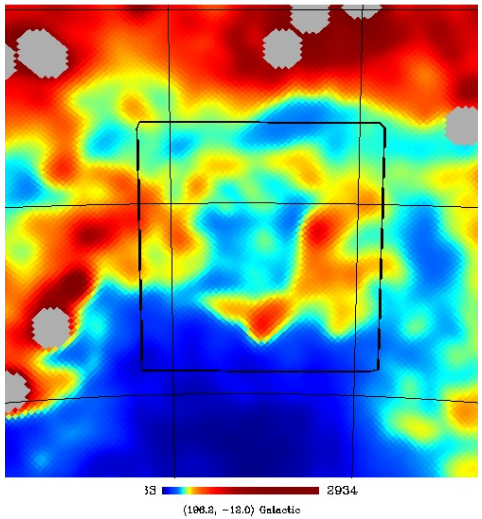
Preliminary!

New AME regions

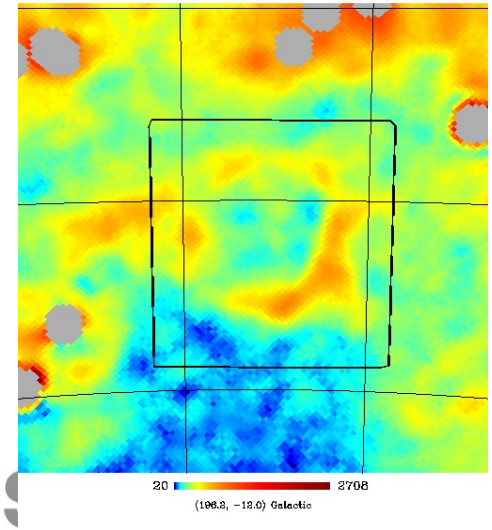
FF



D



- Major foreground at 30 GHz
- Comparable AME emissivities as the ones observed in compact regions.
- No significant polarisation: AME polarisation upper limit of 2% in Perseus.

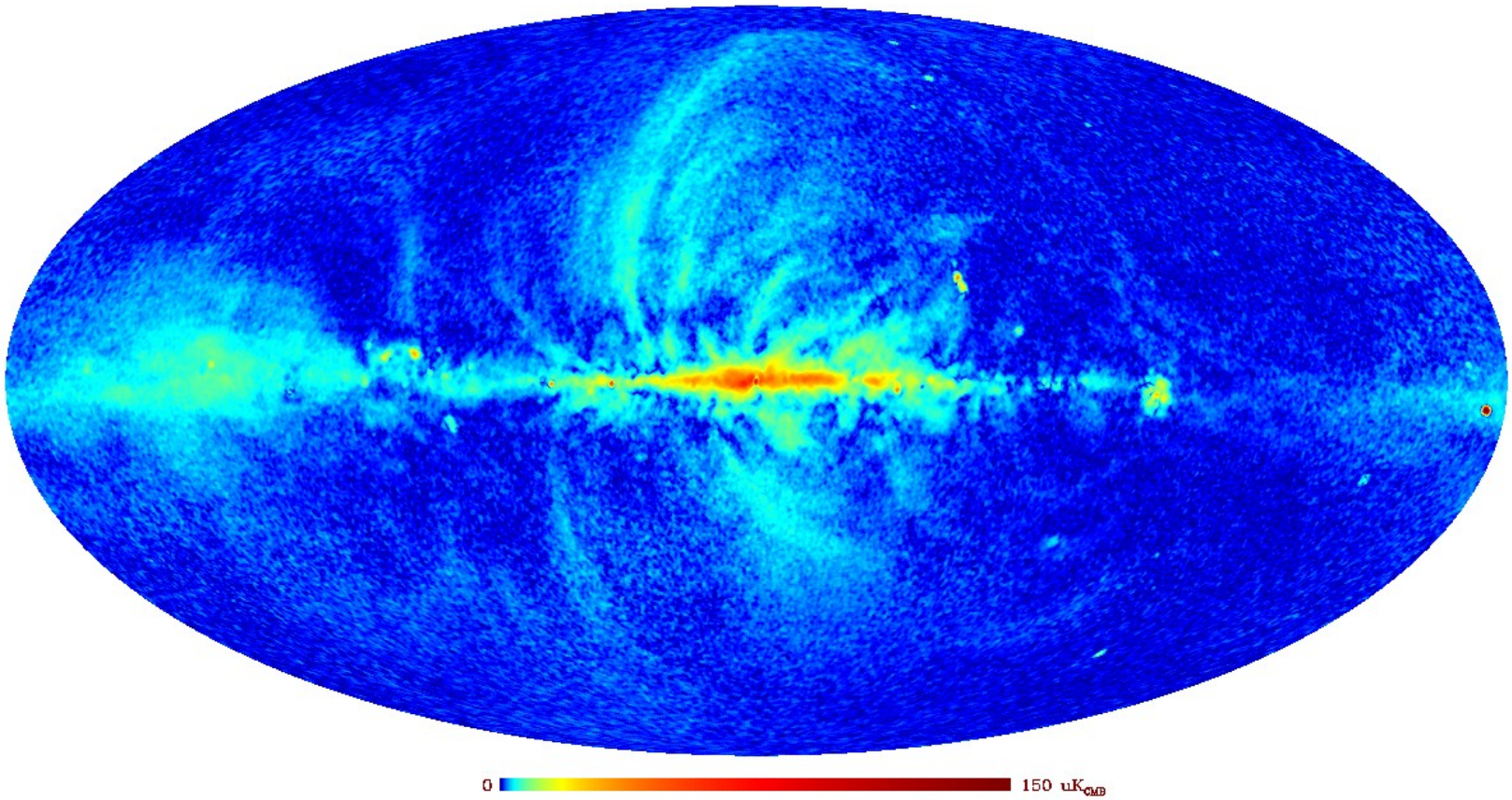


AME predominant in photon dominated regions.

Preliminary!

