



# The QUIJOTE Project

National Astronomy Meeting 2015  
Radio Surveys

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on behalf of the QUIJOTE collaboration





# Izana Observatory

> **Location:** Izana Observatory, Mount Teide, Tenerife.

>> **Lat.:**  $28.3^{\circ}$  N

>> **Lon.:**  $16.5^{\circ}$  W

>> **Alt.:** 2400m



30 year anniversary!



# QUIJOTE QT1 and QT2



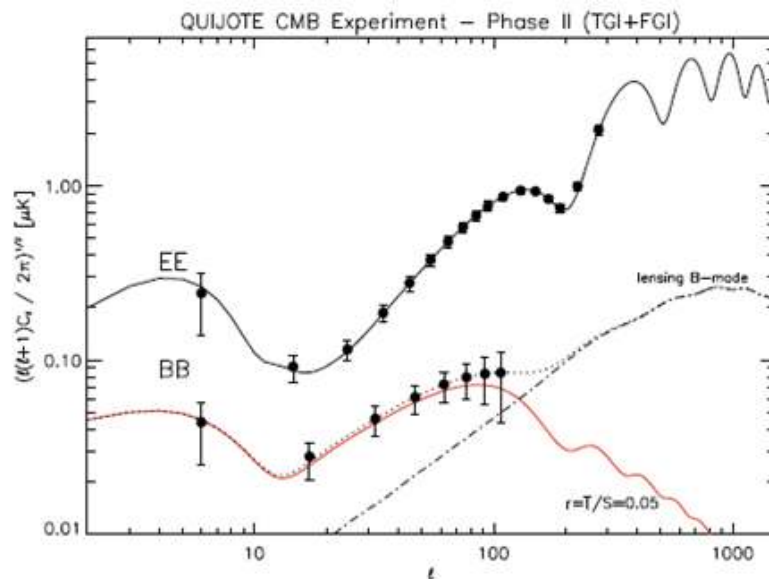
# QUIJOTE Scientific Goals

## >Phase I:

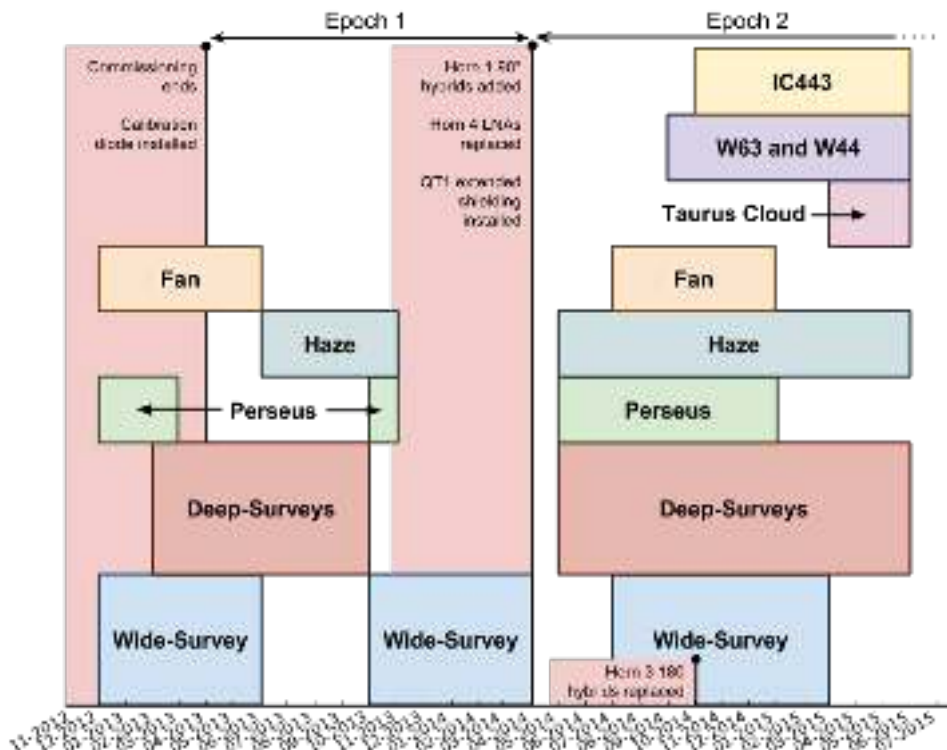
- >> Galactic Emission in intensity and linear polarisation
  - >>> Galactic Synchrotron Emission
  - >>> Anomalous Microwave Emission

