GREEN BANK OBSERVATORY

Proposing for the GBT

Joy “Wilson” Skipper (adapted from Dave Frayer’s pres)

GBT Proposal Deadlines

Proposal Deadlines occur on the 1st of February and August, for the semester starting on the next proposal call. For example, the GBT proposal deadline on February 1st, 2020 will be for the 20B semester starting August 1st, 2020, the same day as the 21A semester proposal deadline.

Users must propose using the Proposal Submission Tool (PST) and register with mynrao.edu

Large proposals must include a data management plan, extra large proposals (every 3 years) must include this as well as a way for the TAC to access the data.

The threshold for Large and extra-large proposals depends on the frequency, but they are outlined in their proposal calls.

Find the Proposal Call

https://greenbankobservatory.org/science/gbt-observers/proposals/

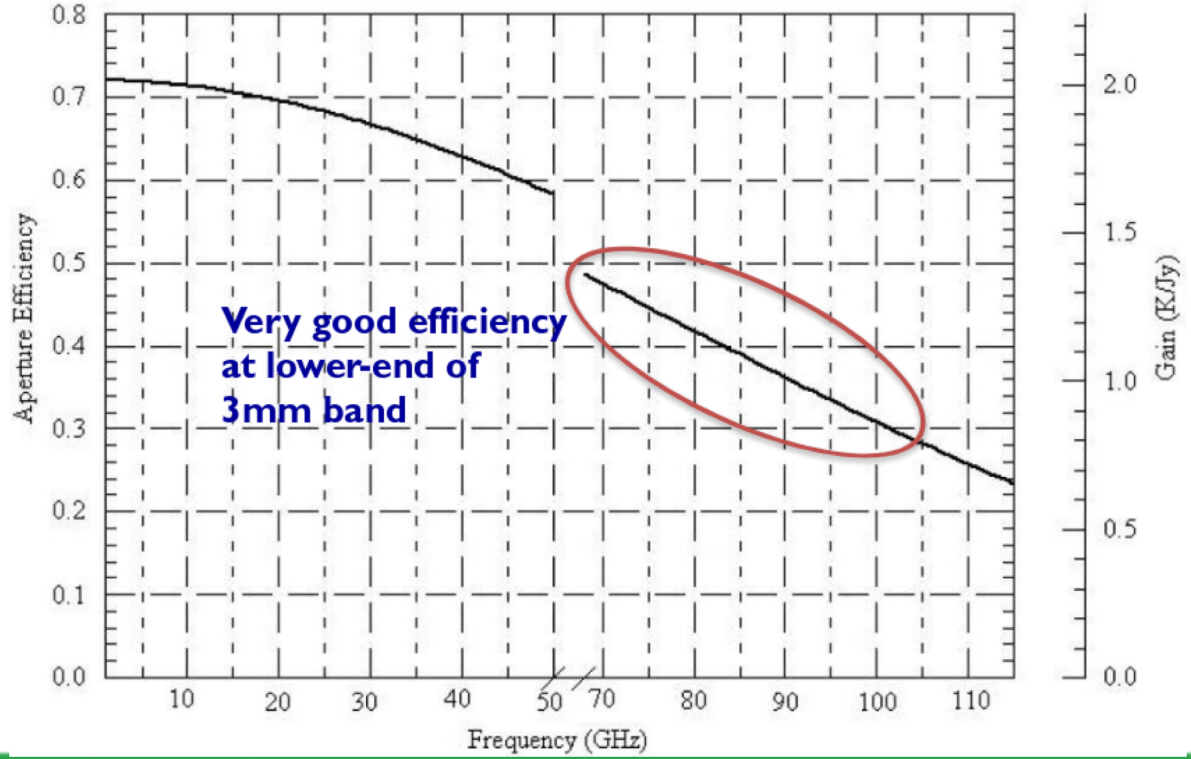
GBT specs

Found in Section 2.1.1 of the Observer's Guide:

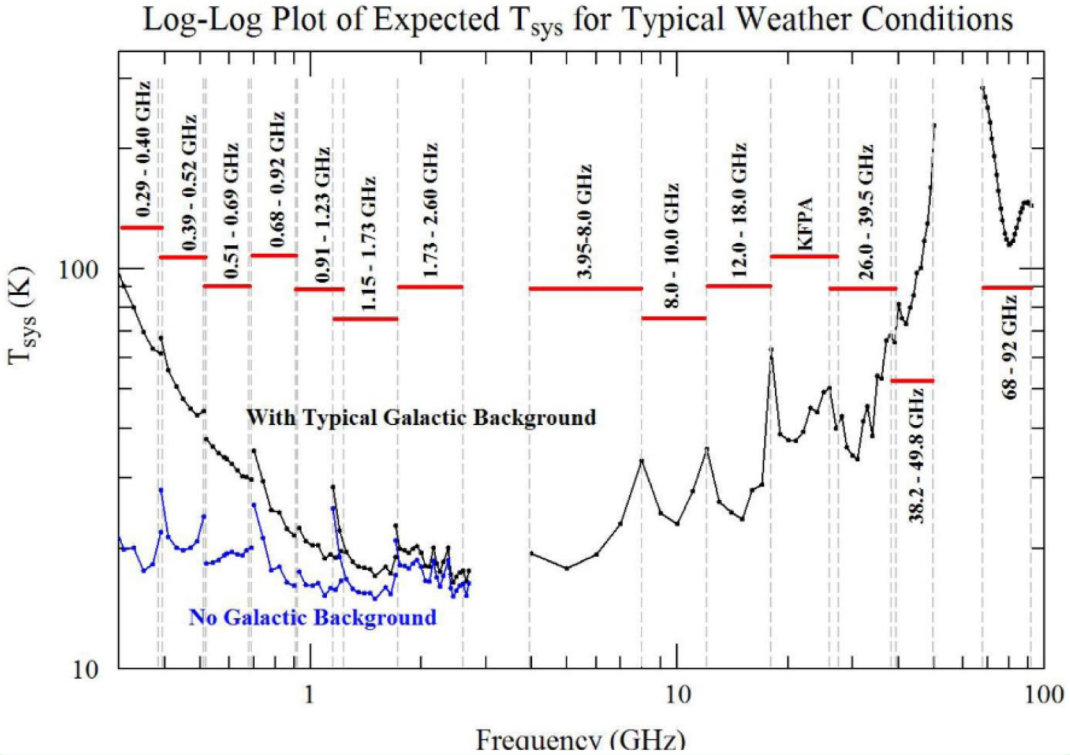
www.gb.nrao.edu/scienceDocs/GBTog.pdf

Location	Green Bank, West Virginia, USA
Coordinates	Longitude: 79°50′23.406″ West (NAD83) Latitude: 38°25′59.236″ North (NAD83) Track Elevation: 807.43 m (NAVD88)
Optics	110 m x 100 m unblocked section of a 208 m parent paraboloid Offaxis feed arm
Telescope Diameter	100 m (effective)
Available Foci	Prime and Gregorian f/D (prime) = 0.29 (referred to 208 m parent parabola) f/D (prime) = 0.6 (referred to 100 m effective parabola) f/D (Gregorian) = 1.9 (referred to 100 m effective aperture)
Receiver mounts	Prime: Retractable boom with Focus-Rotation Mount Gregorian: Rotating turret with 8 receiver bays
Subreflector	8-m reflector with Stewart Platform (6 degrees of freedom)
Main reflector	2004 actuated panels (2209 actuators) Average intra-panel RMS 68 μm
FWHM Beamwidth	Gregorian Feed: $\sim 12.60/f_{GHz}$ arcmin Prime Focus: $\sim 13.01/f_{GHz}$ arcmin (see Section 3.1.1)
Elevation Limits	Lower limit: 5 degrees Upper limit: $\sim$ 90 degrees
Declination Range	Lower limit: ~ -46 degrees Upper limit: 90 degrees
Slew Rates	Azimuth: 35.2 degrees/min Elevation: 17.6 degrees/min
Surface RMS	Passive surface: 450 μm at 45° elevation, worse elsewhere Active surface: $\sim$ 250 μm, under benign night-time conditions
Pointing accuracy	1σ values from 2-D data 5″ blind 2.7″ offset

GBT Aperture Efficiency and Gain (K/Jv)



Noise Levels (Tsys) for Typical Weather



Available GBT Receivers

Table 1: GBT Receivers

Receiver	Frequency Range
Prime Focus 1	290-920 MHz
Prime Focus 2	910-1230 MHz
L-band	1.15-1.73 GHz
S-band	1.73-2.60 GHz
C-band (shared risk)	3.8-8.0 GHz
X-band	8.0-11.6 GHz
Ku-band	12.0-15.4 GHz
K-band Focal Plane Array (7 pixels)	18.0-26.0 GHz
Ka-band	26.0-39.5 GHz
Q-band	38.2-49.8 GHz
W-band	67-93.3 GHz
MUSTANG 2 bolometer array (shared risk)	80-100 GHz
ARGUS (shared risk)	75-115.3 GHz, Private PI instrument