Polarised sky

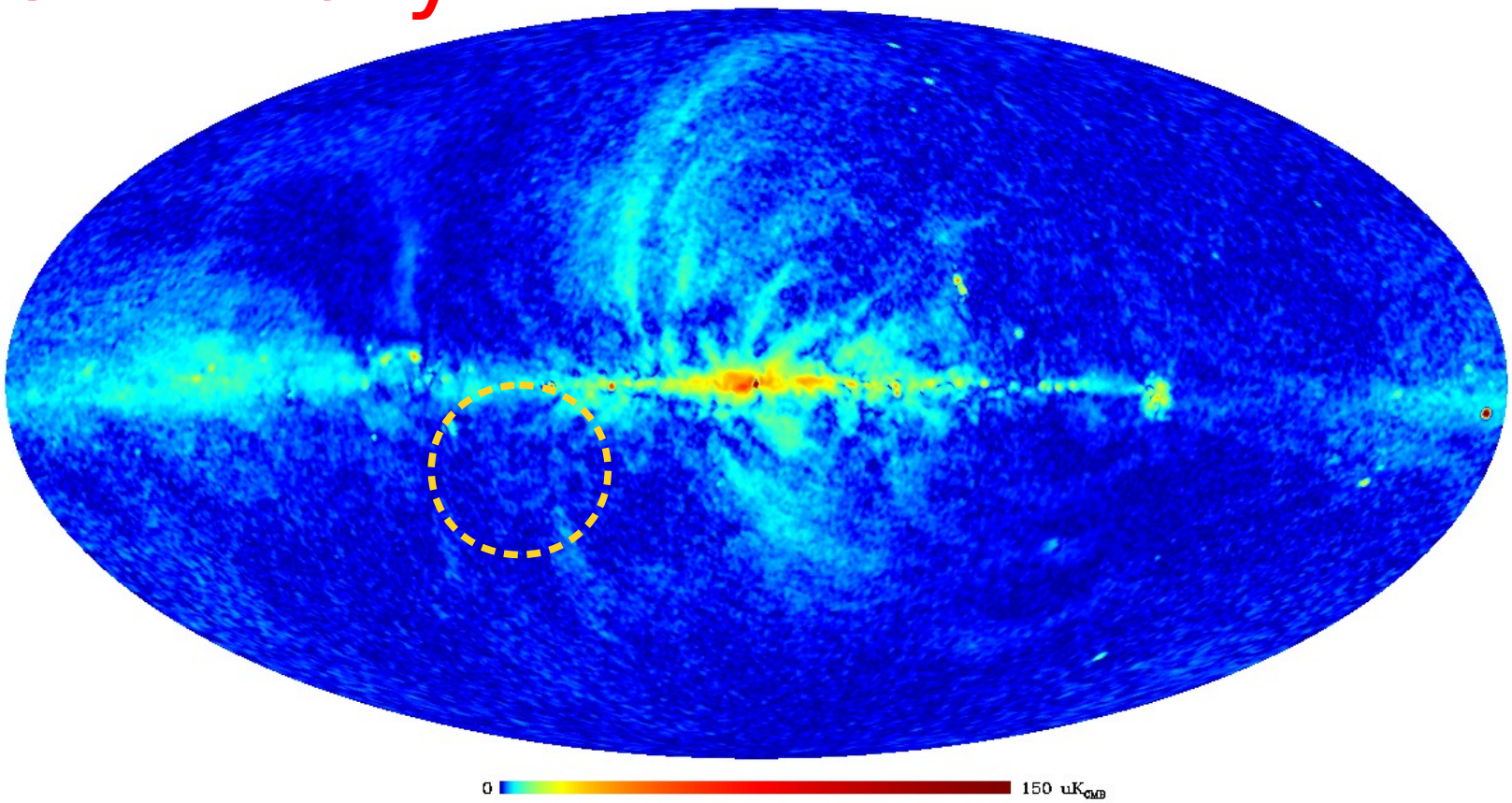
Weighted *WMAP*



Polarised sky

Preliminary!

