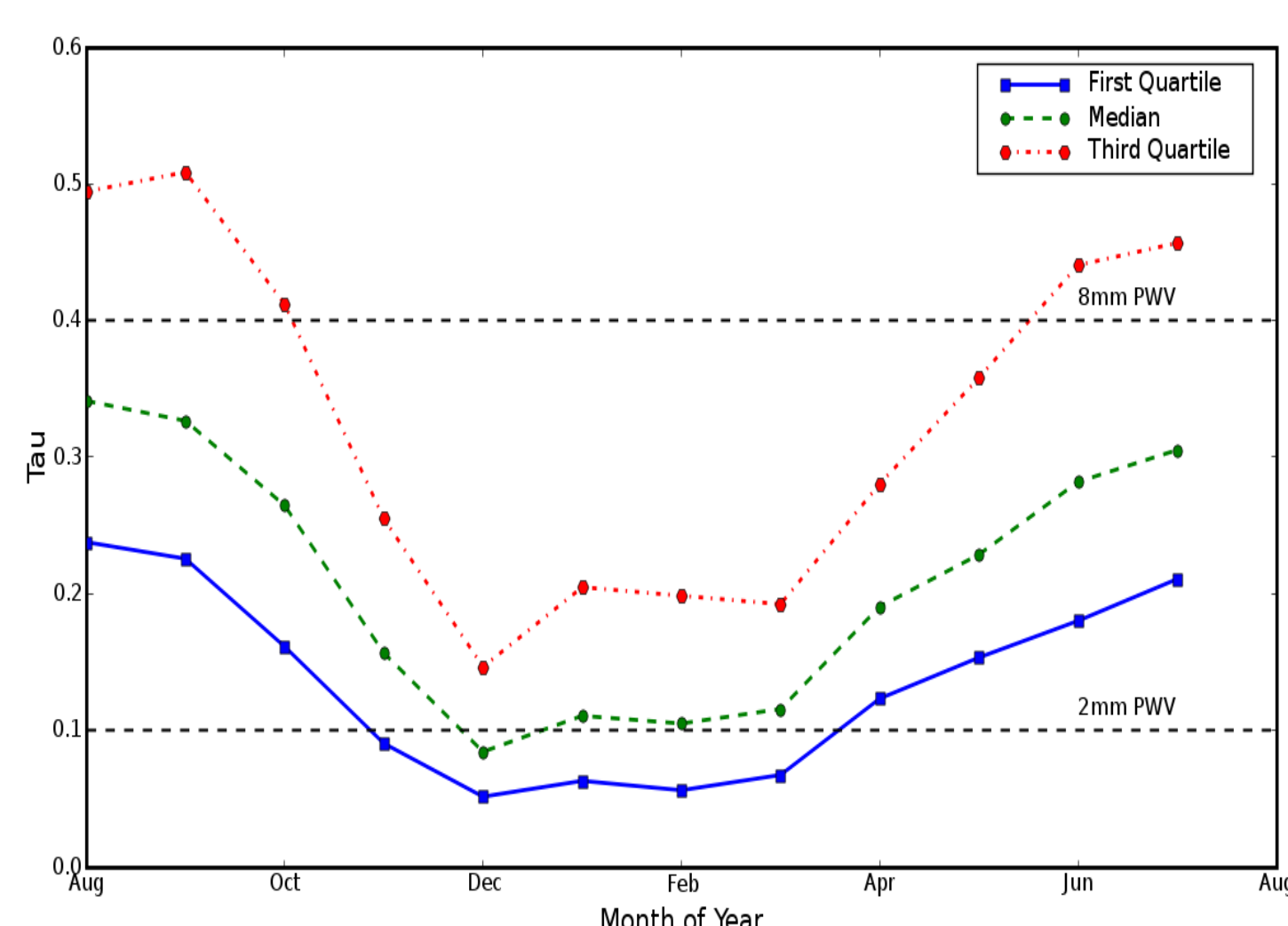


The LMT is a 50-m diameter millimeter-wavelength telescope that is set to begin scientific first-light observations in Fall 2010. The LMT is a bi-national collaboration between the Instituto Nacional de Astrofísica, Óptica, y Electrónica (INAOE) & the University of Massachusetts in Amherst (U.S.A.). Precision surface panels in inner 3 rings (50% of total area) have been installed. Initial holography experiments done in 2008. After completion of surface setting using microwave holography in summer 2010, two first light scientific receivers, the Redshift Search Receiver (RSR), and AzTEC (a 1mm continuum camera) will undertake scientific first light observations in Fall 2010. The full complement of scientific receivers for the LMT is described below.



