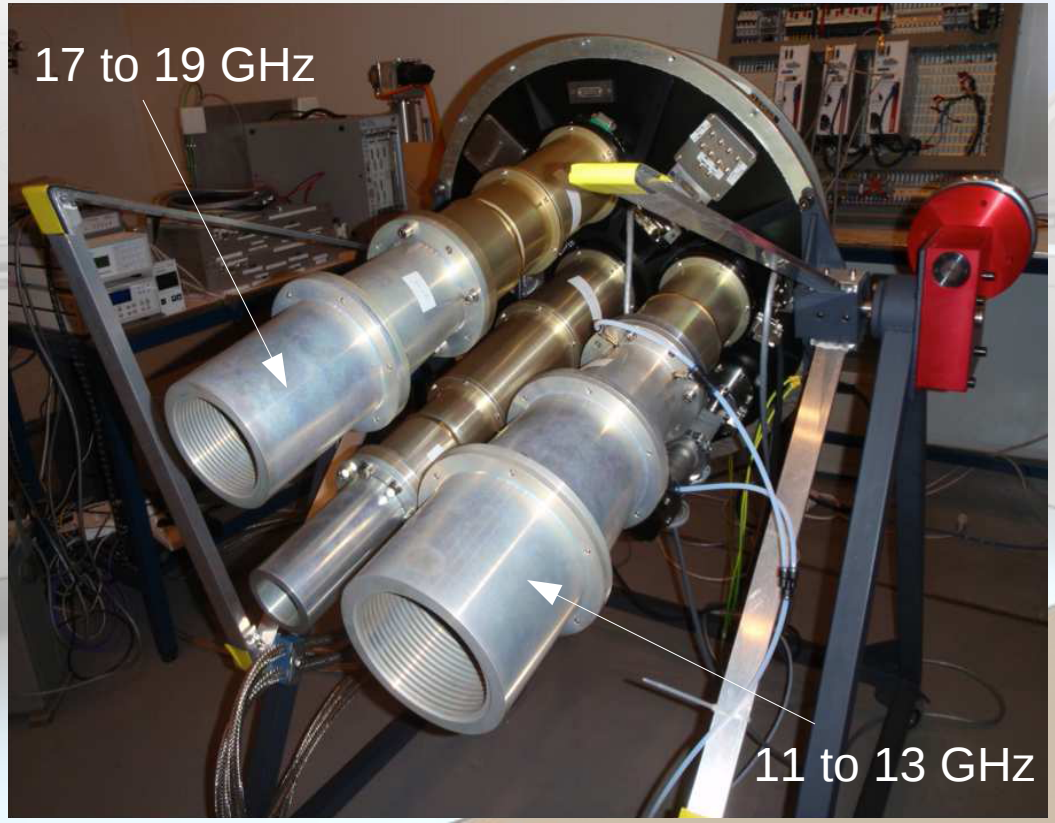
QUI Joint Tenerife Experiment and Anomalous Microwave Emission