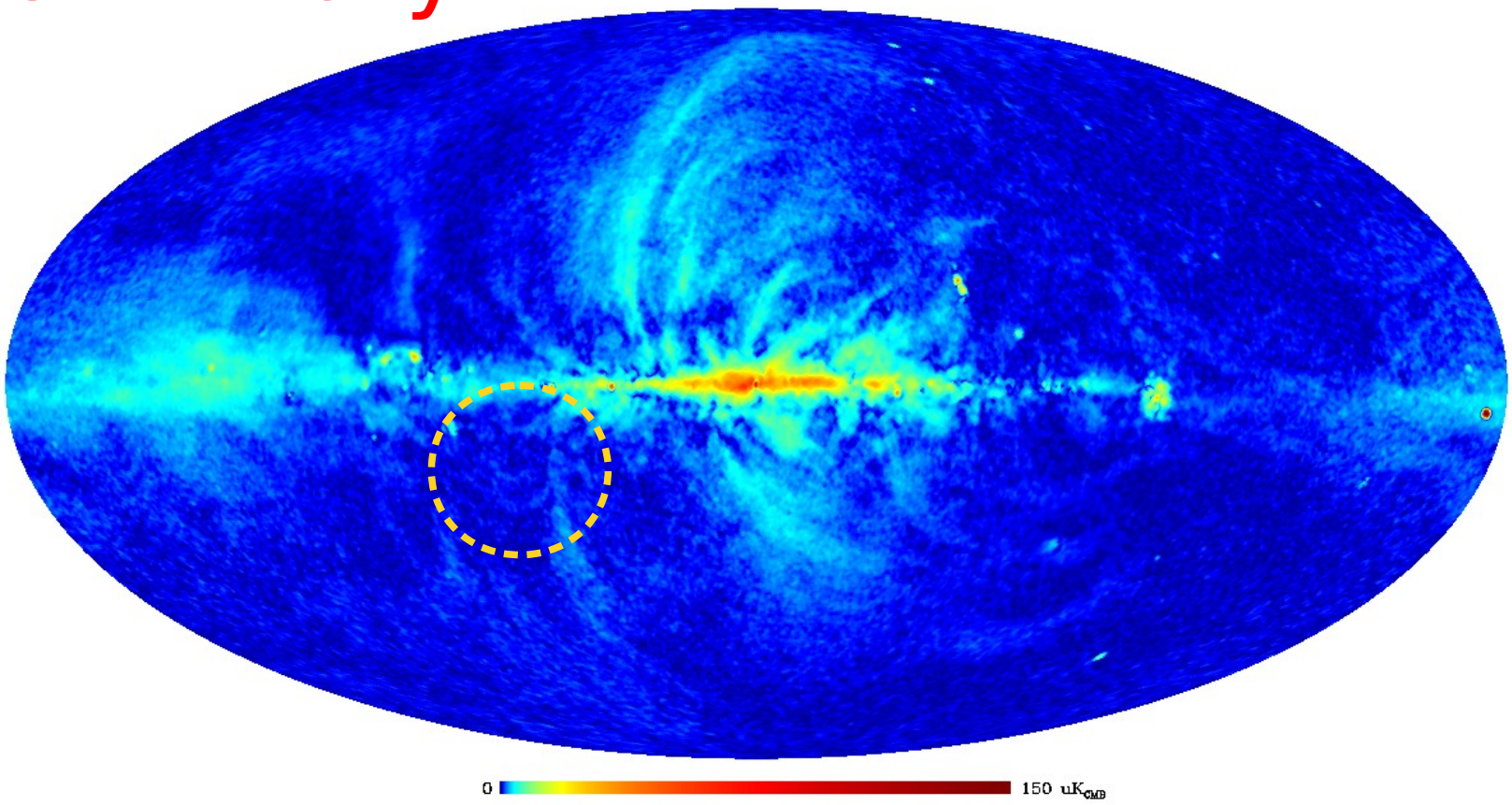
Weighted *Planck*



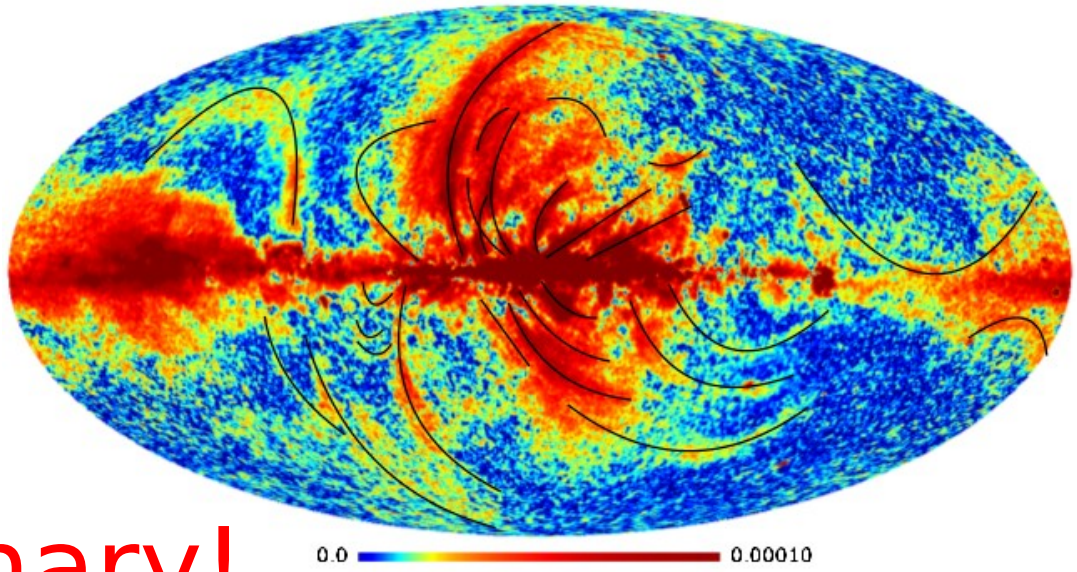
Polarised sky

Preliminary!