## >Phase II:

- >> CMB Gravitational Wave B-Modes
  - >>> Achieve  $r=0.05$  after 3 years TGI and 2 years FGI operation



# First Instrument (MFI) Status



>**First Light:** November 2012

>**Observations:**

~10000 hours total

>> **Wide-Survey:** 5400 hours

>> **Deep-Surveys:** 2200 hours

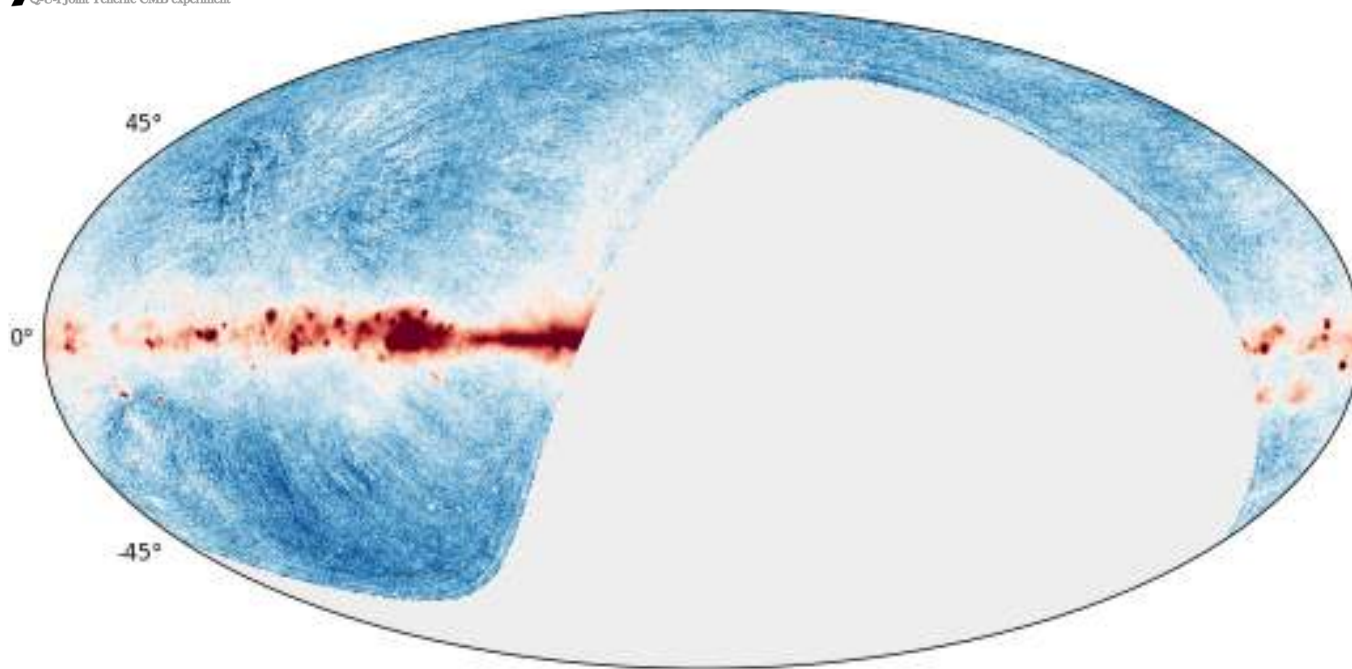
>> **Efficiency:** 50%

>**MFI Sensitivity per channel:**

