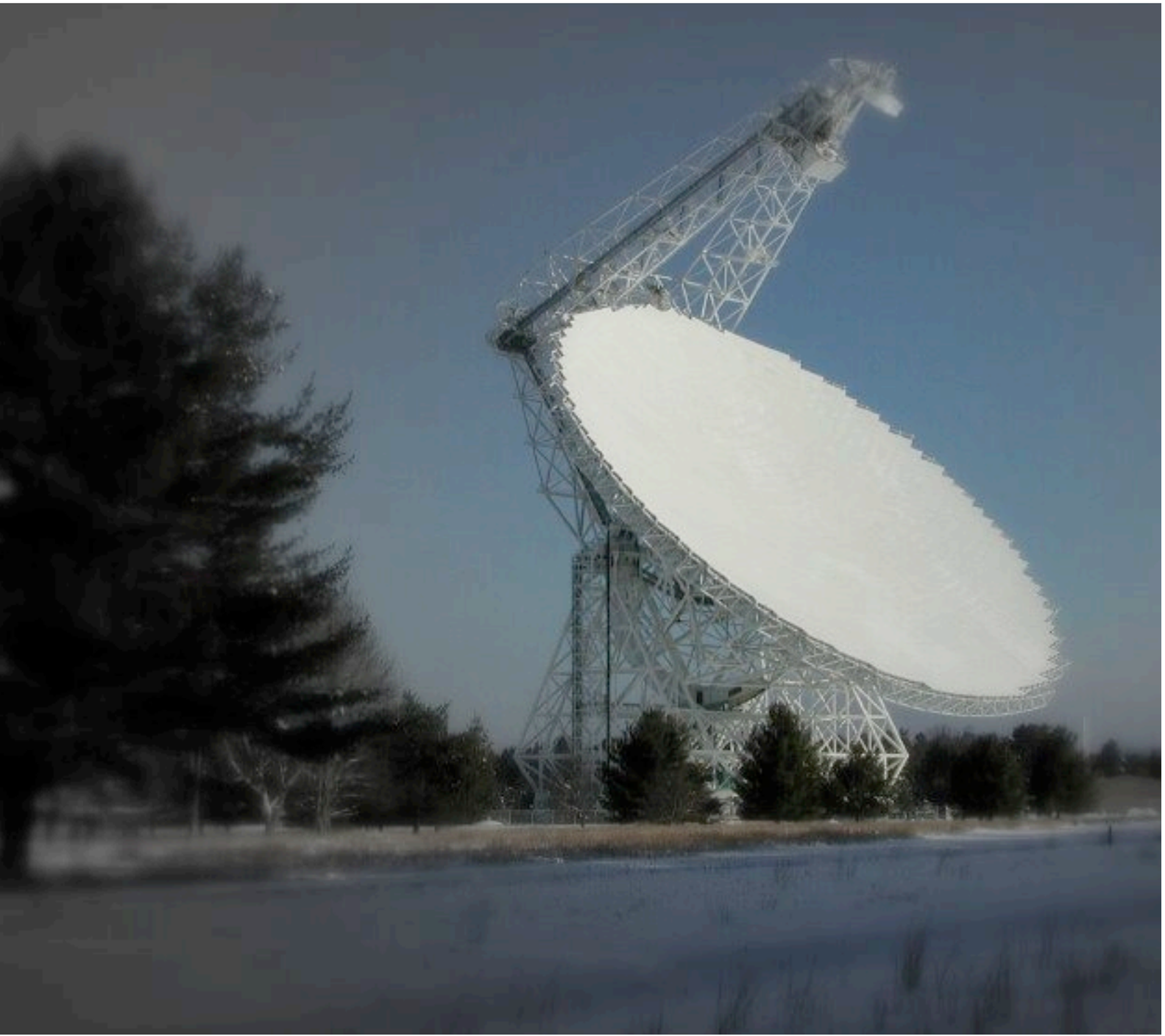
The Green Bank Telescope

a powerful instrument for enhancing ALMA science



Unblocked Aperture

- Low sidelobes gives high dynamic range
- Resistance to Interference
- Excellent spectral Baselines
- Excellent sensitivity to low surface brightness