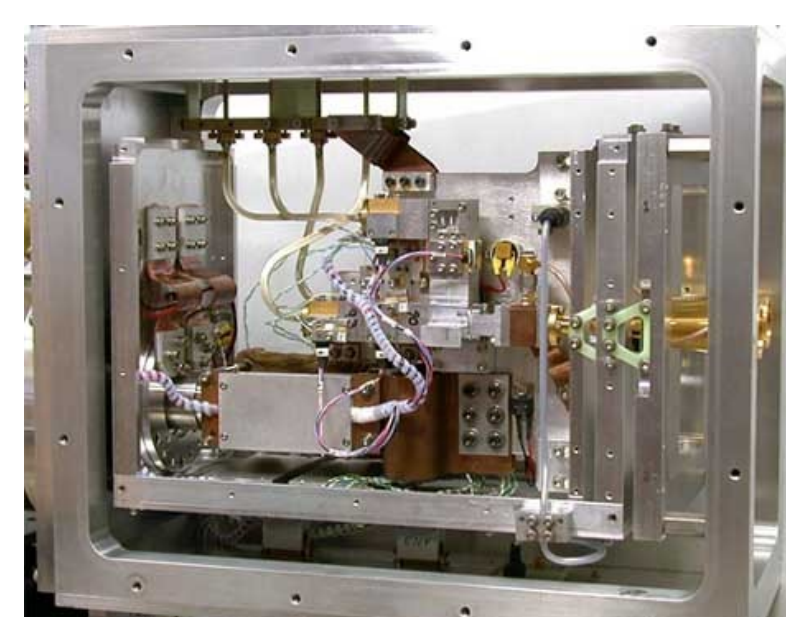
Left: View of the LMT in 2008 on top of Sierra Negra. The mountain to the right is Pico de Orizaba, third highest mountain in N. America. **Bottom Left:** Map of Mexico showing the location of the LMT. The LMT is situated only 2.5 hours from INAOE and 5 hours from Mexico City. **Bottom Right:** Plot of opacity derived from 225 GHz radiometer measurements at the LMT over the period of 1999-2007. The first, second (median) and third quartiles of the data are shown. The site allows for 3mm operation throughout the year, while 1mm wavelength operation is best done from October through May.