Available GBT Backends

Backend	Observing Modes
Versatile Green Bank Astronomical Spectrometer (VEGAS)	Continuum, pulsar, spectral line
Digital Continuum Receiver	Continuum
Vegas Pulsar Modes (VPM)	Pulsar
Mark V Very Long Baseline Array Disk Recorder	Very Long Baseline Interferometry
Caltech Continuum Backend (CCB) (Ka-band only)	Continuum
Radar	Private PI Instrument, open for public use
Breakthrough Listen Backend	Shared Risk

Observing Mode vs Backend Capabilities

What are you doing?:	Continuum	Continuum full-stokes	Line	Pulsar	VLB	Radar
	DCR	Mode-1 VEGAS	VEGAS	GUPPI	Mark5 VLBA recorder	Radar backend
	CCB (Ka)	Mueller matrix calibration (function of parallactic angle)	{29 modes}	VEGAS-Pulsar		
	Mustang (3mm)			{Search mode, timing mode}		
	Reduction uses specialized scripts					

VEGAS Modes

16 separate spectrometer channels (8 dual polarization channels) that can be divided between beams and different frequencies as needed and can support up to 8 spectral sub-windows per spectrometer.

Modes 20-24: 1.25 GHz subbanding step max
Modes 25-29: 800 MHz subbanding step max

Table 4: VEGAS modes.

Mode	Spectral Windows per Spectrometer	Bandwidth per Spectrometer (MHz)	Number of Channels per Spectrometer	Approximate Spectral Resolution (kHz)
1	1	1500[a]	1024	1465
2	1	1500[a]	16384	92
3	1	1080[b]	16384	66
4	1	187.5	32768	5.7
5	1	187.5	65536	2.9
6	1	187.5	131072	1.4
7	1	100	32768	3.1
8	1	100	65536	1.5
9	1	100	131072	0.8
10	1	23.44	32768	0.7
11	1	23.44	65536	0.4
12	1	23.44	131072	0.2
13	1	23.44	262144	0.1
14	1	23.44	524288	0.05
15	1	11.72	32768	0.4
16	1	11.72	65536	0.2
17	1	11.72	131072	0.1
18	1	11.72	262144	0.05
19	1	11.72	524288	0.02
20	8 [c]	23.44	4096	5.7
21	8 [c]	23.44	8192	2.9
22	8 [c]	23.44	16384	1.4
23	8 [c]	23.44	32768	0.7
24	8 [c]	23.44	65536	0.4
25	8 [c]	16.875	4096	4.1
26	8 [c]	16.875	8192	2.0
27	8 [c]	16.875	16384	1.0
28	8 [c]	16.875	32768	0.5
29	8 [c]	16.875	65536	0.26

[a] The useable bandwidth for this mode is 1250 MHz.
[b] The useable bandwidth for this mode is 850 MHz.
[c] For modes 20-24, the spectral windows must be placed within 1500 MHz with a useable frequency range of 150 to 1400 MHz. For modes 25-29, the spectral windows must be placed within 1000 MHz with a useable frequency range of 150 to 950 MHz.

“MyNRAO” Account is needed for using the Proposal Submission Tool (PST)

https://my.nrao.edu

Dissertation box - explain benefits and extra steps

Elevations: 15 in general, 20 for M2, use sens. Calc. to double check

Use NRAO helpdesk for any questions: https://help.nrao.edu

Where to find Information needed for Technical Justification Boxes

https://greenbankobservatory.org/science/gbt-observers/proposals/

Checking RFI:

https://science.nrao.edu/facilities/gbt/interference-protection/ipg/rfi-scans/rfi-scans

What is subbanding?

GBT Sensitivity Calculator/Time Estimator

https://dss.gb.nrao.edu/calculator-ui/war/Calculator_ui.html

Use reasonable elevations

Ta, Tr, Tmb, vs mJy

GBT Mapping Calculator

http://www.gb.nrao.edu/~rmaddale/GBT/GBTMappingCalculator.html

Checking for RFI Sources

https://science.nrao.edu/facilities/gbt/interference-protection/ipg/rfi-scans/rfi-scans

Key Points for GBT Observing

- All Awarded projects are assigned a GBT scientific staff member as the friend of the project who will help you set up observing scripts and with your data reduction
- After setting up your observing scripts, enable your project within the DSS and specify observers and have observers fill out their blackout dates
- The DSS will schedule your project based on weather, observer availability, and receiver/backend availability.
- GBT users carry out their own observations (either by visiting the site or remotely - on-site observers are given priority for observations)

Title

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