The QUIJoTE MFI

Rubino-Martin, et al., SPIE 2012

The QUIJoTE MFI



Rubino-Martin, et al., SPIE 2012

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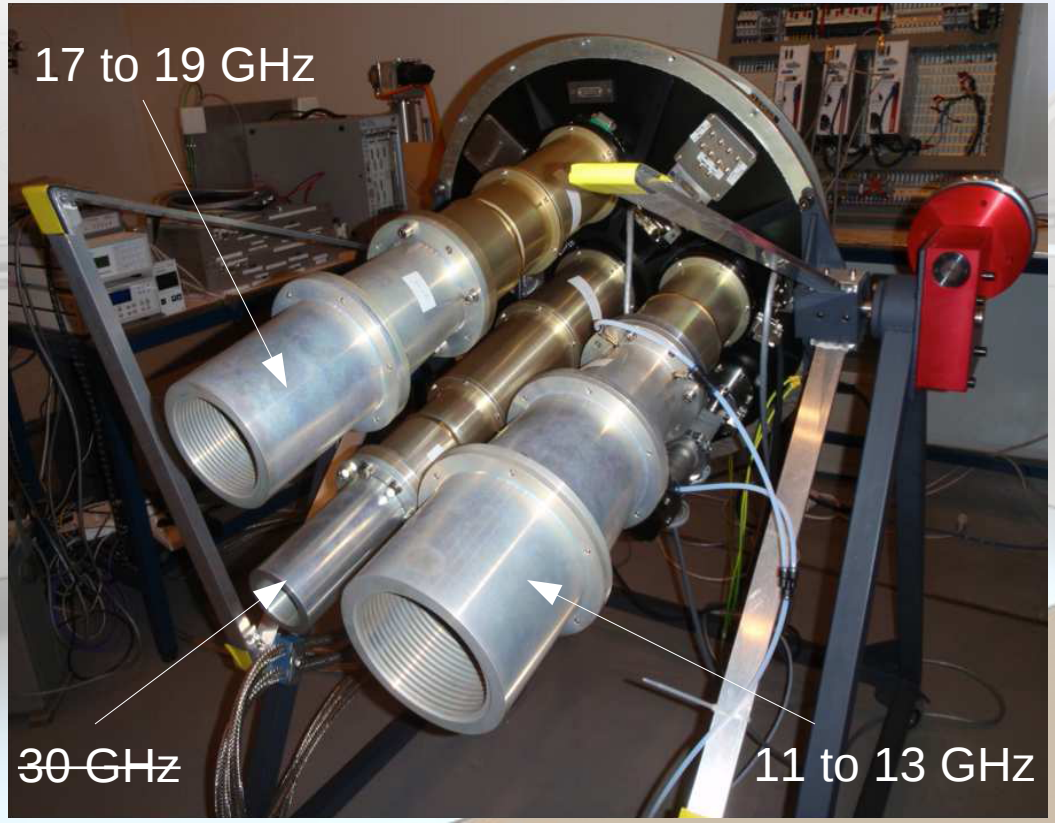
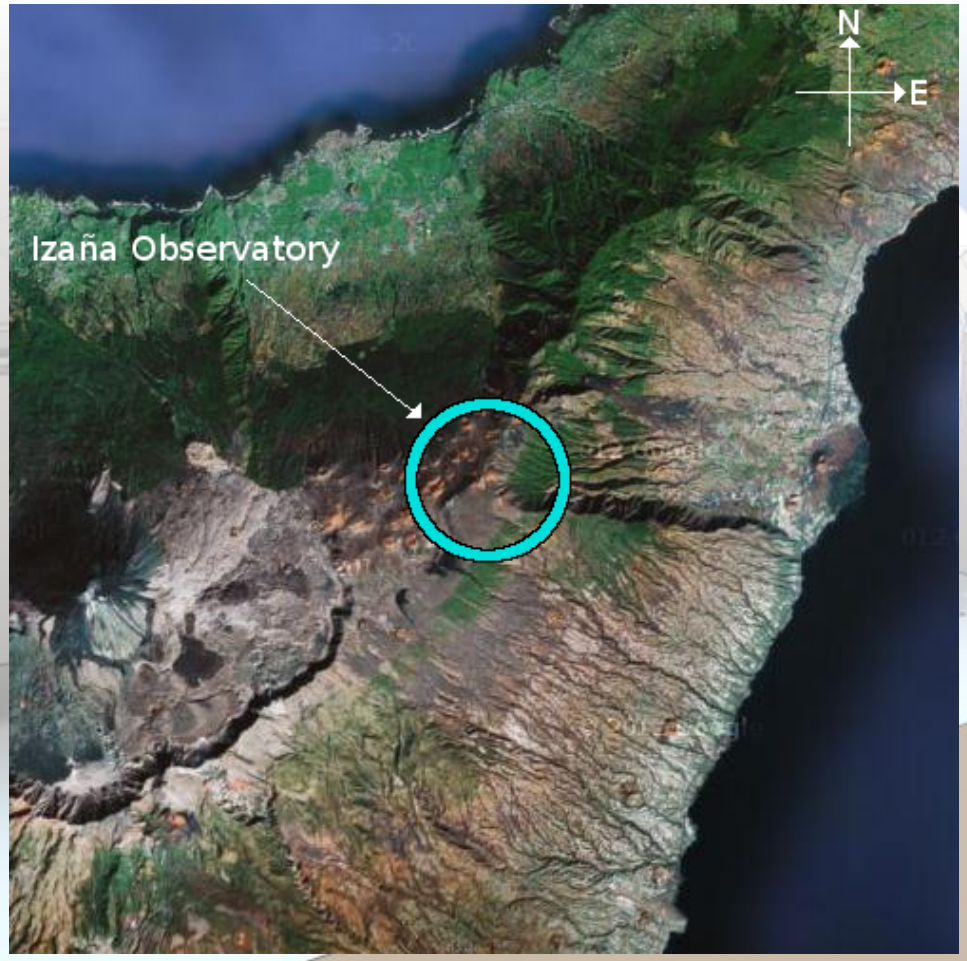