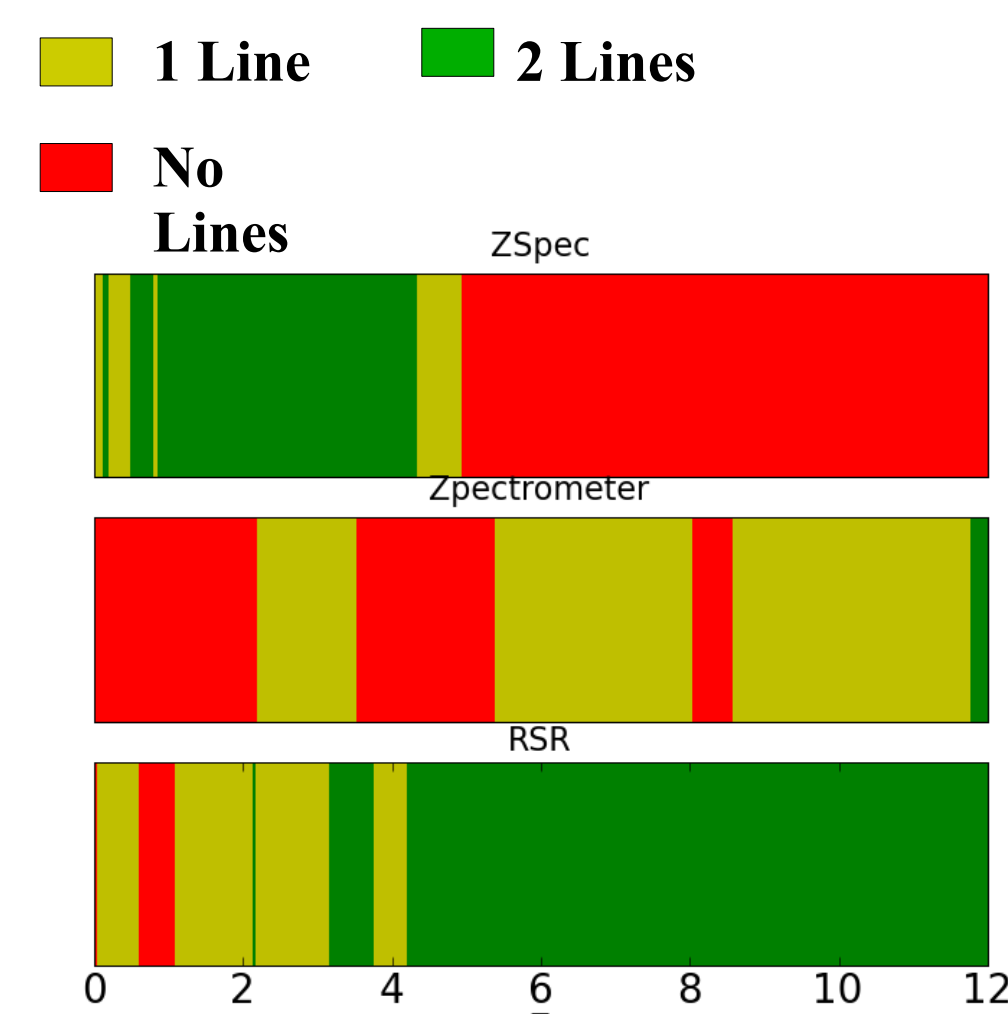
- 50-m reflector, 2.5-m secondary mirror
- primary surface: 180 panel-segments
- active surface (accuracy ~ 75 micron rms) to correct for gravity & temperature
- operating at 0.85 - 3.4 mm
- FOV ~ 4 arcmin diameter
- 5 - 18 arcsec resolution, < 1" pointing accuracy
- altitude of site: 4600m (15100 ft.)
- average wind speed < 10 m/s (90% time)
- median opacity $\tau_{225\text{GHz}} \sim 0.12$ (winter)
- scientific operation starts in 2010 at 3mm and at 1-2mm under good weather conditions

REDSHIFT SEARCH RECEIVER (RSR) (First Light LMT Fall 2010)

- Spectroscopic redshifts for sub-millimeter galaxies
- Chemistry variations in nearby galaxies
- Planetary atmospheres

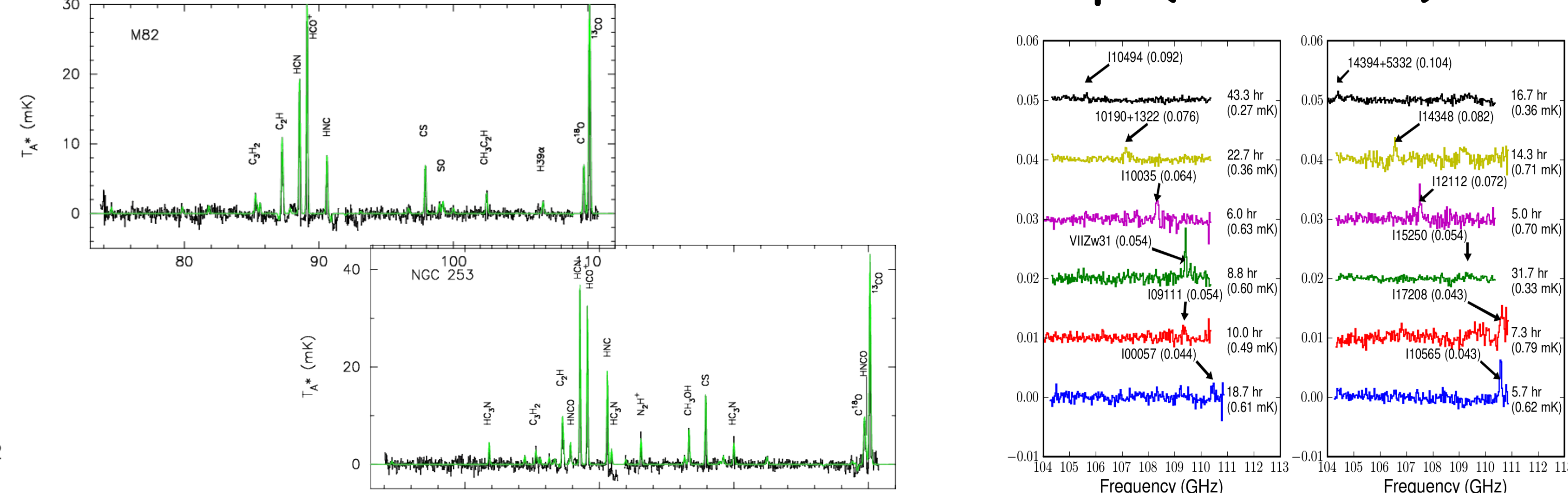


- 2 pixel, dual polarization frontend
- MMIC preamplifier over 73-111 GHz
- Rapid (kHz) polarization switching for baseline stability
- 38 GHz instantaneous bandwidth
- Analog Autocorrelation Backends (~150 GHz)