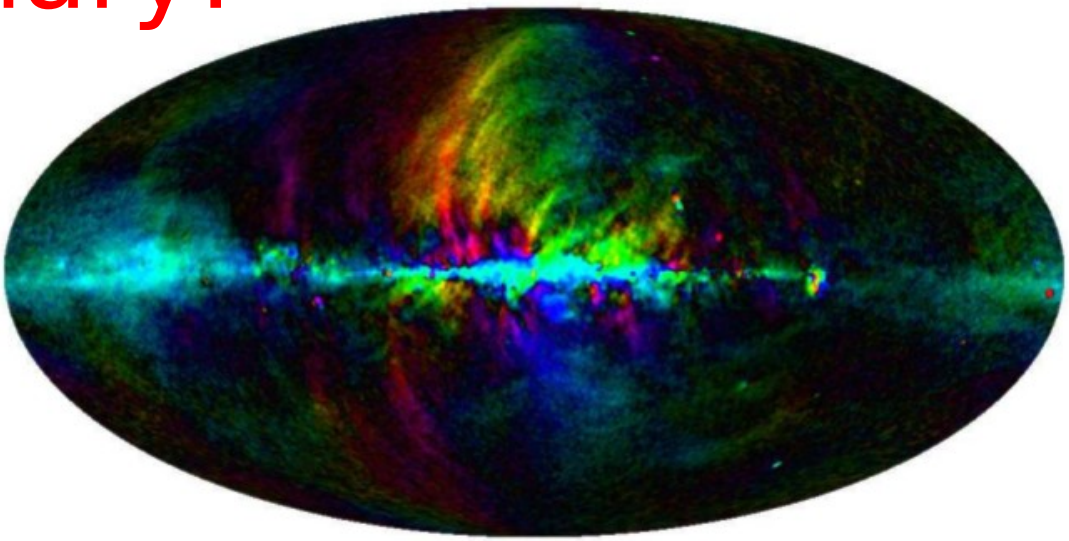
Weighted *WMAP+Planck*



New spurs and loops

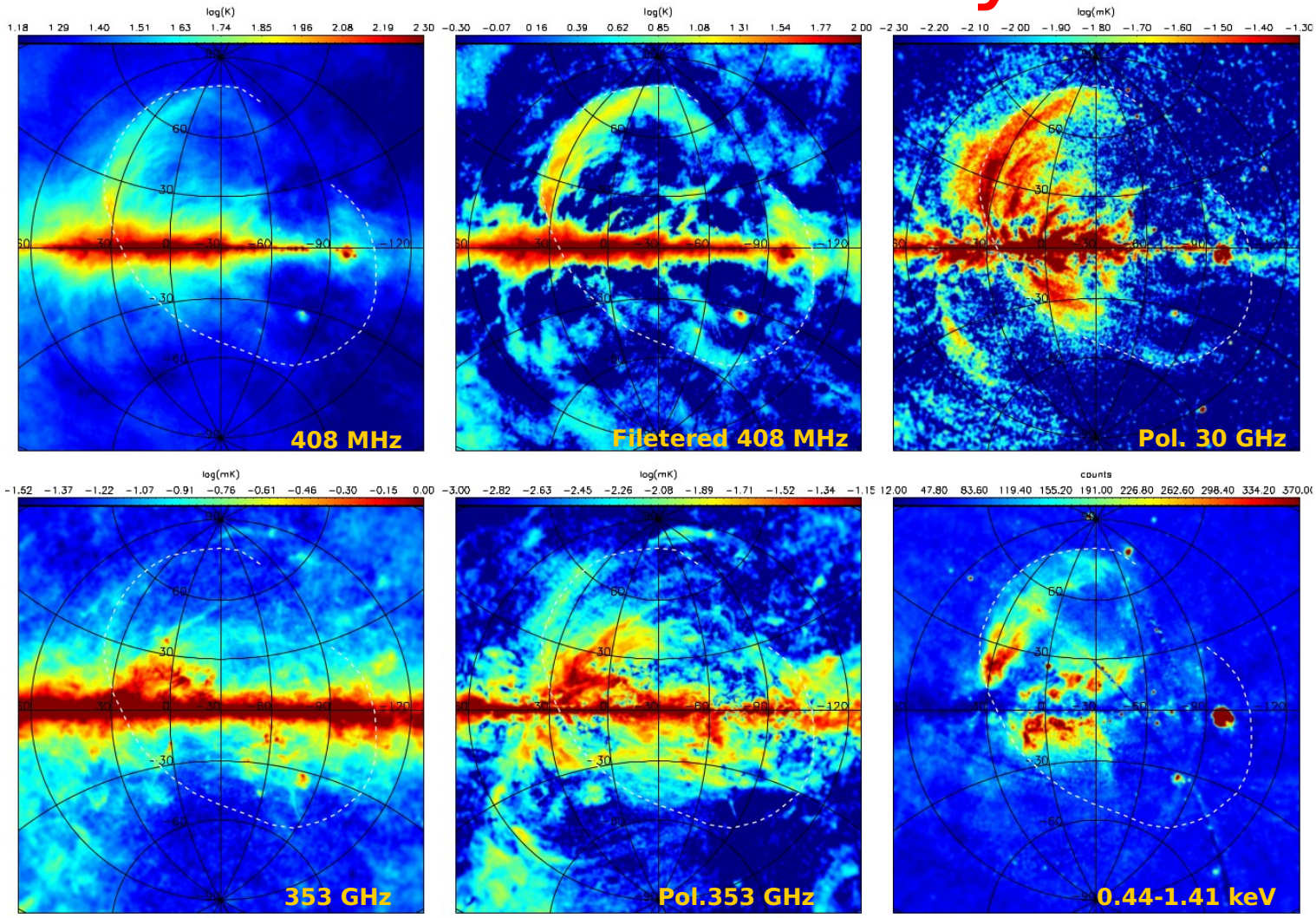


Preliminary!

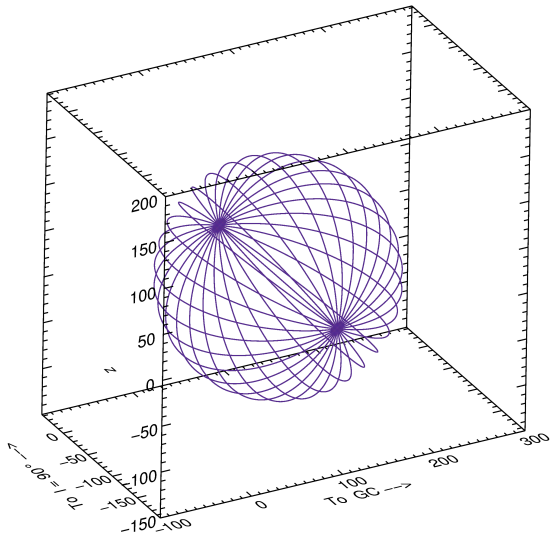


Loops and spurs

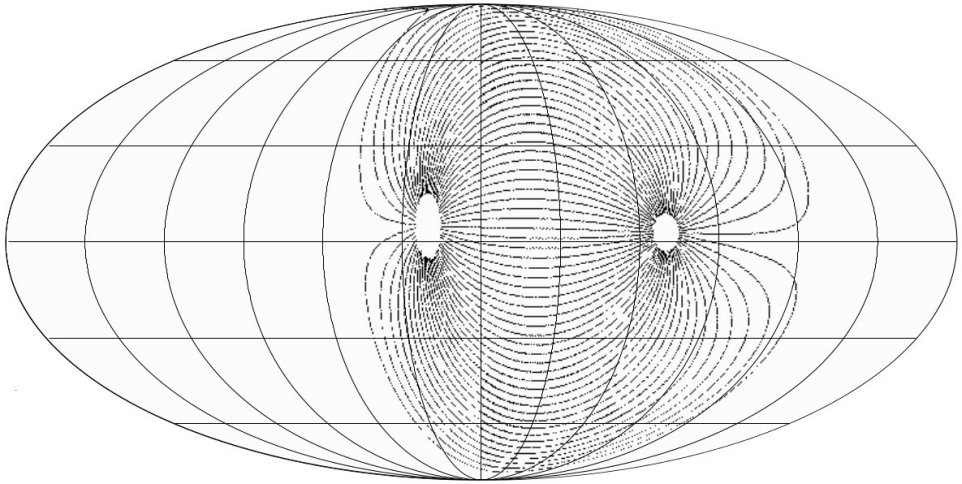
Preliminary!

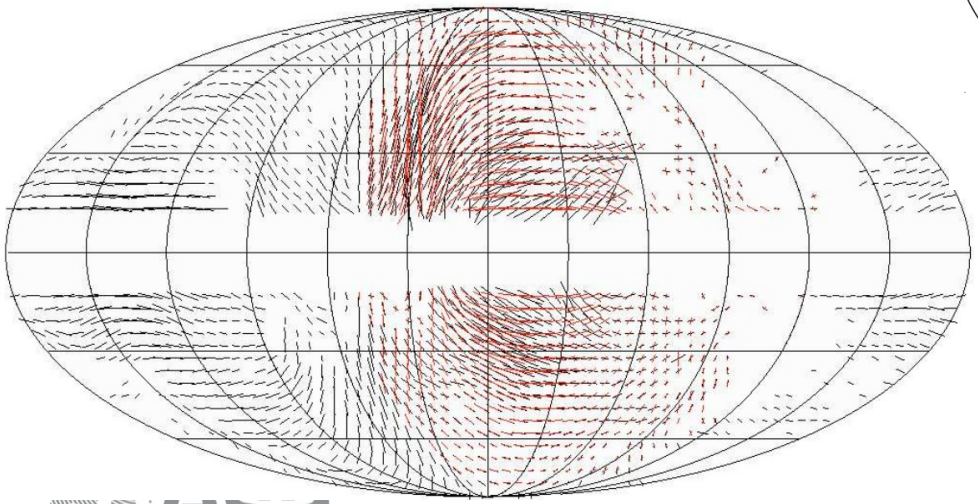


Loops and spurs



- Vidal et al. 2014 shows that a simple model explains large scale polarisation structures.
- Nearby origin, incompatible with Galactic centre activity.