Rubino-Martin, et al., SPIE 2012

The Observatory



The Observatory

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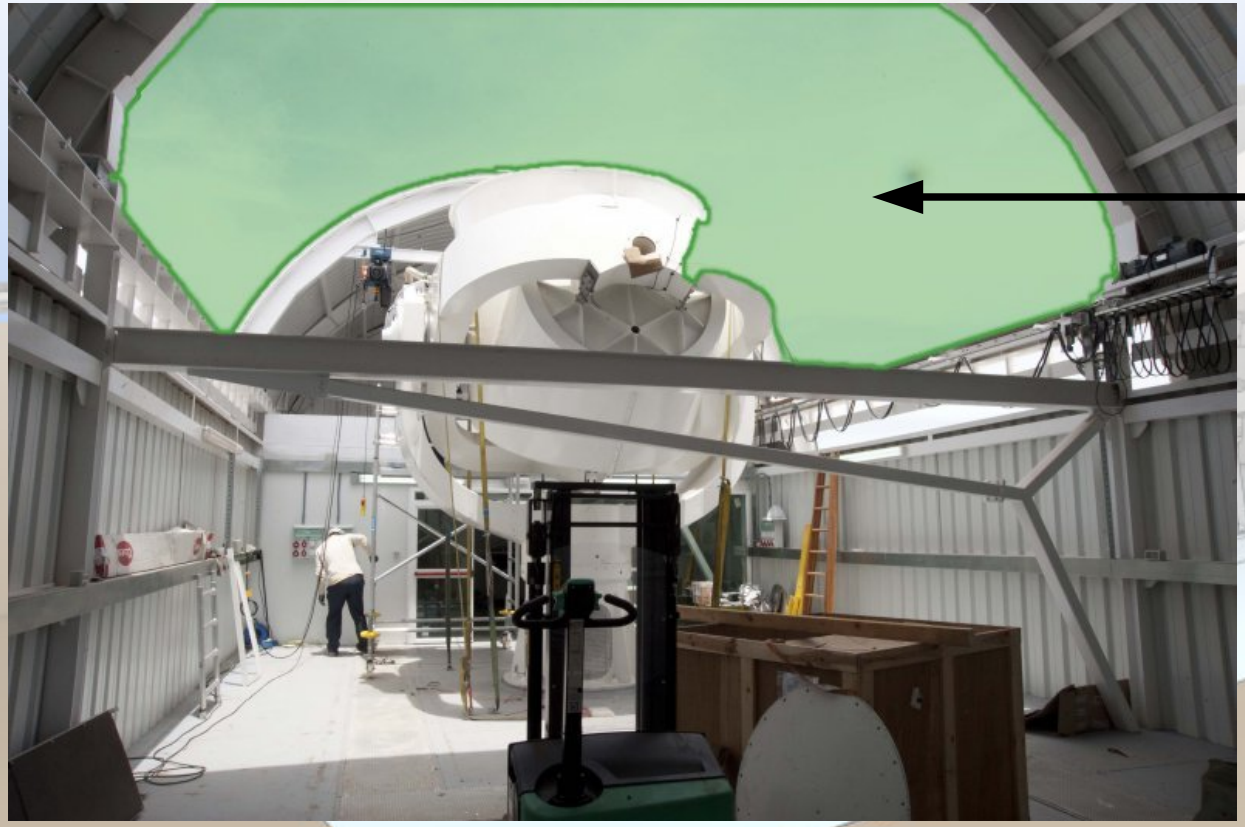