Plot showing the redshift coverage of RSR compared with its two competing instruments, Zspec on the CSO, and Zpectrometer on the GBT. The plot assumes coverage of CO lines up to J=10.

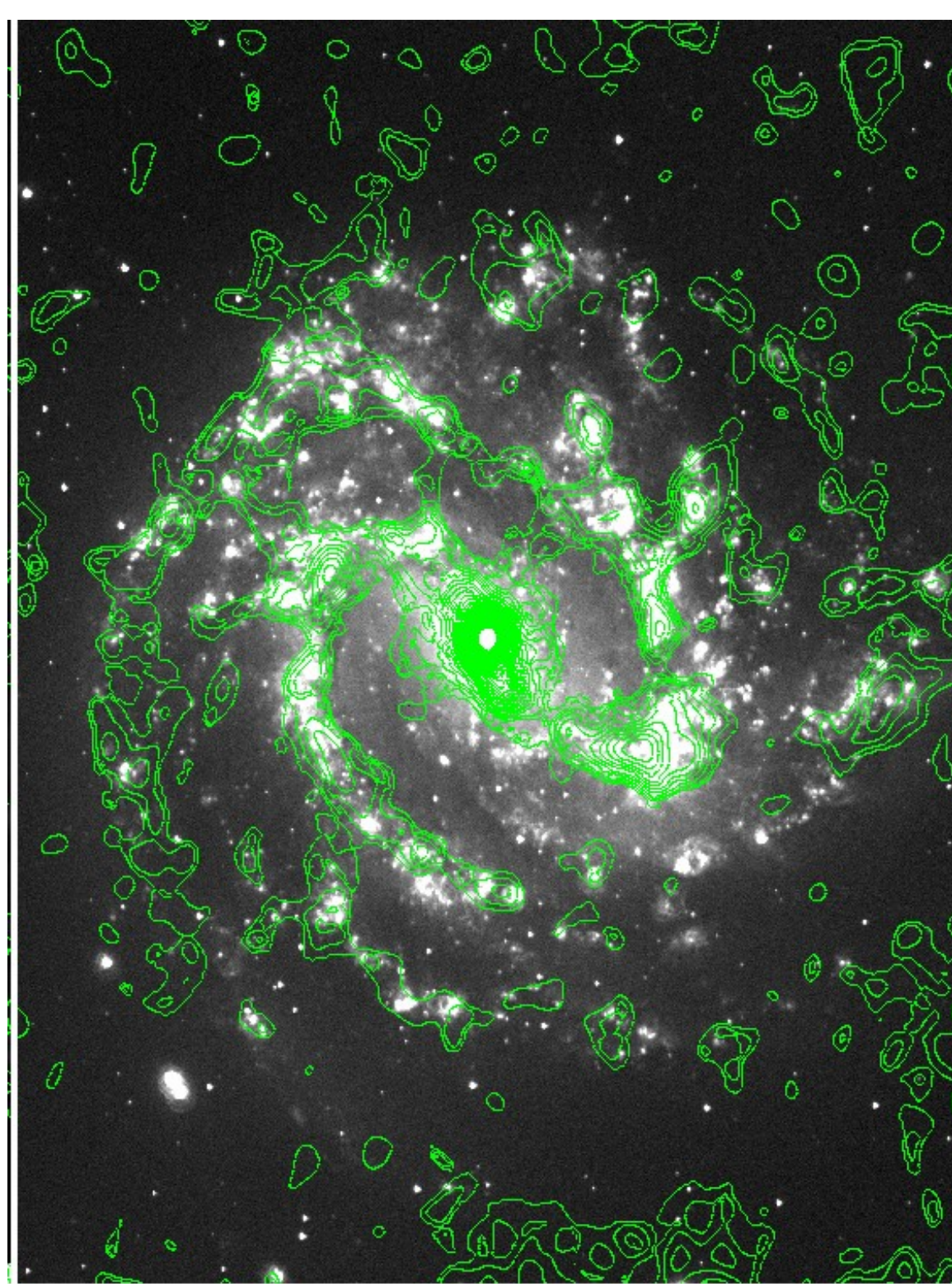
RSR on the FCRAO 14m Telescope (2007-2008)