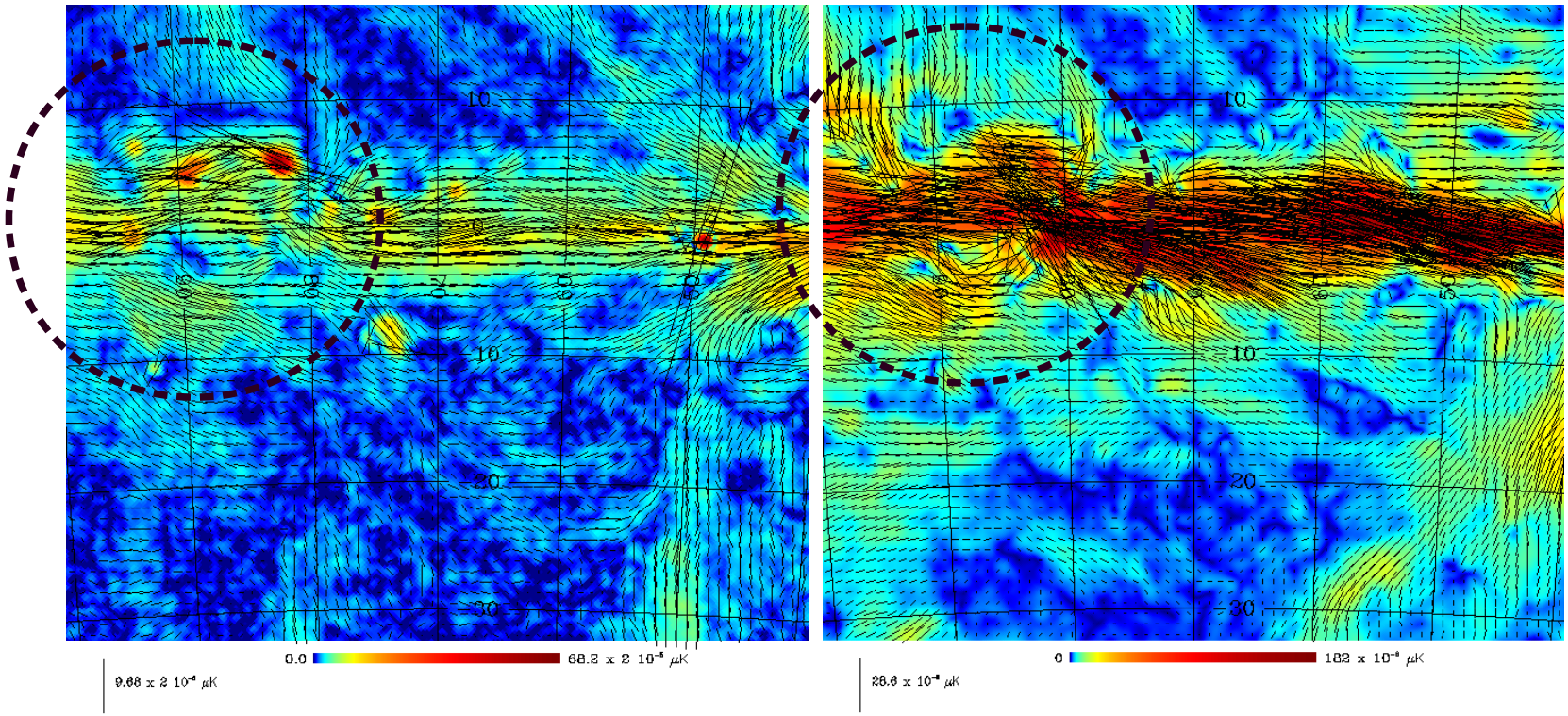


See Vidal et al. 2014. arXiv:1410.4438

Distant Loops

LFI polarisation

Dust polarisation



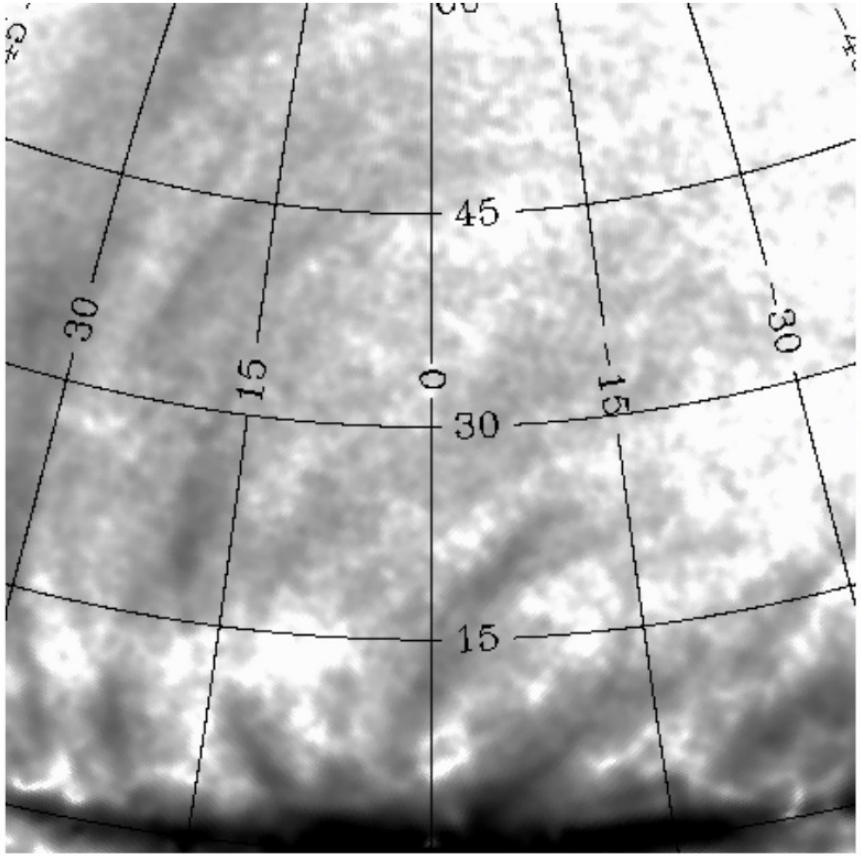
Distant loops around Cyg X region. Are these analogous to the NPS?

Preliminary!

