



Green Bank Telescope

Mark M. McKinnon

- Structure & Optics
- Special Features & Subsystems
- Performance
- Science

Key to Diagram

1. Primary Reflector Surface
2. Reflector Support Structure
3. Elevation Wheel
4. Secondary Reflector (in sub-focus 170 mm from 1) (variable focus)
5. Cassegrain
6. Active Surface Control Basin
7. Access Way to Feed Horn
8. Elevation Keating
9. Altitude
10. Elevation
11. Equipment Room
12. Azimuth Tracks and Drives
13. Elevation Drives
14. Park Drives
15. Azimuth Track

M. McKinnon, Synthesis Summer School, 25 June 2002

GBT Features



- Unblocked Aperture
 - High aperture efficiency
 - Low sidelobes
- Active Surface
- Laser Metrology System

GBT Active Surface



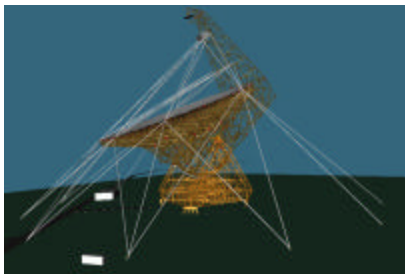
- 2004 panels, 2209 actuators
- Actuator travel = 51 mm
- Position Accuracy = 25 μ m



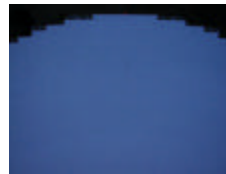
Actuator Control Room

Surface Actuator

Laser Metrology System



Laser Metrology System



Surface Retroreflectors

Ground Laser

- Laser diode modulated @ 1.5 GHz
- Distance via phase detection, mod 10cm
- Accuracy = 100 μ m @ 100m

Mechanical Drive Systems



Az Wheels & Track

El Gear & Motors

Upper Feed Arm



- Subreflector
- Prime Focus Boom
- Receiver Room

Frequency Coverage

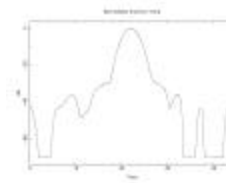


PF 1-1: 0.29 - 0.40 GHz
 PF 1-2: 0.38 - 0.52
 PF 1-3: 0.51 - 0.69
 PF 1-4: 0.68 - 0.92
 PF 2 : 0.91 - 1.23

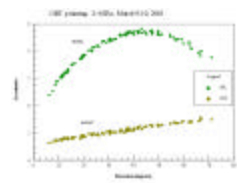
L : 1.15 - 1.73 GHz
 S : 1.73 - 2.60
 C : 3.95 - 5.85
 X : 8.00 - 10.0
 Ku : 12.0 - 15.4
 K1 : 18.0 - 22.0
 K2 : 22.0 - 26.5
 Q : 40.0 - 52.0

Gregorian Receiver Room

GBT Performance



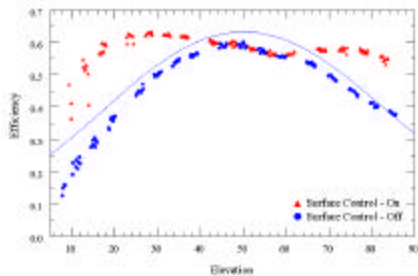
Low Sidelobes



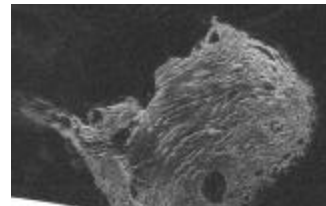
Excellent Pointing

$$\text{FWHM} = 12^\circ/\lambda(\text{GHz})$$

Active Surface Performance

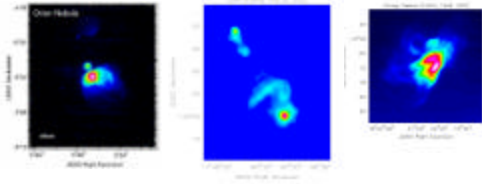


GBT First Science



- Bistatic radar imaging of Venus
- Discovery of 3 millisecond pulsars in M62
- Discovery of youngest pulsar, PSR J0205+6449

GBT Science: Imaging at 8.5 GHz



Orion Nebula

Galactic Center

Omega Nebula



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