Frequency coverage from 100 MHz–100 GHz

- Spectroscopy, Continuum, Pulsar, VLBI

>85% Sky Coverage

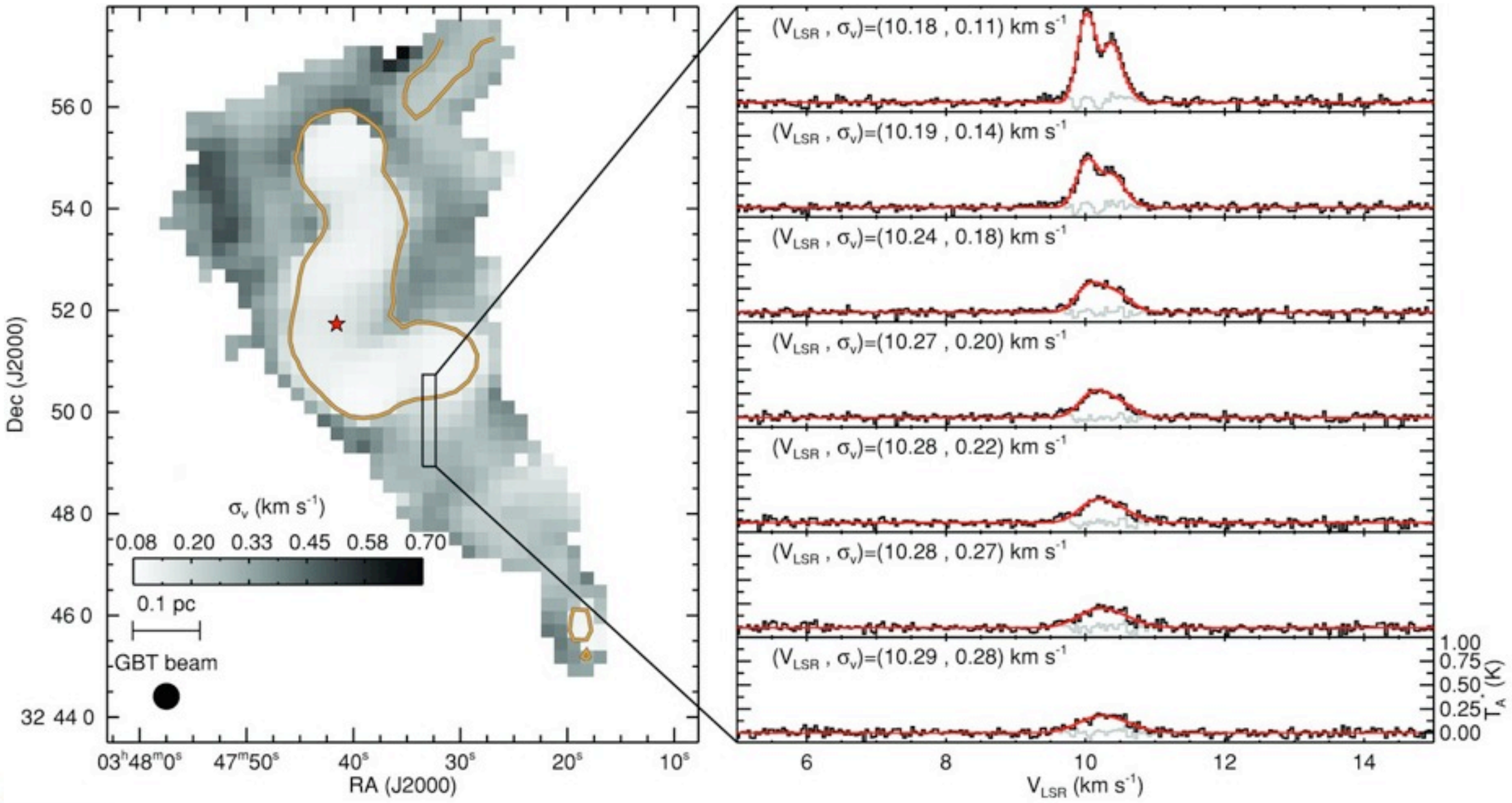
- Pointing to 1”–2” accuracy
- Surface good for 3mm work

Active Instrument Development Program

Site Protected by a 13000 km^2 Radio Quiet Zone

GBT Studies of Star Formation

Direct Observation of a Sharp Transition to Coherence in Dense Cores
Pineda et al 2010, ApJ