Left: Full 3mm band spectra obtained with the RSR on the FCRAO 14m telescope towards M82 and NGC253 (Snell et al 2010). **Right:** RSR observations of a sample of Ultraluminous Infrared Galaxies at moderate redshifts using an early generation of the RSR (Chung et al 2009).

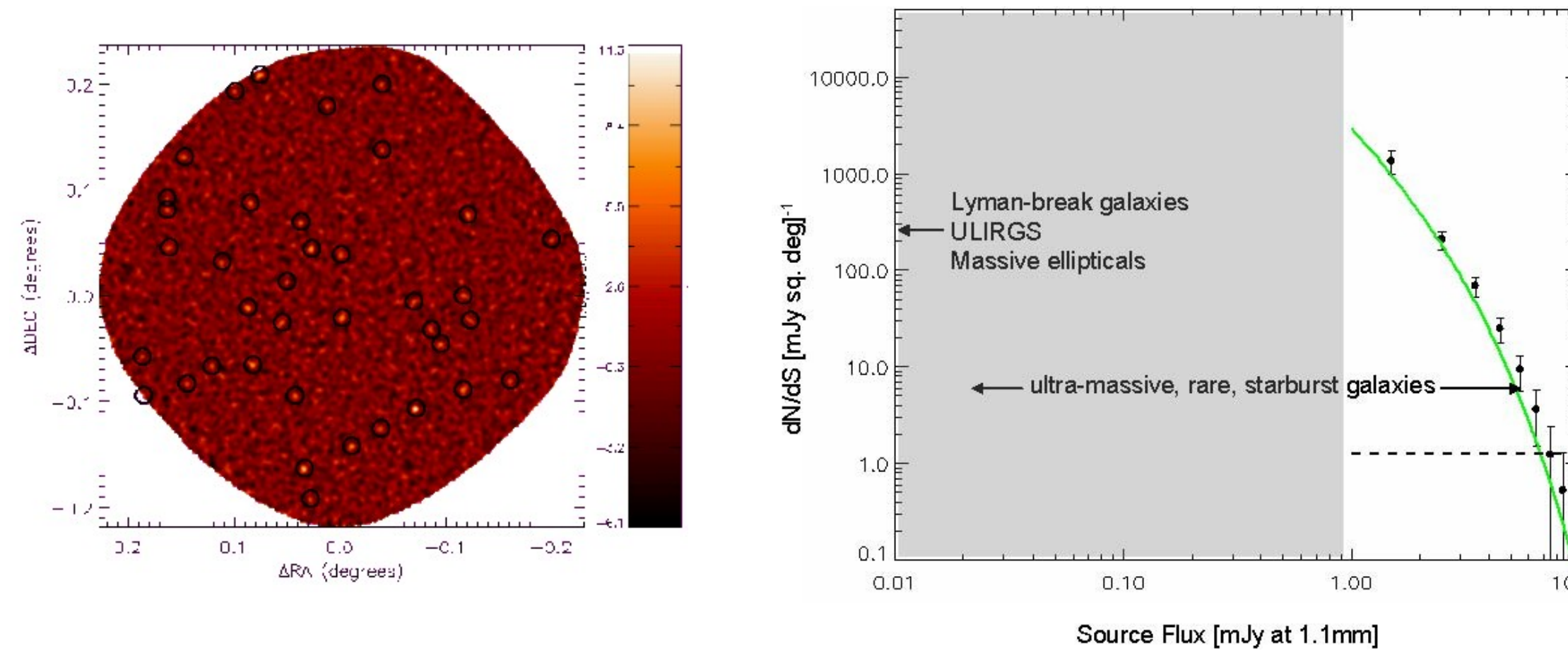
AZTEC (First Light LMT Fall 2010)

- 144 pixel bolometer focal plane array
- Si-Ni spider-web bolometers
- Operating bands 1.1 and 2.1mm