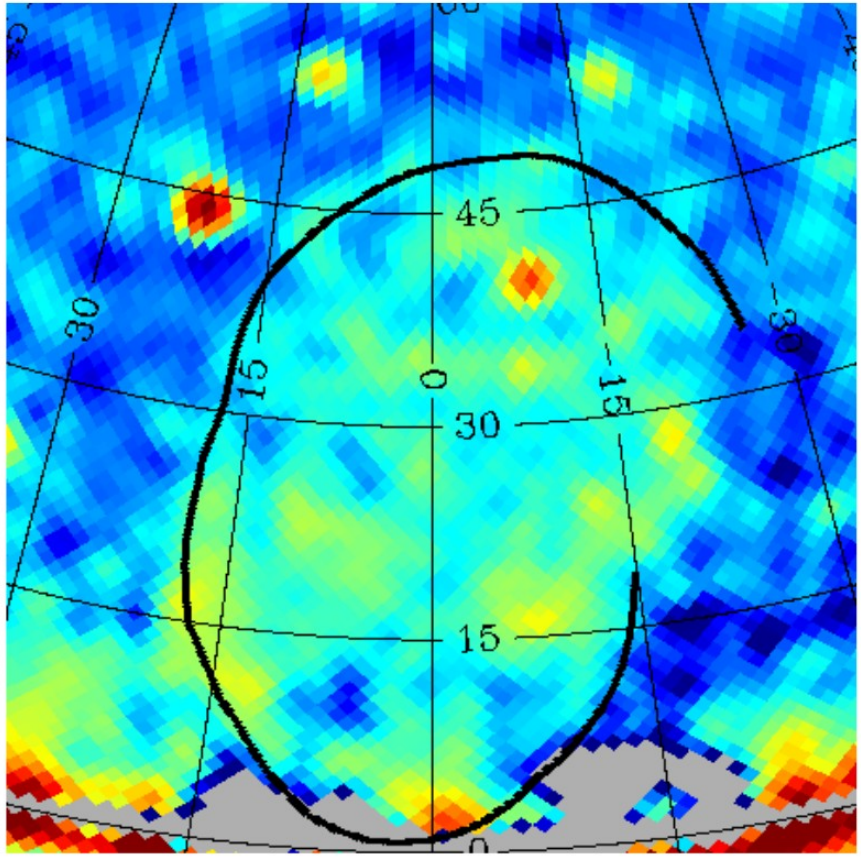
Fermi bubble outline in *Planck* data

Preliminary!