>>  $400\text{-}600 \mu\text{K s}^{1/2}$

# MFI Wide-Survey

**Preliminary!**

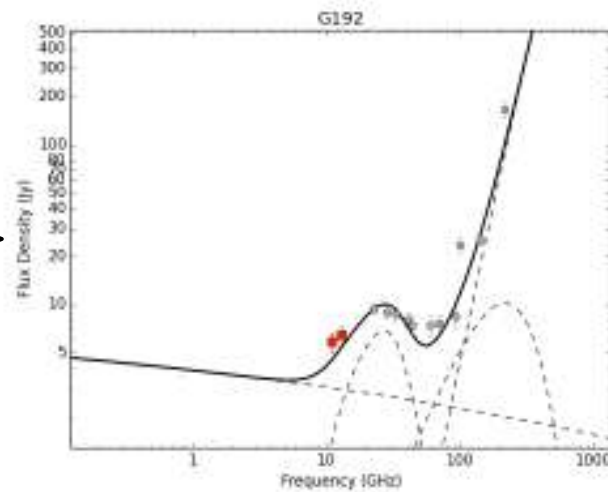
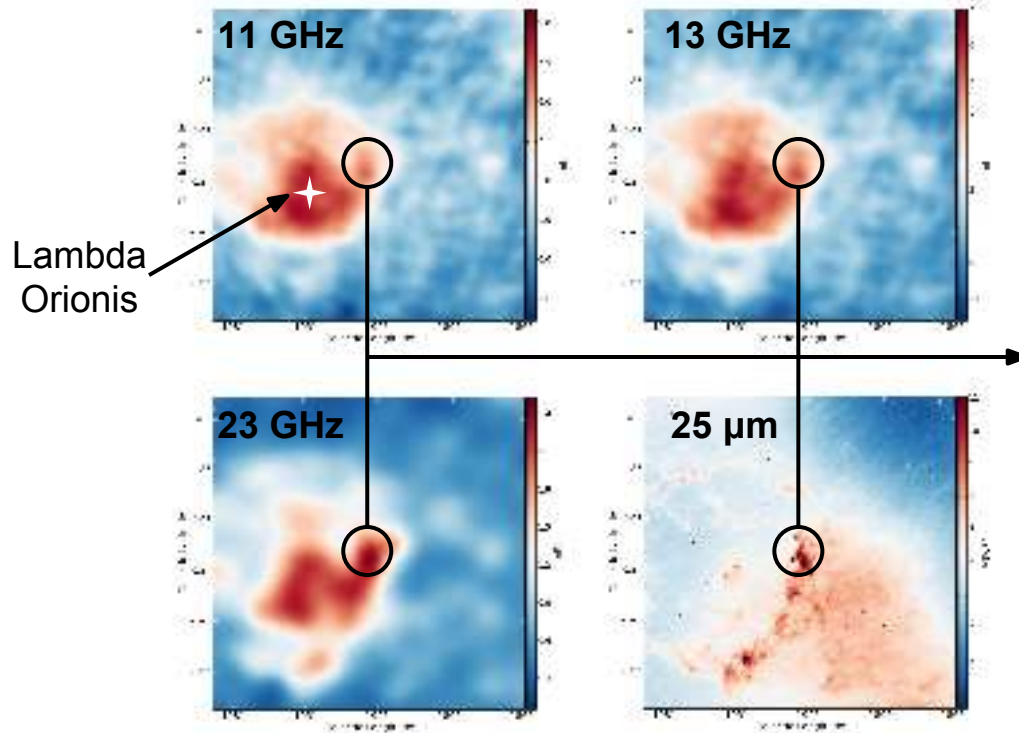


- > **Coverage:**  
~32000 sq. deg.
- > **Destriping Map-Making:**  
2.5 second baselines
- > **Map Sensitivities:**
  - >> **Low Frequencies:**  
~1 mK  
[25 Jy/beam s<sup>1/2</sup>]
  - >> **High Frequencies:**  
~2 mK  
[38 Jy/beam s<sup>1/2</sup>]