M83, Wall et al, in preparation

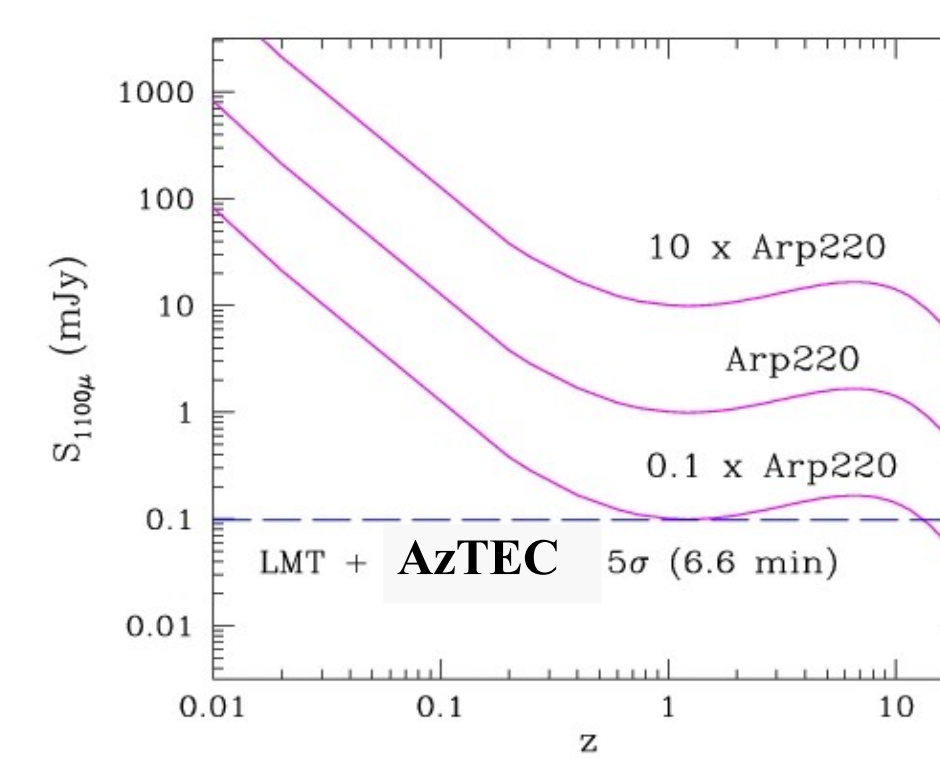
AZTEC on the JCMT (2005)



COSMOS Field Scott et al, 2007. Source counts from the COSMOS field. Grey area represents portion that is not accessible with current generation of 15m class telescopes.

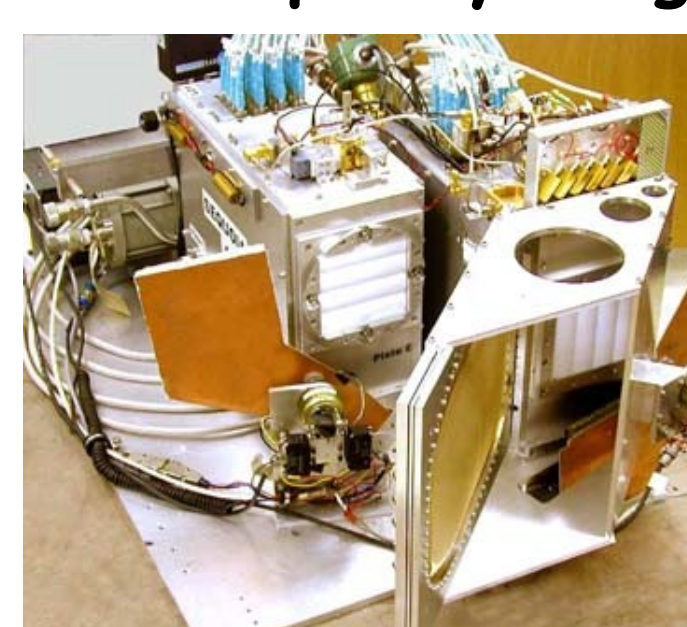
AZTEC on the LMT/GTM

- Large Scale Structure formation in the high-z universe
- Image gas and dust content of galaxies and Milky Way star forming regions
- Dust emission from comets and asteroids