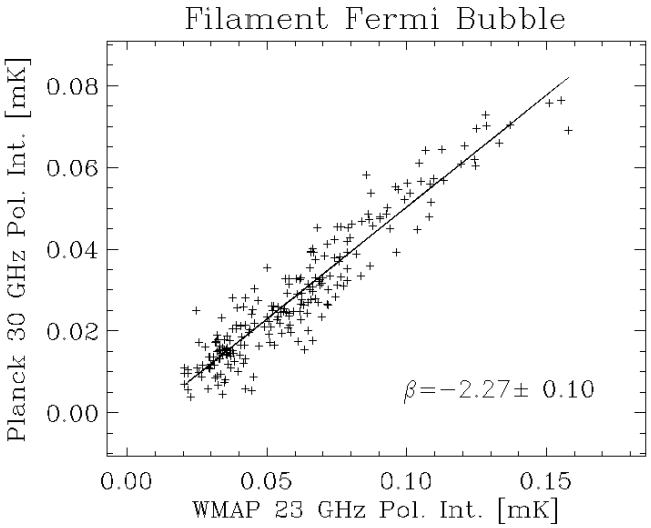
Planck Pol. Amplitude

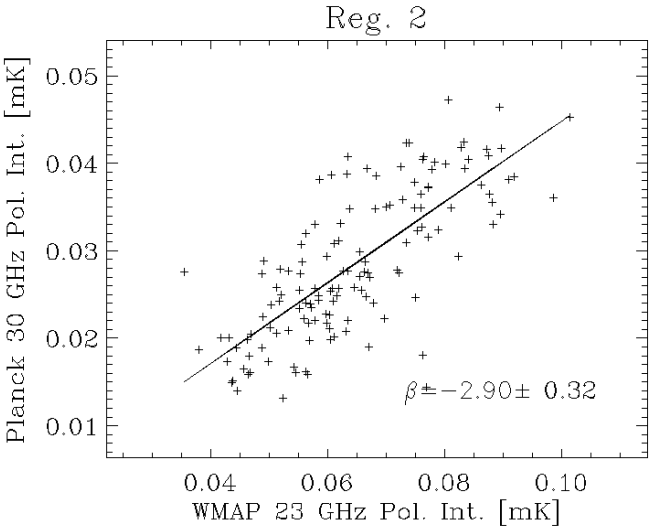


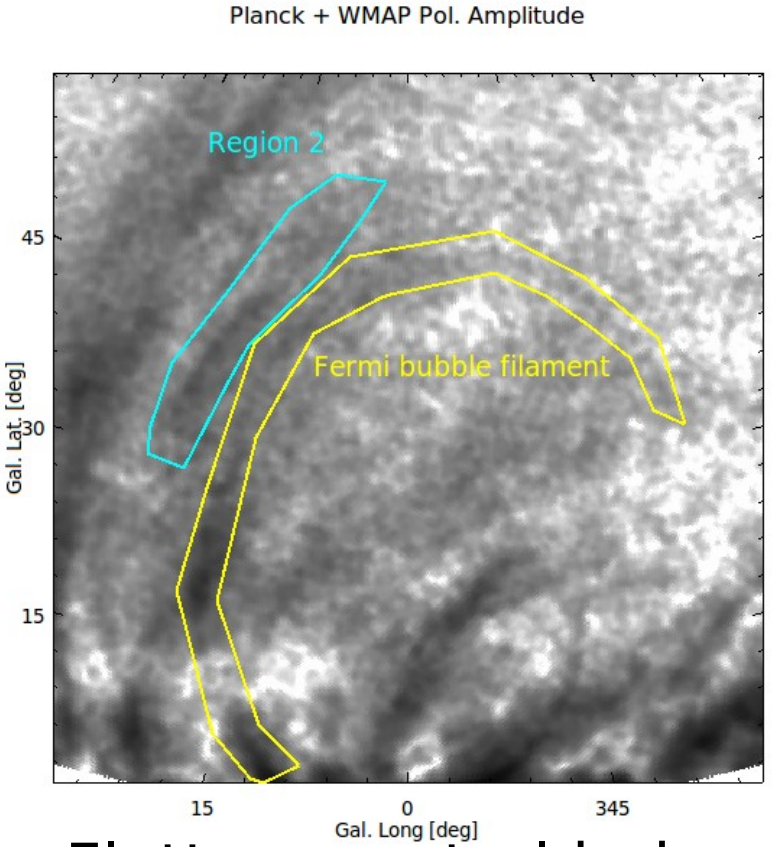
Fermi, E > 10 GeV



Fermi bubble outline in *Planck* data





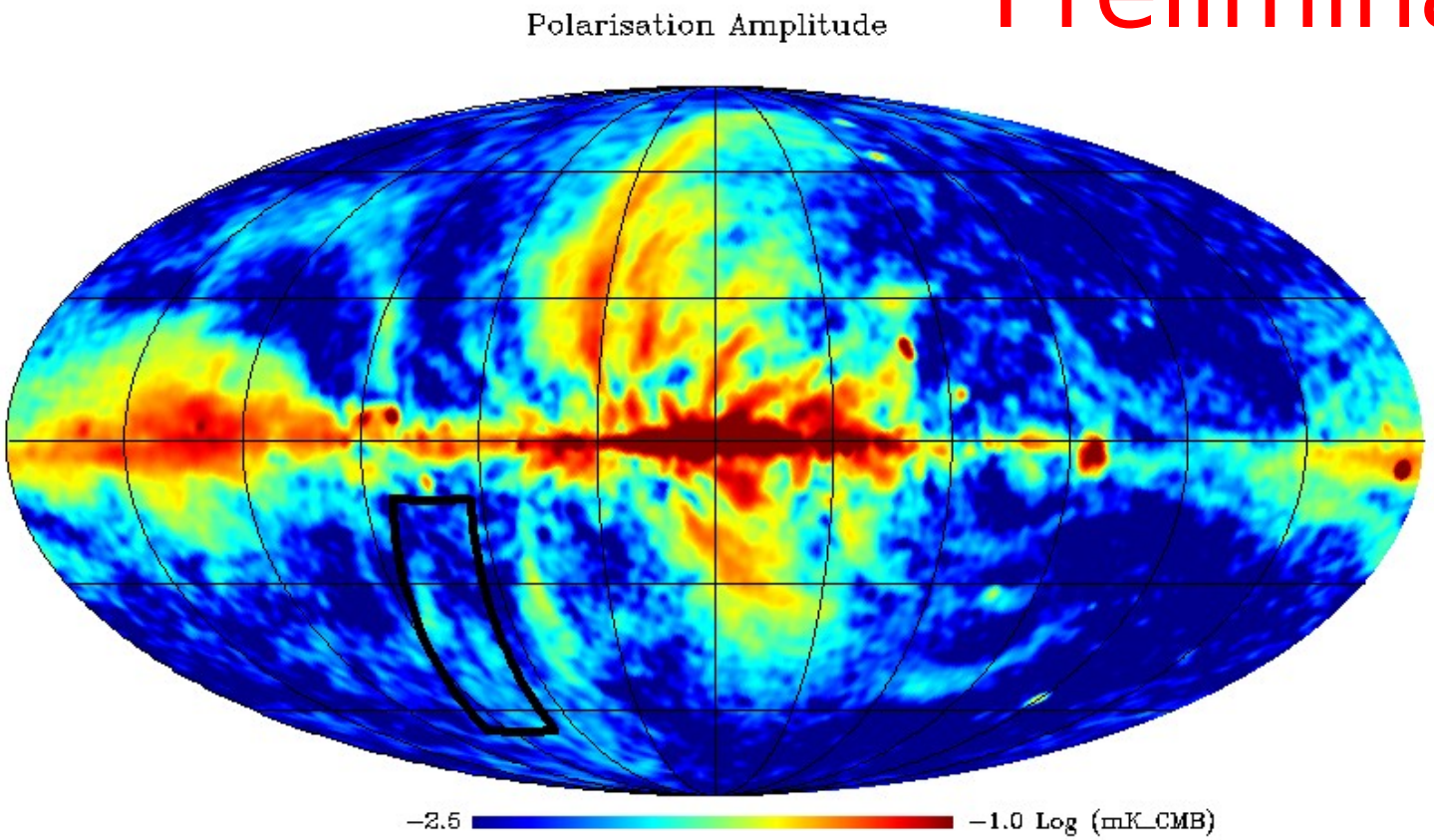


Flatter spectral index

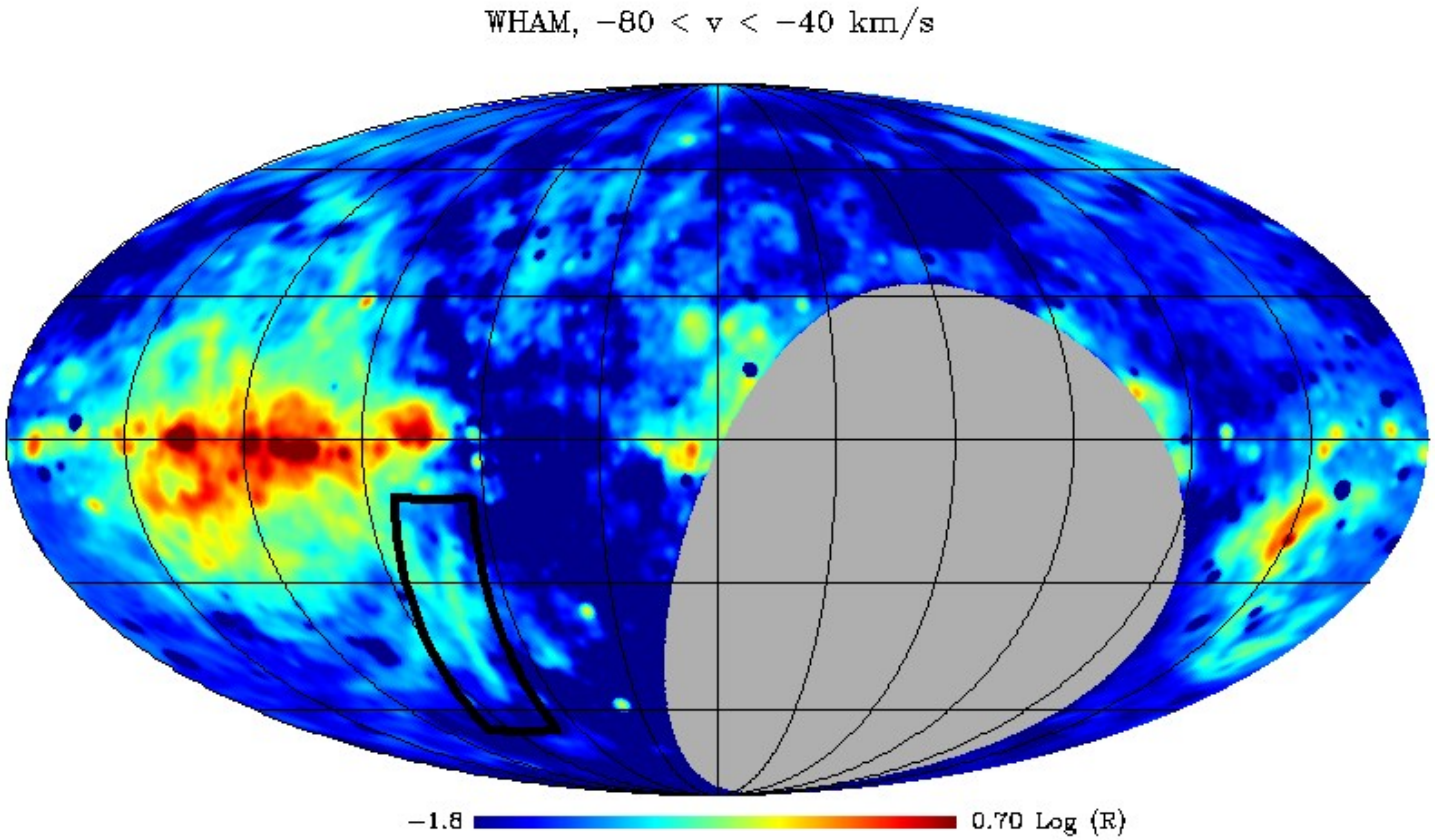
Preliminary!

