Submitting a GBT Proposal

2021 Winter Observer Training Workshop

NSF

AUI

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Before you Begin

- Read the call for proposals in detail
- Understand the telescope and its capabilities
- Ask yourself…
  - Why is this proposal worth doing? Put yourself in the shoes of a critical referee
  - Has this been done before? What will I do differently this time?
  - Is this the right telescope for my science?
  - What do I actually need (as opposed to want) to accomplish my scientific goals?

Proposal Categories

- Regular
  - 0.3 – 8 GHz (any weather): < 400 hours and <= 1 year
  - 8 – 18 GHz (good weather): < 200 hours, <= 1 year
  - 18–27.5 / >50 GHz (excellent weather): < 100 hours, <= 1 year
  - Fixed time / monitoring (all weather): < 200 hours, <= 1 year
- Large
  - 0.3 – 8 GHz (any weather): >= 400 hours and > 1 year
  - 8 – 18 GHz (good weather): >= 200 hours, > 1 year
  - 18–27.5 / >50 GHz (excellent weather): >= 100 hours, > 1 year
  - Fixed time / monitoring (all weather): >= 200 hours, > 1 year

Proposal Categories

- Triggered proposals are submitted at the normal proposal deadlines
  - Intended for pre-planned observations of transients whose times are not known *a priori*
  - Must include clear, well-justified trigger criteria
- Director's Discretionary Time (DDT): Two types
  - Target of Opportunity: Unexpected phenomena, rapid response
  - Exploratory Time: Typically a few hours or less, intended for pilot projects taking advantage of a new idea or capability

Great, Good or Poor

- 300-500 proposals reviewed every deadline
- Few (~10) are obviously great
- Few (~10-20) are obviously poor
- All others are good and about equal
  - We are all intelligent, good writers, etc.
- How do you make your proposal standout?

Proposal Elements

- Abstract (on the cover page) – limited to 200 words for GBT proposals
- Introduction and background information
- Project description
- Scientific justification
- Time request (including backends, observing strategy, etc.)
- Technical justification (pre-formatted)

Scientific Justification Tips

- Do
  - Be thorough but concise – this is a skill that takes practice to develop!
  - Provide a relevant introduction
  - Cite relevant literature
  - Discuss the potential impact of a successful proposal
  - Discuss the potential impact of a **null result**
- Don't
  - Assume that all referees are experts in your domain
  - Don't "blind with science" - KISS
  - Use words when a figure would suffice (and vice versa)

Technical Justification Tips

- Do
  - Make sure you are up-to-date on instrumental availability and capabilities
  - Ask observatory support staff if you have questions
  - Provide all the information that is asked for
  - Use observatory provided tools
  - Be explicit about any assumptions you are making
- Don't
  - Ask for something that is unavailable or impossible
  - Ask for an instrumental set up that is not justified by the science
  - "Pad" the time request – we conduct an independent review

Stylistic Considerations

- Don’t repeat the abstract in the proposal – it is included in the cover sheet! The same goes for technical justification
- Don’t add content just to reach the page limit
- Follow all formatting guidelines
  - 4-page limit for regular, triggered, DDT proposals
  - 10-page limit for large proposals
  - Includes figures, tables, references
  - All proposals: Min. 11 point font for main text (smaller font OK for figures, footnotes, but must be legible)
  - All proposals: 1-inch margins
- Remember that referees read lots of proposals – make it exciting

GBO/NRAO Proposal Calls

- August 1 and February 1 deadlines
- August deadline observing February-July
- February deadline observing August-January

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Hidden Gems

- Joint proposals with
  - Hubble
  - Fermi
  - Chandra
  - Swift
  - SOFIA
- Filler time proposals

GBO/NRAO Tips

- Panel Based system
  - Eight different panels
  - Broad community representation on panels
  - Non experts on panels

- 0=best and 10=worst
- Will be given a group
  - A: active for one year, expect to complete
  - B: one semester, should get most of time
  - C: one semester, filler time
  - N: not accepted

GBT Tips

- If in doubt contact us
- Technical justification – unlimited space
  - What you are using
  - How you are using it
  - How long you need it
  - How you determined those values
- Include Overhead times
  - Pointing/focus every 0.5-2 hours
  - AutoOOF every 1-2 hours (above 30 GHz)
  - Interscan latencies
    - Slew times
    - 20-30 seconds to start scan

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Common Mistakes

- Confusion Limit
  - Once you hit it you are done (unless you have knowledge of emission at higher resolution)
- 1/f noise (Gain variations)
  - Receiver dependent
  - Relevant when product of BW and tint exceeds certain limits
- RFI
  - Check for known emissions
  - Have a plan
- Use the GBT sensitivity calculator
  - https://dss.gb.nrao.edu/calculator-ui/war/Calculator_ui.html
- Use the GBT mapping calculator
  - http://www.gb.nrao.edu/~rmaddale/GBT/GBTMappingCalculator.html

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Sessions

- Only include receivers and backends that must be observed at one time
- Typical telescope period is 3-6 hours long
  - Scheduled using **average** RA and Dec of sources
  - Group sources accordingly
- Sources in a sessions should be:
  - Within a 2-3 hour RA range
  - Use λ=δ as a divider (avoid long slews)
  - Time visible should be the same to within 1-2 hours
- Don’t restrict observable LST range too much
  - More flexibility = better chance to be scheduled

Scheduling Considerations

- GBT is oversubscribed, particularly when Galactic center is up
  - If you can, ask for time that is in lower demand
- Fixed projects are becoming harder to schedule!
  - This especially impacts pulsar and VLBI observing
  - If you need **fixed** or **windowed** observations you must provide strong justification (and rank highly)
  - Be as flexible as possible with scheduling constraints
  - Make your “must-haves” clear and different from your “prefer-to-haves”

Important Websites

- https://greenbankobservatory.org/science/gbt-observers/proposals/
  - Links and information for all things related to GBT proposals
- https://my.nrao.edu
  - Primary portal for submitting all GBO/NRAO proposals
- https://dss.gb.nrao.edu/calculator-ui/war/Calculator_ui.html
  - Tool for calculating observing time and sensitivity
- https://www.gb.nrao.edu/~rmaddale/GBT/GBTMappingCalculator.html
  - Tool for planning maps