Sky Properties

Temperature: ~10 K
Intensity Knee Freq: 1Hz

The Telescope

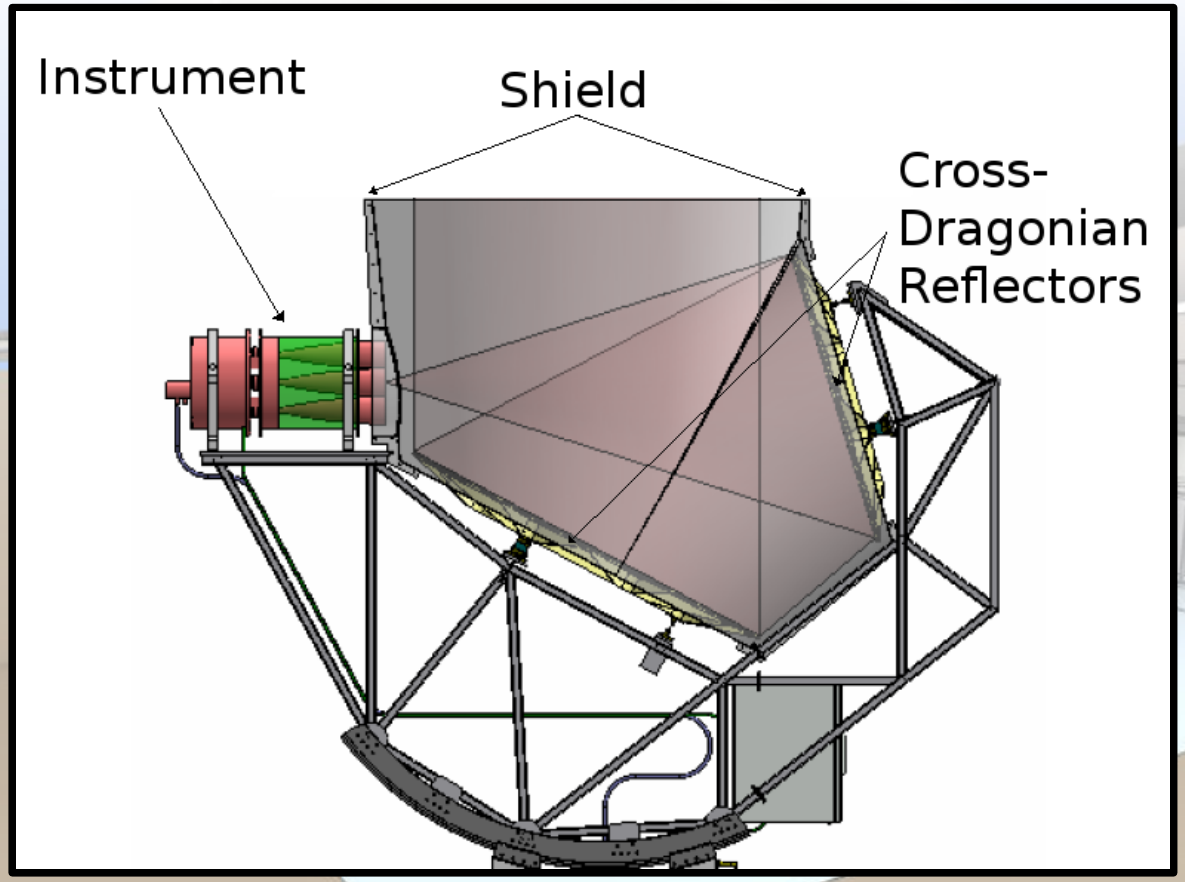


Diagram by IDOM.

Telescope Properties

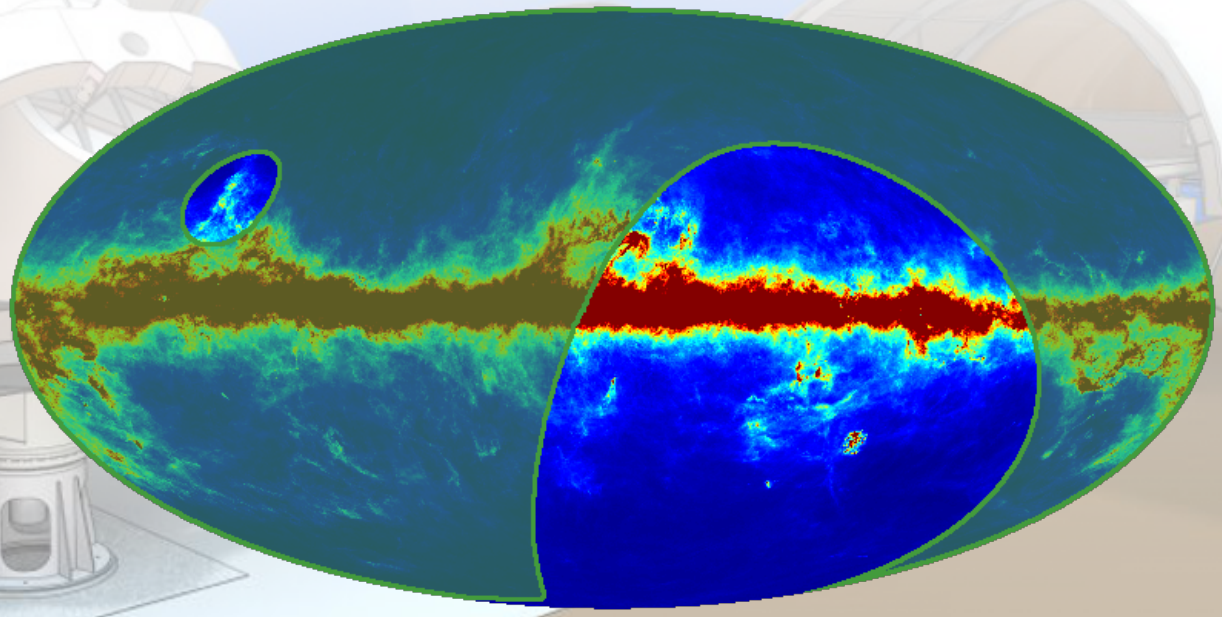
- Rotation speed: 1 rpm or 6 degrees per second.
- Cross-Dragonian optics: more sensitive, less cross-polarisation, larger DLFOV.
- Modular design allows for instruments to be switched.