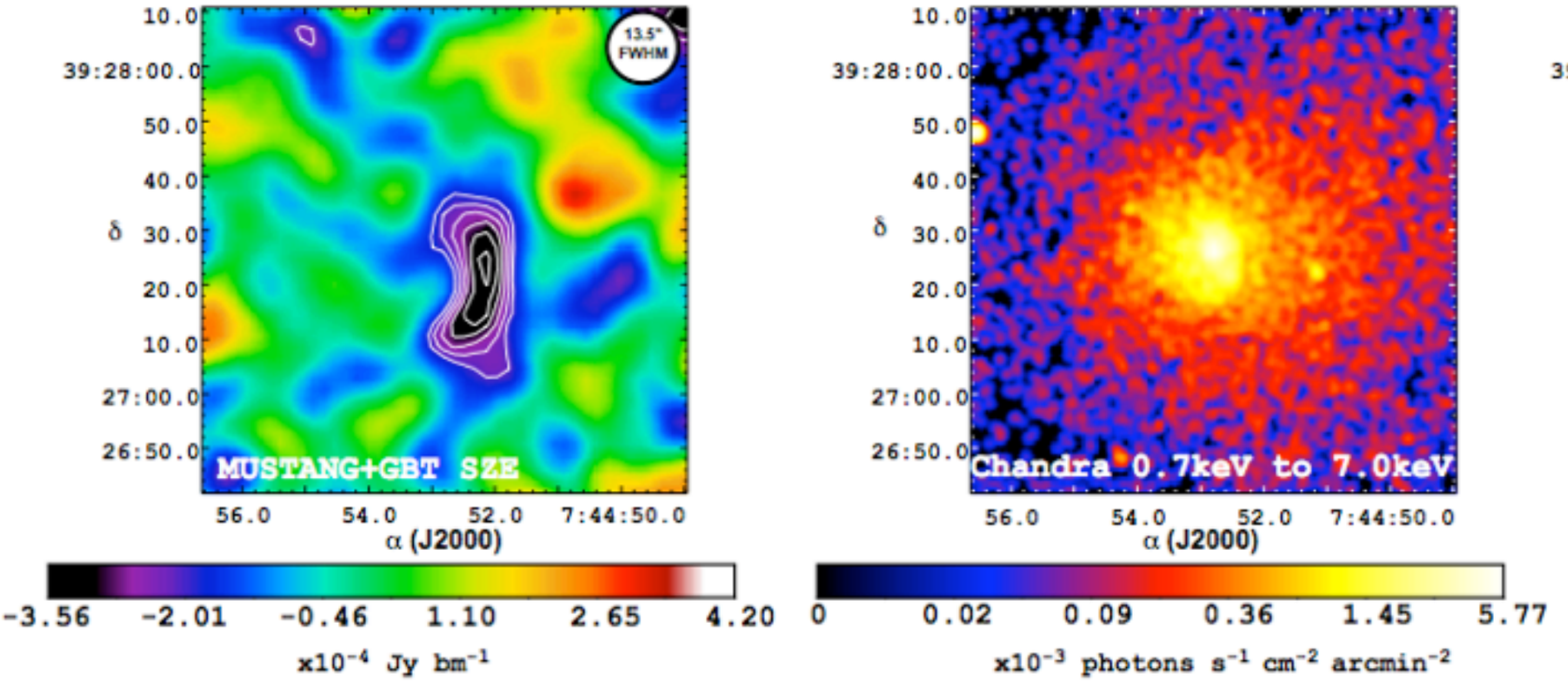


MACS0744+3927

previously unknown/unexpected weak shock near the core of this cluster

Korngut et al. (submitted)

MUSTANG
64-pixel 90 GHz bolometer array now routinely imaging the SZE at ≈10″ resolution