Hα – radio anti correlation

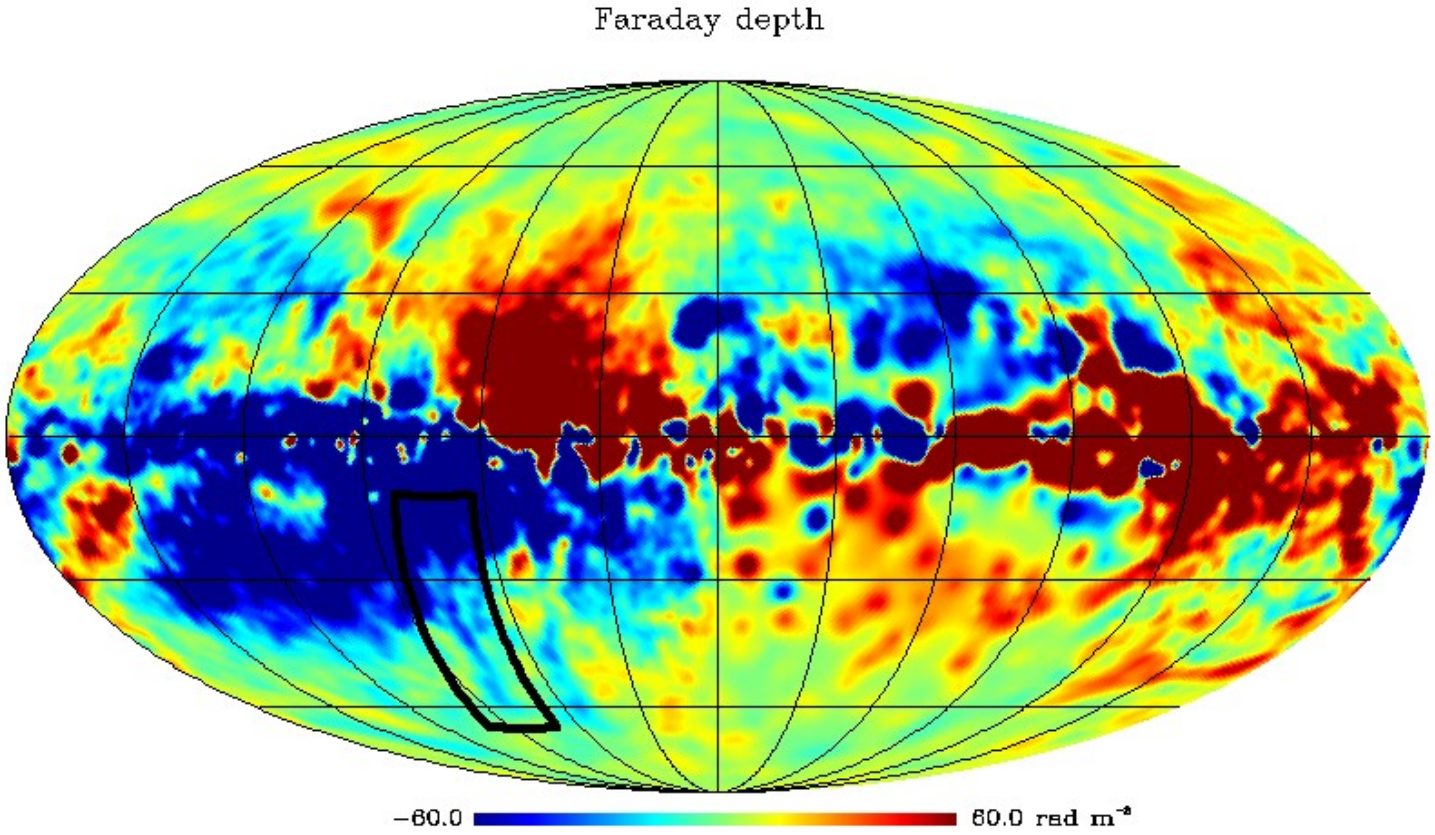
Preliminary!



Hα – radio anti correlation



Hα – radio anti correlation



Conclusions

1. Component separation allows study of AME, free-free and synchrotron.

2. *Planck* detects new AME regions.

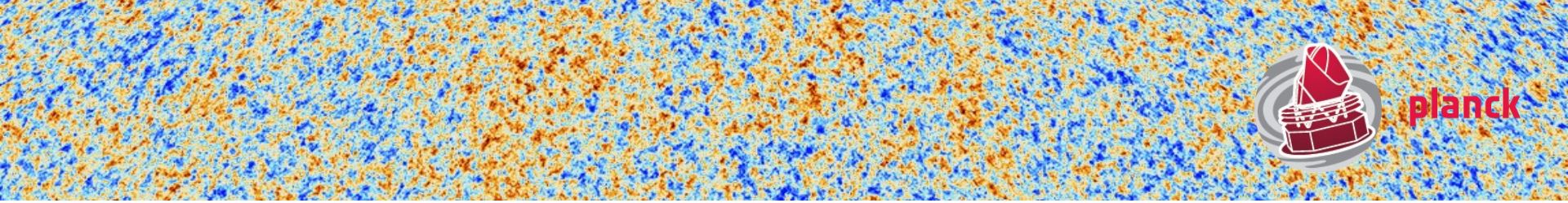
3. Polarisation maps shows new interesting feature: e.g. *Fermi* bubble outline, loops and spurs.

4. Also new questions: Hα excess due to scattering? Hα anti–correlation with synchrotron.

5. See paper XXXI for discussion of these results.

The scientific results that we present today are a product of the Planck Collaboration, including individuals from more than 100 scientific institutes in Europe, the USA and Canada

Planck is a project of the European Space Agency, with instruments provided by two scientific Consortia funded by ESA member states (in particular the lead countries: France and Italy) with contributions from NASA (USA), and telescope reflectors provided in a collaboration between ESA and a scientific Consortium led and funded by Denmark.



esa

PLANCK LFI

HFI PLANCK


Thank you