The Telescope

The QUIJoTE MFI

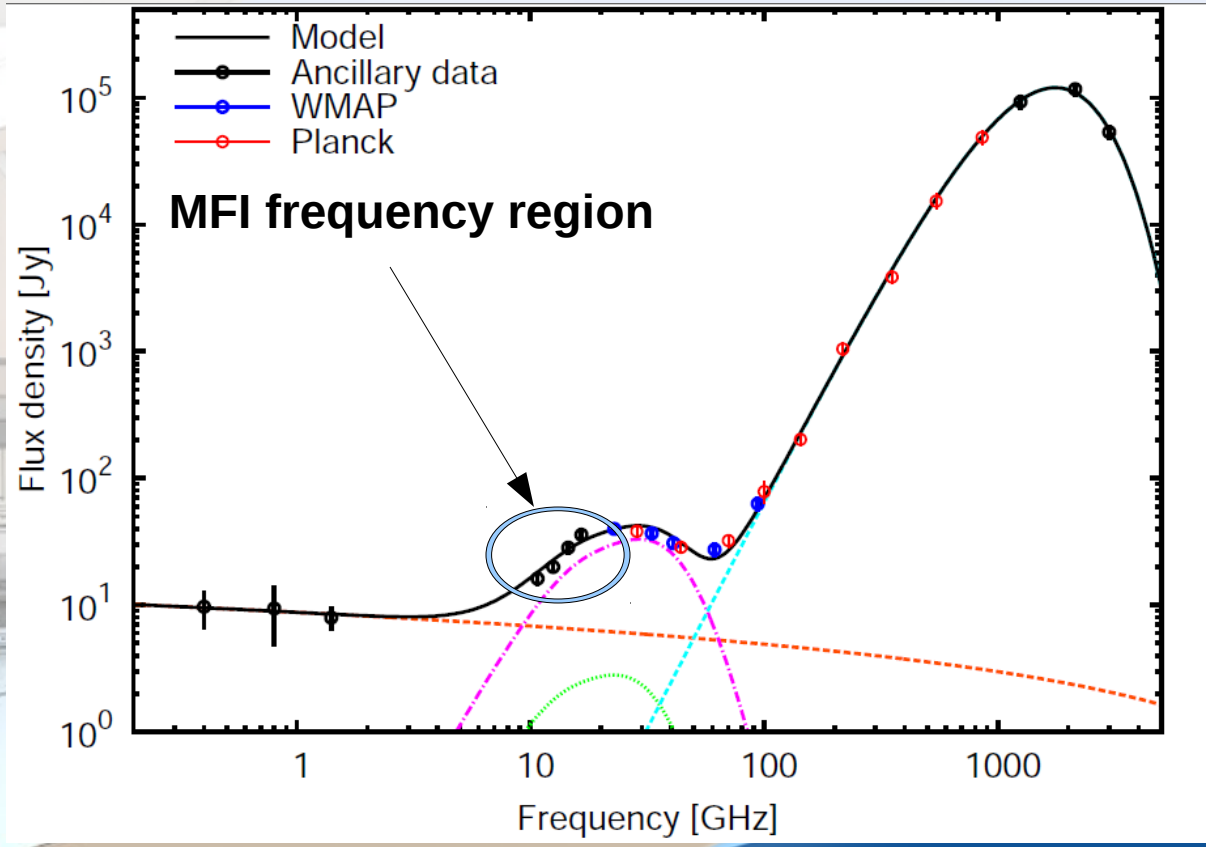
Properties

- **Simultaneous measurement of Q, U and I parameters.**
- **Galactic science survey of ~10000 sq. deg.**
- **Sensitivities of ~15 μK per degree per beam.**
- **About 2 – 3 months effective observing.**