# MFI Wide-Survey Science

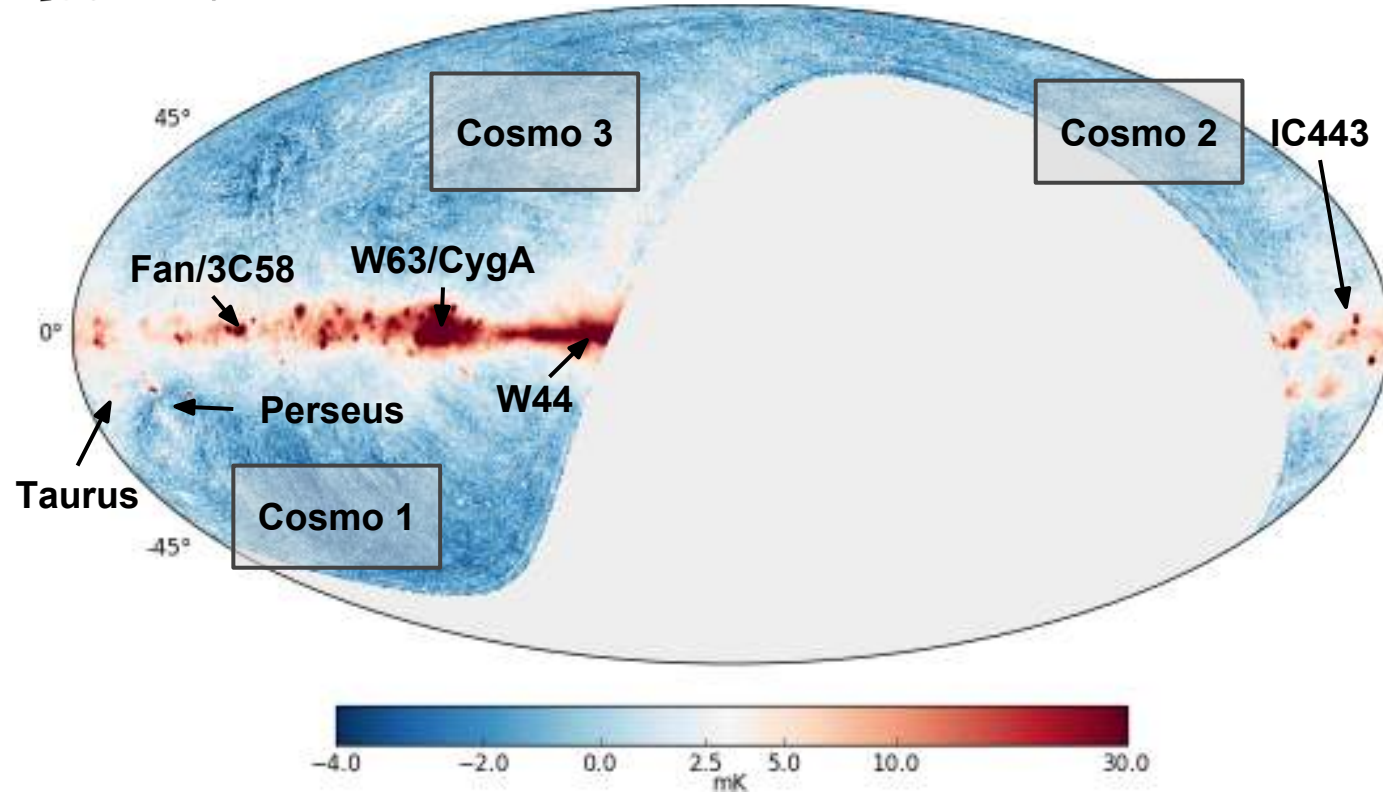
Preliminary!

LDN1582 [Planck Early Results XX. 2011]



# MFI Deep-Surveys

*Preliminary!*



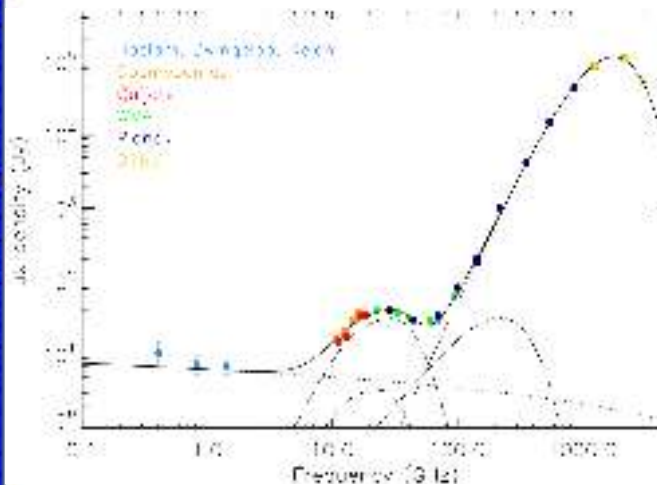
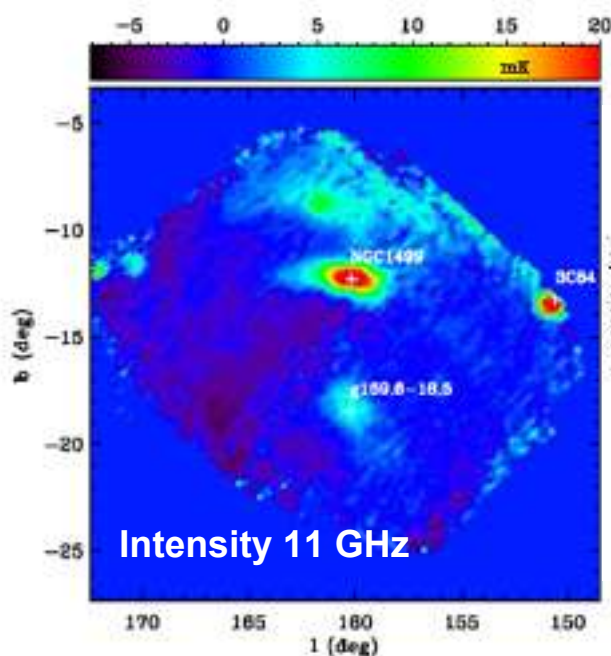
> Deep Surveys of three cosmological fields:  
>> 2000 hours observed