9” (FWHM) on GBT; 40”x40” FOV

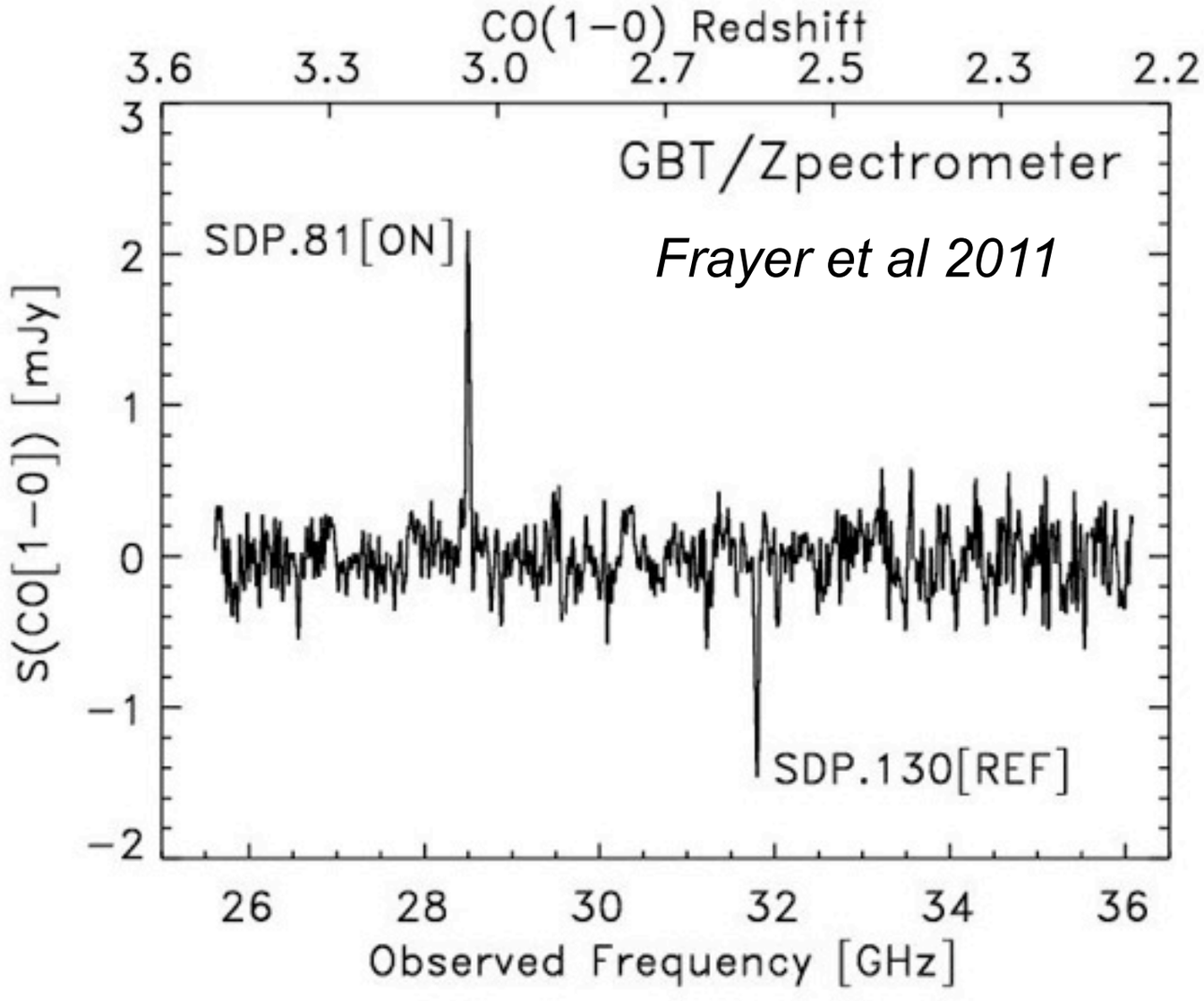
Sensitivity: rms ~ 3 mK $sec^{1/2}$

- 3’x3’ region to 0.4 mJy (RMS) in one hour
- integrates down for at least 12 hours

Blind High-z CO detections

GBT discovery of highly-redshifted CO(1-0) emission from optically obscured, lensed, Herschel sub-millimeter galaxies.

The line strength reveals the presence of large reservoirs of cold molecular gas in young systems.