MFI for AME

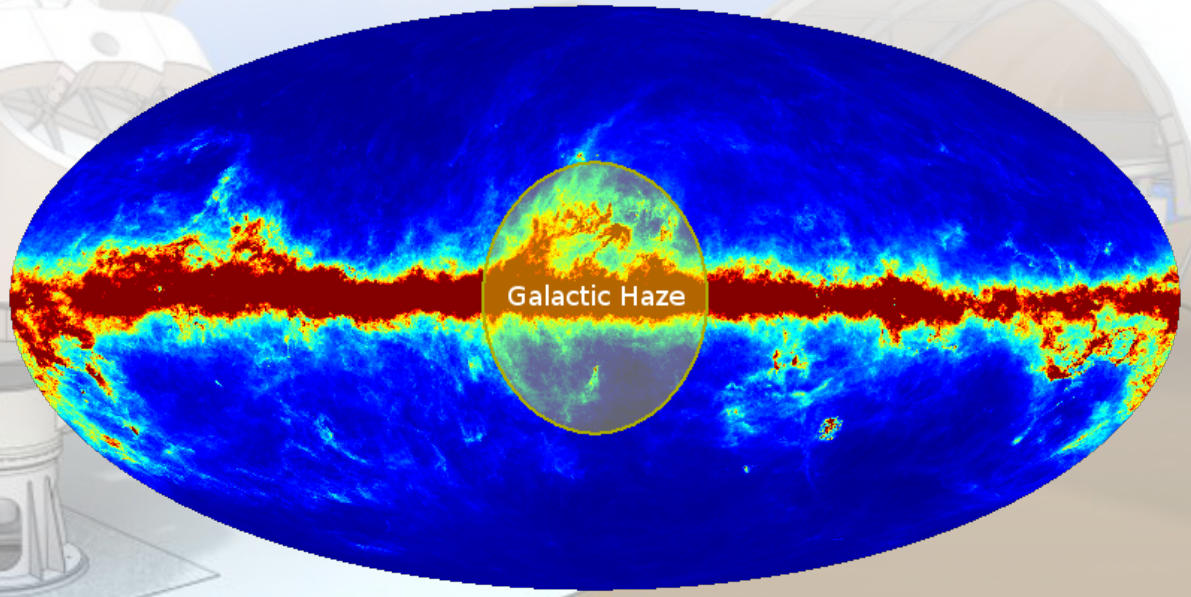
- Total Intensity
  - Rising spectrum.
  - Useful to compare with C-BASS for low frequencies.
  - Useful with PLANCK for the higher frequencies.
- Polarisation
  - Grain composition and model constraints.



Perseus Molecular Cloud SED. Planck Early Results. XX. (2011)

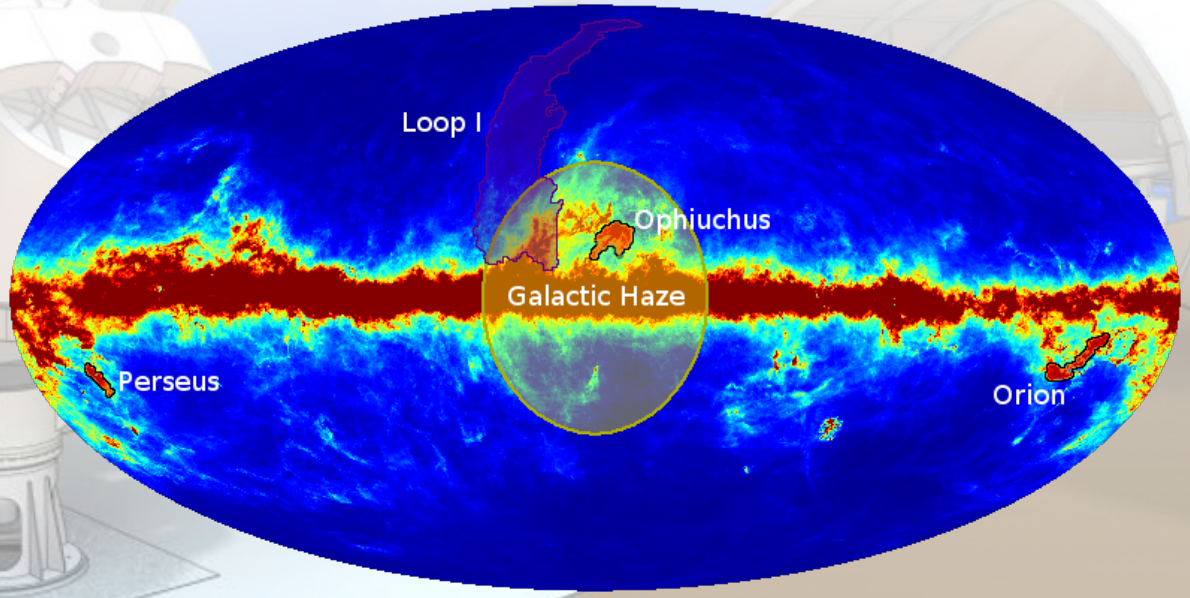
MFI for other Foregrounds

- WMAP Haze in Galactic Centre.