> Deep Surveys of Galactic regions:  
>> Several hundred hours per region

> Intensity and Polarisation measurements

# Early Science: Perseus Region

See Genova-Santos et al. 2015 arXiv:1501.04491



> Perseus MC identified as bright AME source [Watson et al. 2005, Planck Early Results XX, 2011]

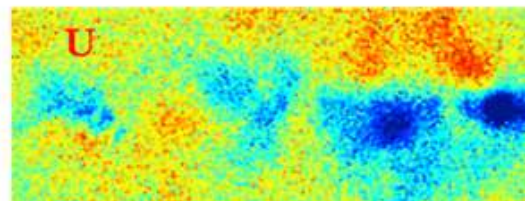
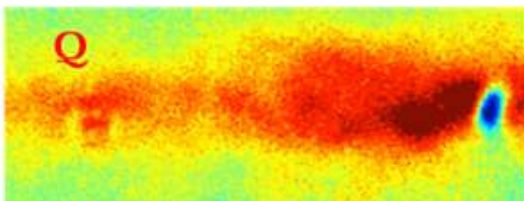
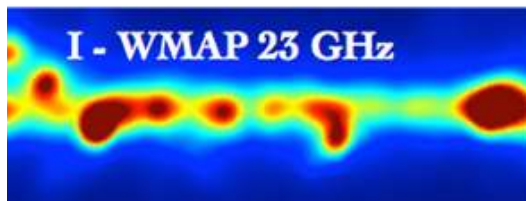
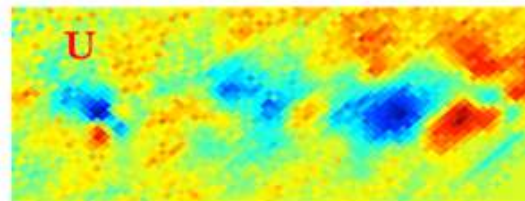
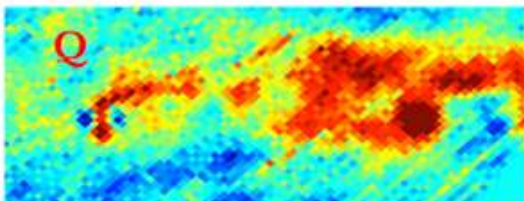
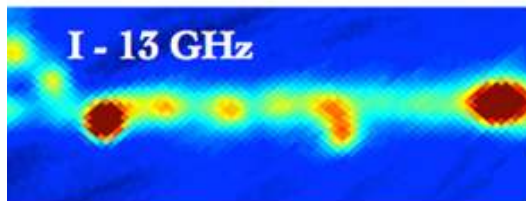
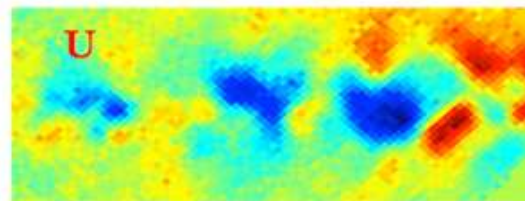
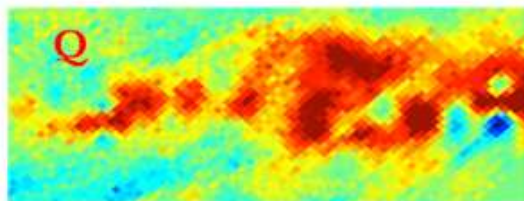
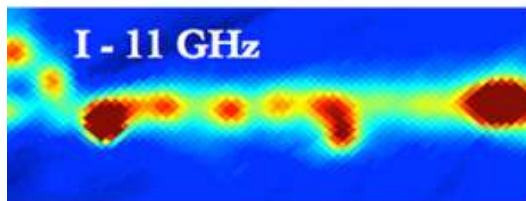
## > QUIJOTE Observations:

- >> 200 hours of raster scans
- >> Intensity measurements agree with past observations
- >> Limits on polarisation at:
  - 12 GHz: < 6.26%
  - 18 GHz: < 2.85%

# MFI Deep-Surveys

Preliminary!