Last updated: Fri, Jan 14, 19:00:00 UT

Ronald J Maddalena
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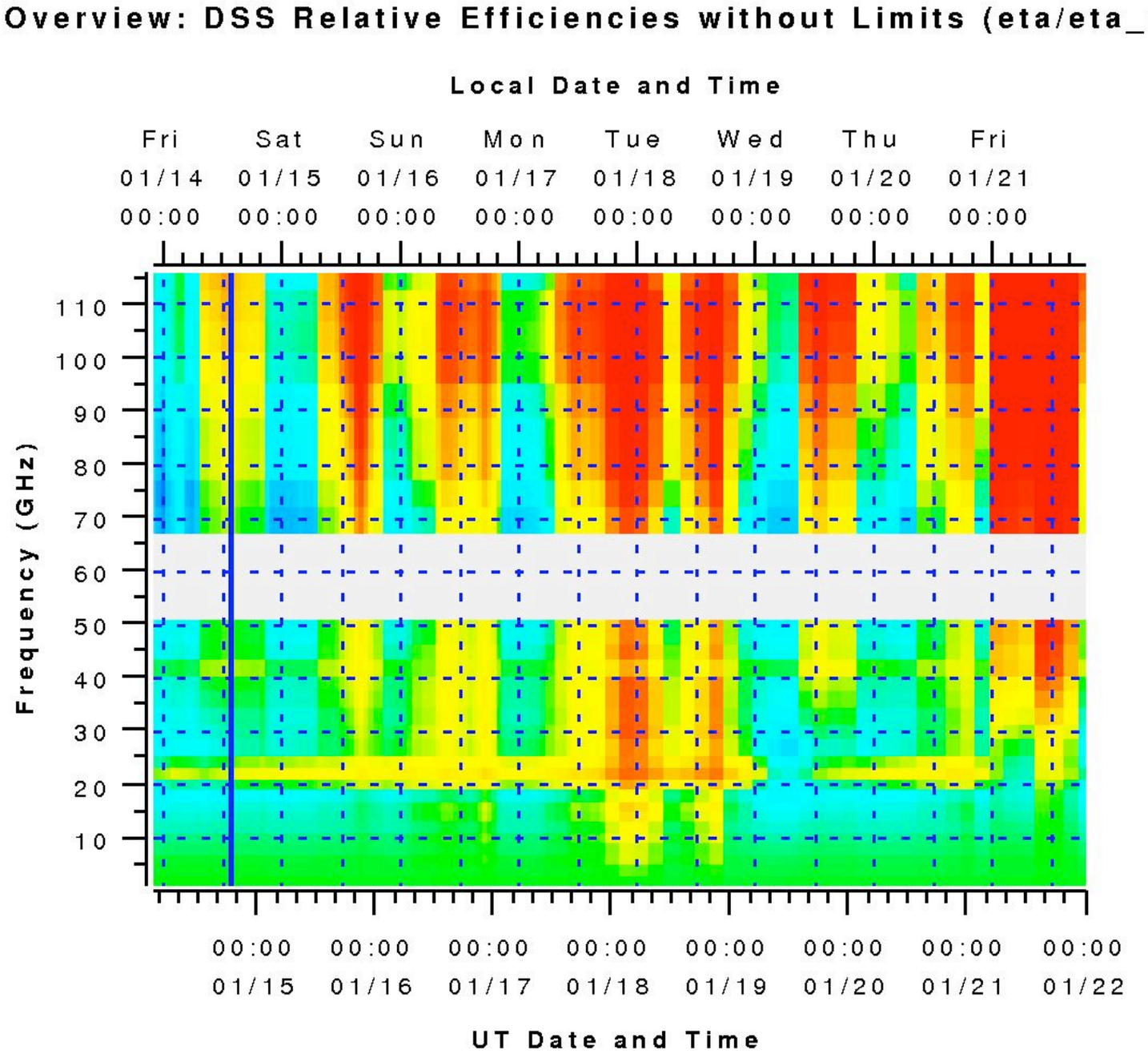
GBT Dynamic Scheduling matches the project to the weather



1776 hours of observing at >18 GHz dynamically scheduled in 2010 -- this amount should rise in the coming years