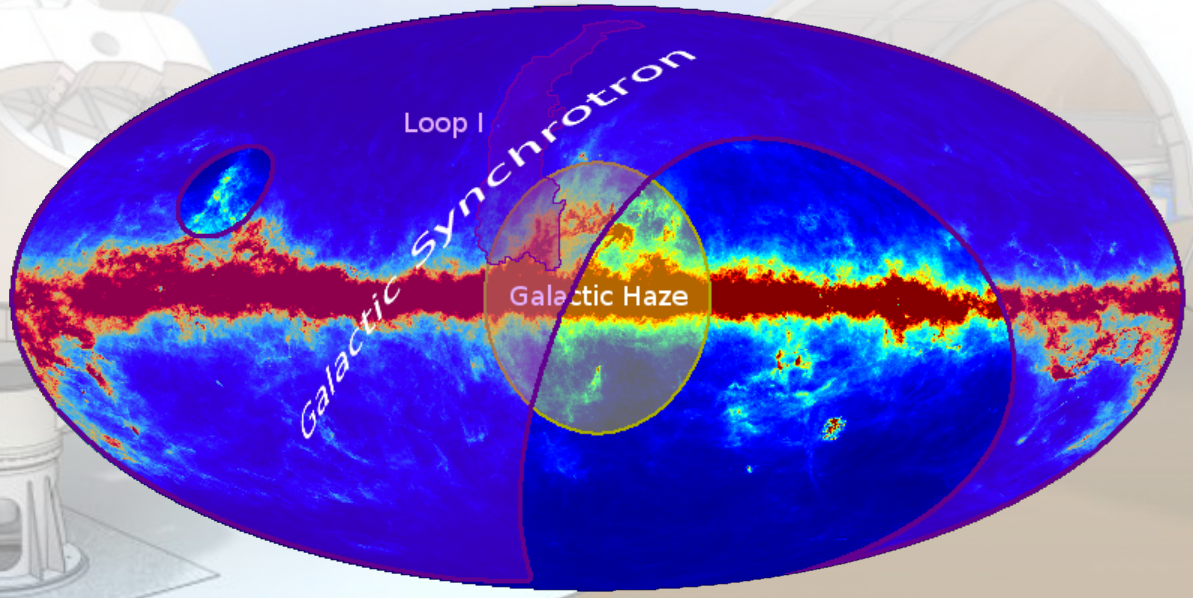
MFI for other Foregrounds

- WMAP Haze in Galactic Centre.
- Polarisation and origins of the North Polar Spur.
- Specific Anomalous Microwave Emission sources.



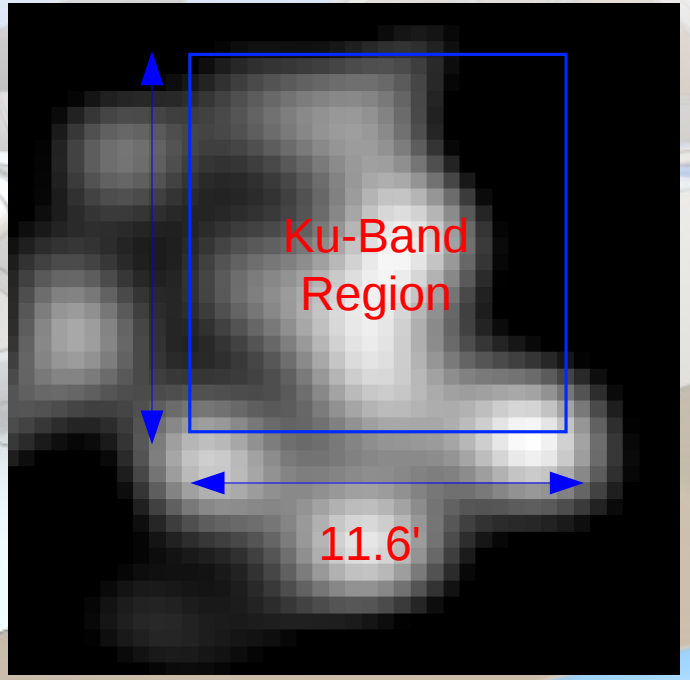
MFI for other Foregrounds

- WMAP Haze in Galactic Centre.
- Polarisation and origins of the North Polar Spur.
- Specific Anomalous Microwave Emission sources.
- A map of Galactic synchrotron emission.