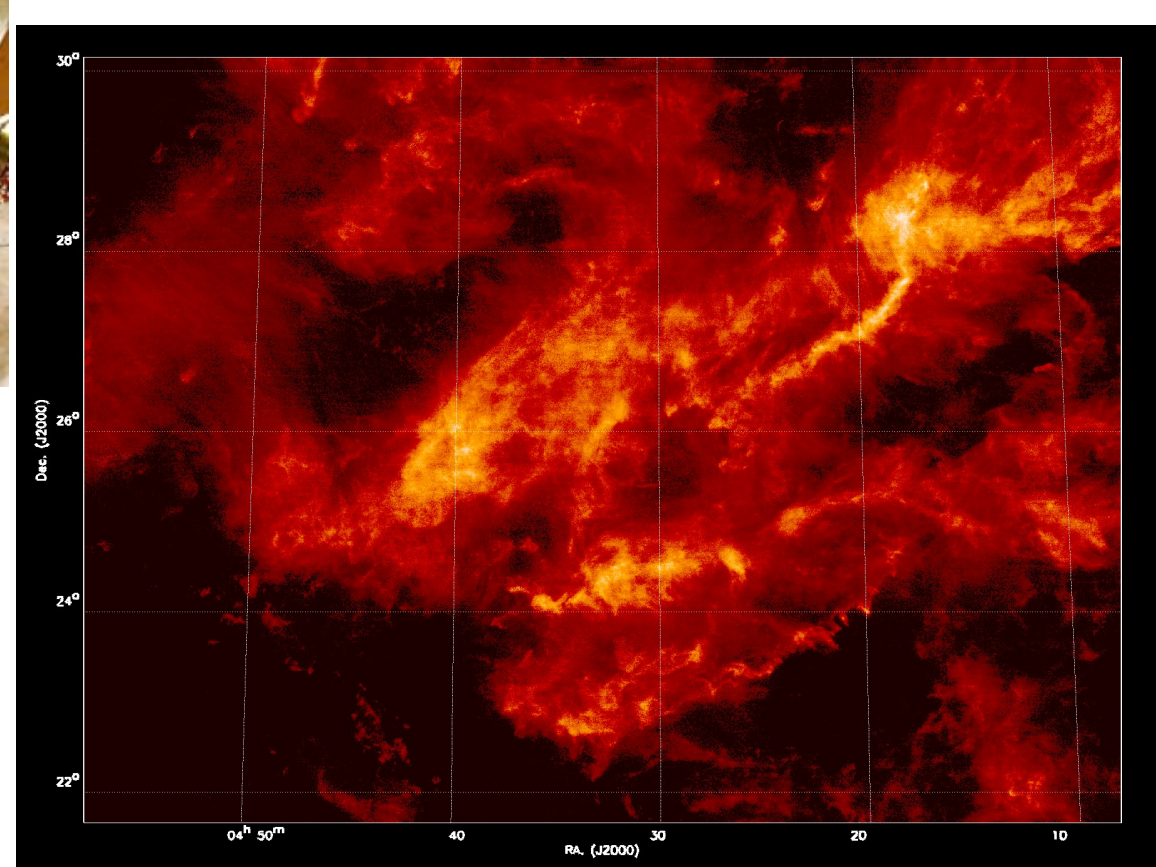


SEQUOIA (deploy in 2011)

- 32 pixel heterodyne focal plane array
- Low noise MMIC amplifiers
- Frequency range 85-115 GHz



100 sq. deg. Taurus Survey (Narayanan et al 2008)



Under development

SPEED

- prototype 4 pixel x 4 frequency array
- Frequency Selected Bolometers at wavelengths 0.85, 1.1, 1.4, 2.1 mm; TES thermistors; SQUID amplifiers
- UMASS, NASA/GSFC and U.Chicago
- LMT/GTM Science
- Sunyaev-Zeldovich Effect
- Spectral energy distributions of galaxies, protostars, debris disks, Solar System objects

1mm Receiver

- single, dual polarization pixel, SIS, heterodyne receiver
- Frequency range 210-275 GHz
- 8 GHz bandwidth in each sideband
- LMT/GTM Science
 - Spectroscopic Redshifts for sub-millimeter galaxies
 - Molecular Line emission from galaxies, Galactic molecular clouds, comets, stellar envelopes, debris disks

Wideband Correlator Array (under construction)

- Autocorrelation spectrometer for heterodyne systems (SEQUOIA Redshift Search Receiver, 1mm receiver) and future focal plane arrays
- Support for multiple L.O. settings

Mode	Bandwidth(MHz)	Resolution(kHz)
A	800	780
B	400	390,195
C	200	98,49
D	50	49,24
E	25	24,12,6,3