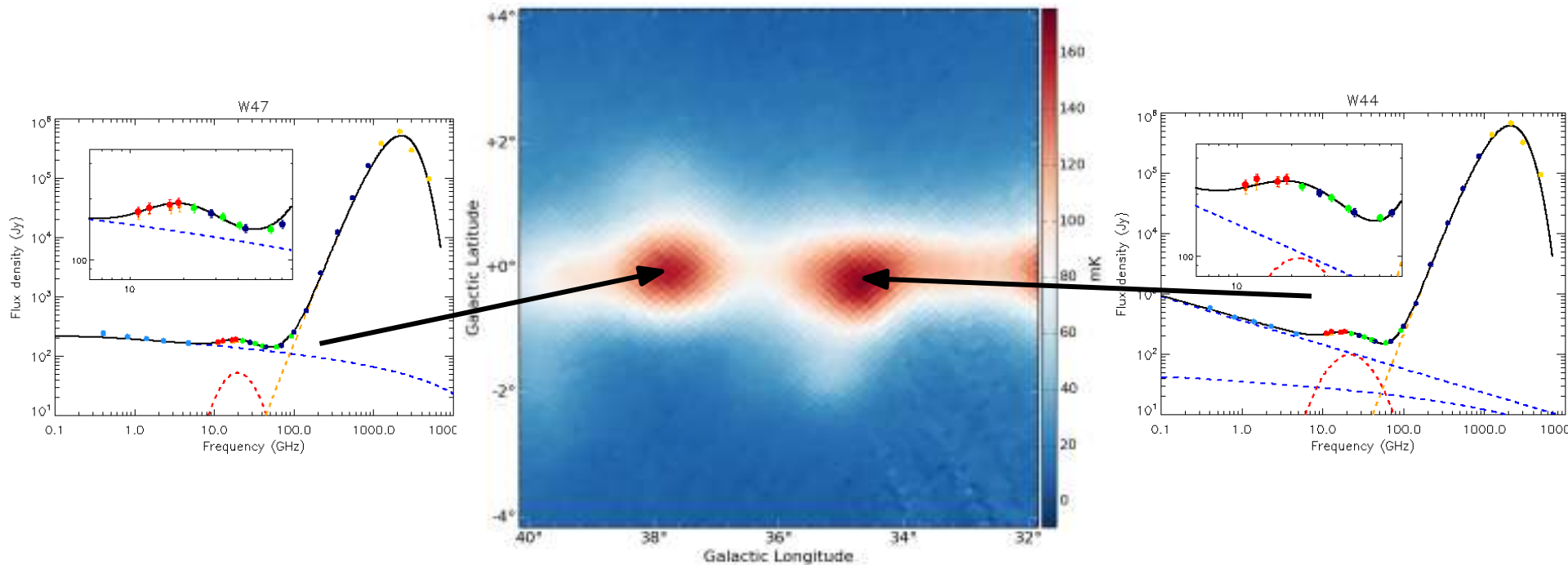
## Galactic Centre



# MFI Deep-Surveys

Preliminary!

W44 and W47 - Recent AME candidates from C-Bass (Melis et al. 2015)



# Conclusions

- **QUIJOTE Project** aims to achieve a sensitivity level to measure an  $r = 0.05$  B-mode angular power spectrum.
- **QUIJOTE MFI** can provide measurements of Northern hemisphere Galactic foregrounds in a frequency range that complement *PLANCK*, *WMAP* and C-Bass surveys.
- First MFI early science paper on Perseus region recently published in MNRAS. Many more MFI science papers in prep. on numerous Galactic regions.
- **QT2 and TGI** recently installed at Izana observatory, the TGI is preparing for first light soon. The FGI is expected to be completed early 2016.