GBT Instrument Development Program

- K-band Focal Plane Array 7 pixels for 18-27 GHz
  - Completed and in regular use
- 4mm two-pixel receiver for 68-92 GHz spectroscopy
  - Under construction, commissioning late 2011, see http://www.gb.nrao.edu/4mm
- FPGA based spectrometer with up to 128 spectral windows
  - Under construction with CASPER group UCB, testing late 2011
- MUSTANG-2 bolometer array >100x faster than MUSTANG
  - Proposed but not yet funded
- W-band 100 pixel Focal Plane array 84-116 GHz (ALMA Band 3)
  - Under study but not yet funded

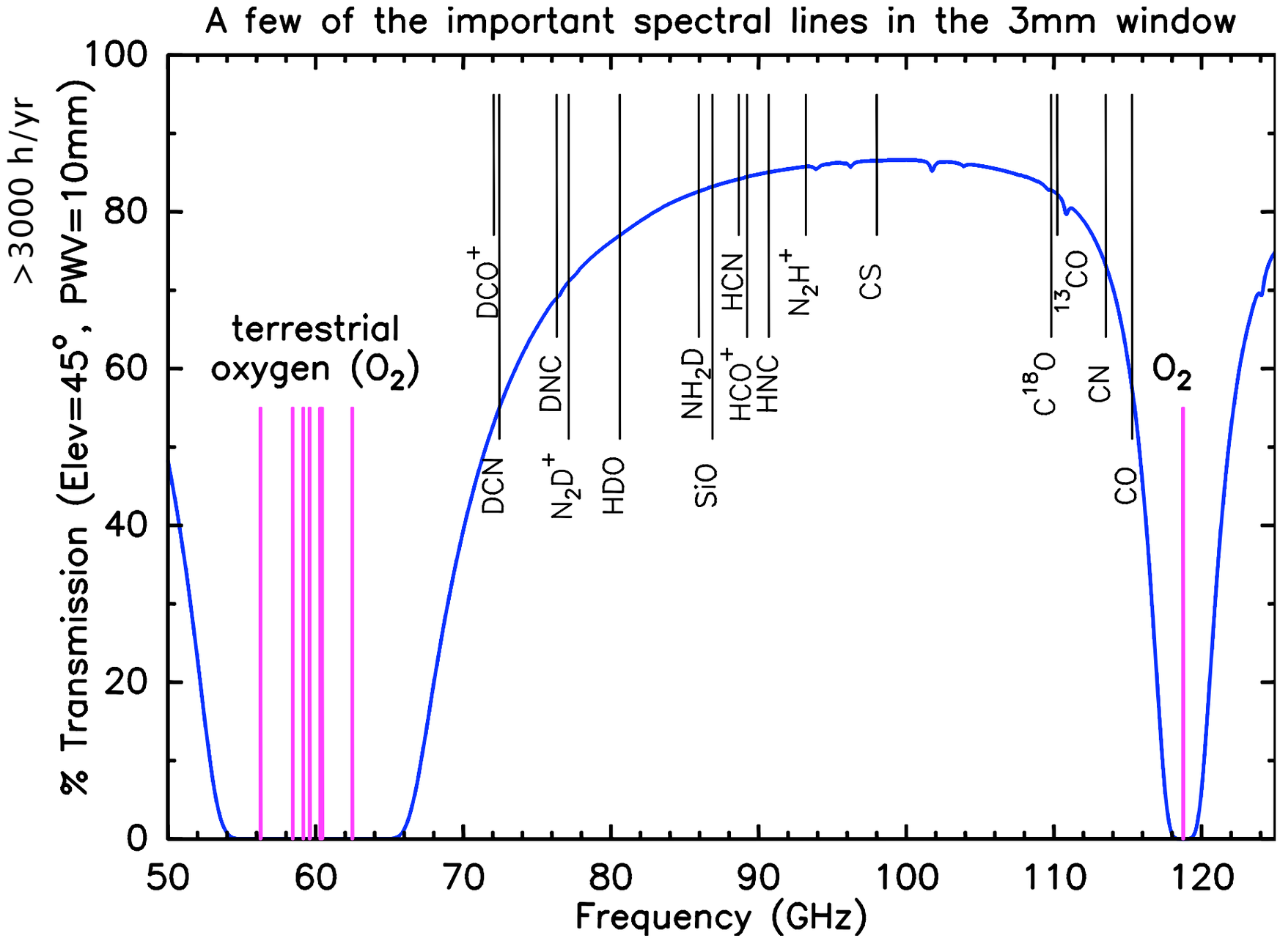
The GBT K Band Focal Plane Array is up and running