LDN 1622

http://www.flickr.com/photos/ytoropin/

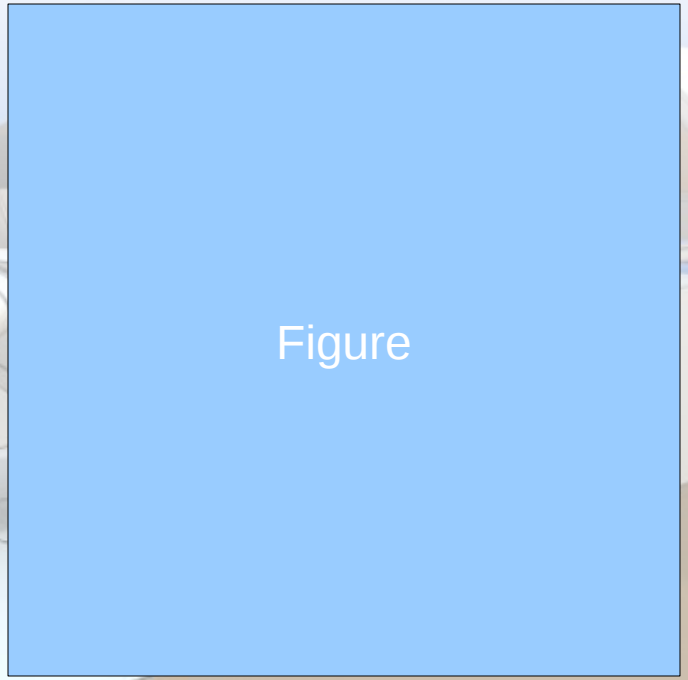


LDN 1622

- Principle Component Analysis of each scan to determine spatially correlated noise.
  - Used fractional eigenvalue of PC1 as figure of merit.

- Baseline subtraction via polynomial fitting.

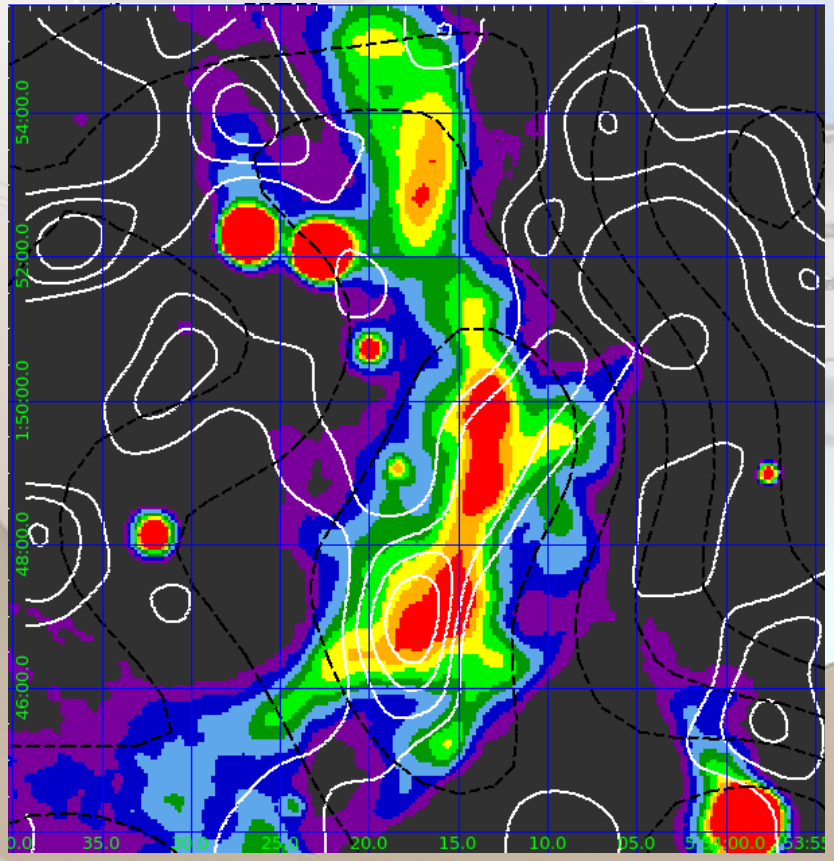
- Filtering of the spatial frequencies by combining orthogonal scans.



Very heavily filtered data!
(Probably too filtered)

LDN 1622 Reduced GBT Data

AME detected by GBT (5, 8, 10 GHz) (Finkbeiner, D. et al. 2002) and CBI (31 GHz) (Casassus, S. et al. 2006).



Background: WISE 22 microns. (Wright et al. 2010)

Believing the LDN 1622 Result

- Simulations
  - GBT average 1/f noise
  - Simulated TOD with GBT 1/f added
- Pipeline Improvements
  - Produce less filtered maps
  - Improve PCA technique