KFPA
NH_3 (1,1)

Ammonia mapping of dark clouds
Finn & Jackson

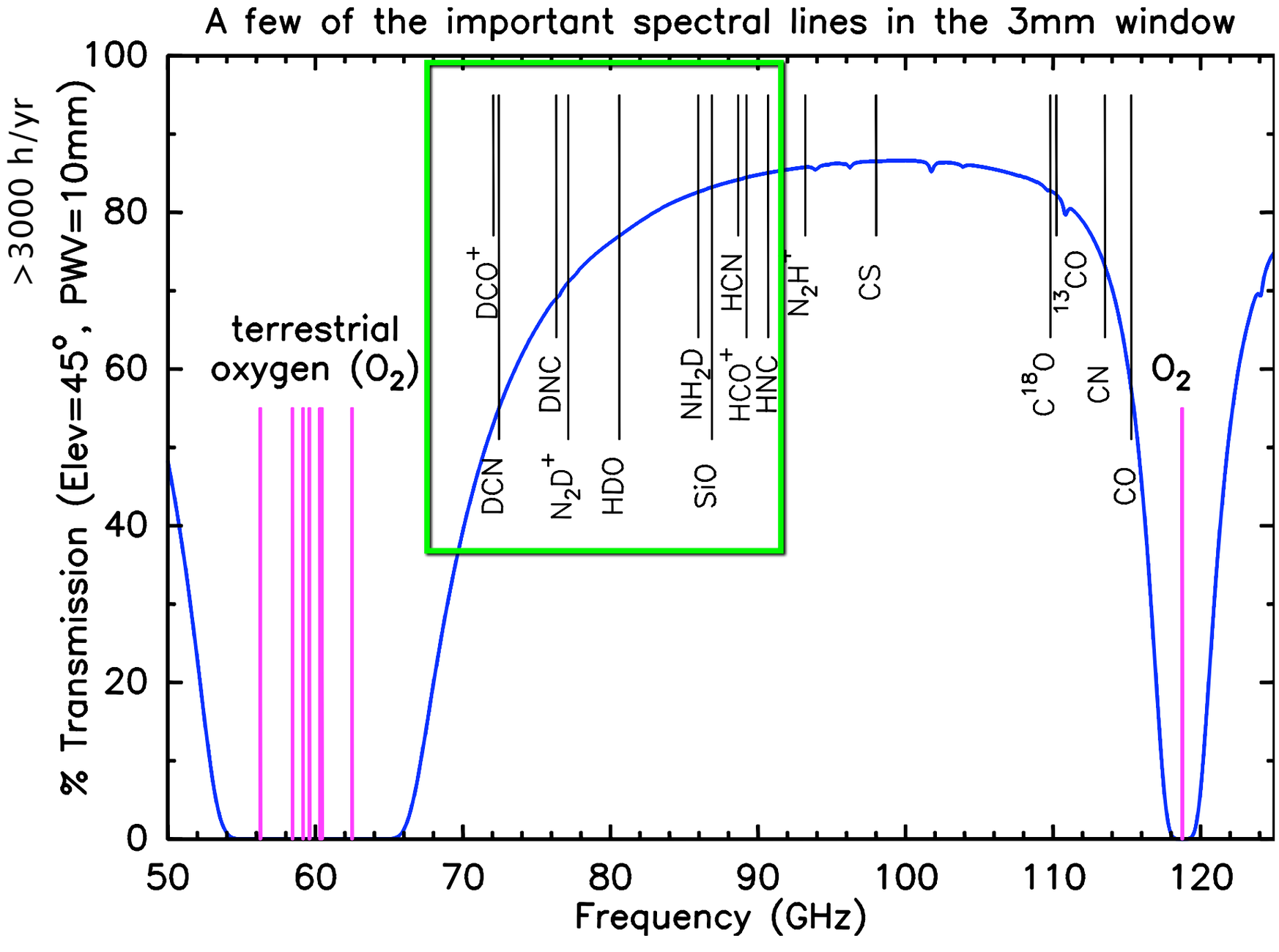
4mm Receiver Spectral Coverage

Available on the GBT in late 2011



4mm Receiver Spectral Coverage

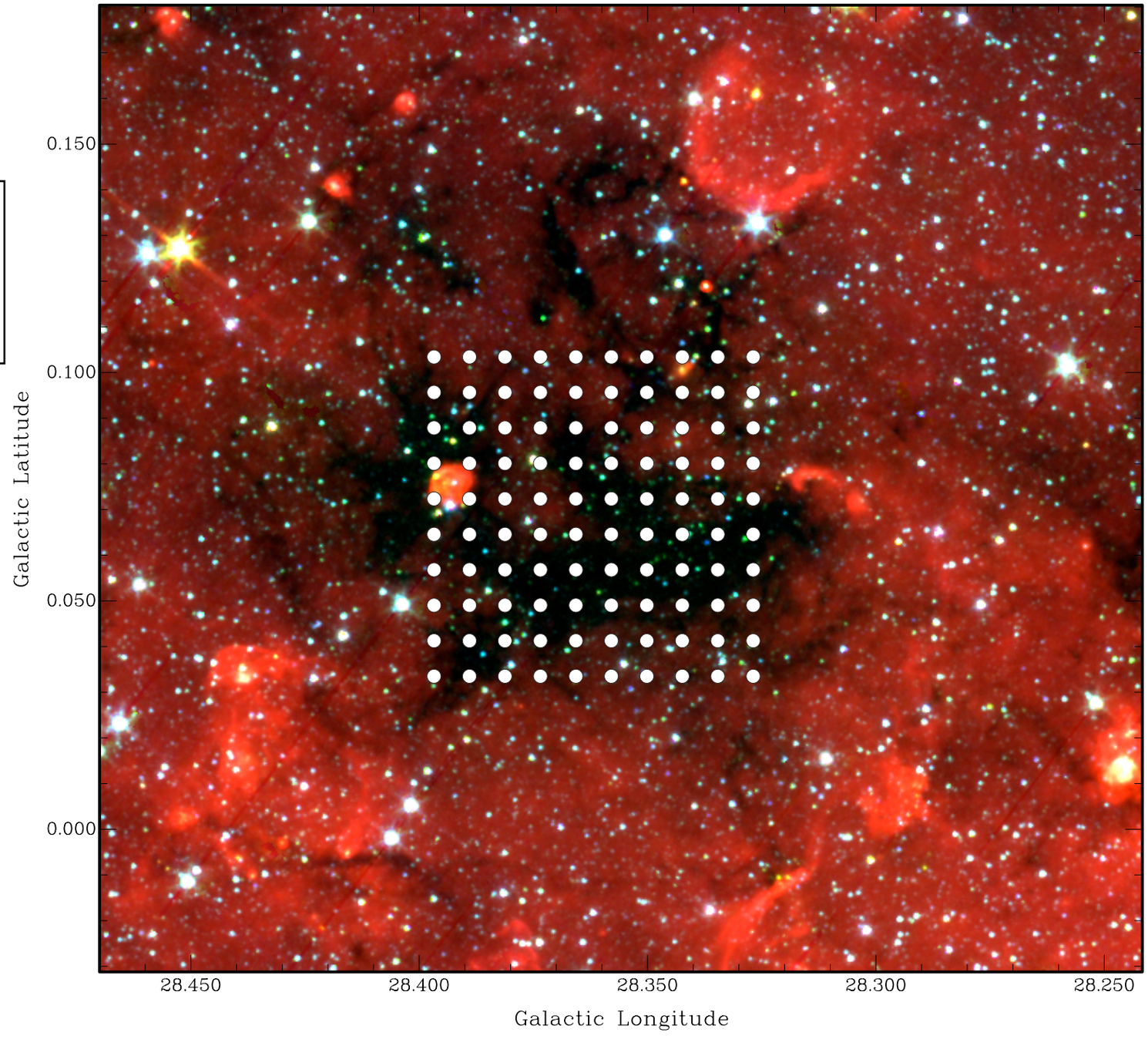
Available on the GBT in late 2011



Planned 3mm Focal Plane Array

a wide field mapping complement to ALMA Band 3

GBT 3mm FPA footprint on an Infrared Dark Cloud



ALMA primary beam at 3mm


Field of View
Sensitivity
Resolution