

An Observer's Introduction to the GBT Dynamic Scheduling System

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This document gives an introduction to the Dynamic Scheduling System (DSS) for the Robert C. Byrd Green Bank Telescope (GBT). The GBT will be scheduled with the DSS beginning October 1, 2009. Observers can access the DSS through this site:

<https://dss.gb.nrao.edu>

Additional information on the DSS can be found here:

<http://www.gb.nrao.edu/dss>

Overview of the DSS

The primary goal of the DSS is to improve the efficiency of GBT observations by matching the observing schedule to current weather conditions, while allowing each observer to retain interactive control of the telescope. Each day the DSS will examine the weather forecast, equipment availability, observer availability, and other factors, and set an observing schedule for the 24-hour period beginning the next day. Observers will therefore get about 24-48 hours notice before their project will observe. Observers will have the opportunity to pause their observing program, set blackout dates indicating when they are unavailable for observing, and back out of current observations if they find the observing conditions are not suitable to their science goals.

The DSS readily accommodates remote observing, but by being on site in Green Bank observers increase their likelihood of being scheduled during the period of their visit. Observing visits to Green Bank should be arranged in advance with the project's "Friend," and observers should expect to spend four or more days in Green Bank to give enough opportunity for their project to get scheduled.

Resources for Getting Help

The main resource for help with the DSS is the email helpdesk:

helpdesk-dss@gb.nrao.edu

There is a link to the helpdesk on the main DSS web site. In addition, there is a live chat option available from the web site during normal working hours (Monday through Friday, 9:00 AM through 5:00 PM ET). The chat link connects to a member of the DSS

team. Also on the web site is a link to online documentation, including a FAQ and a glossary of DSS terms.

DSS Terminology: Projects, Sessions, and Telescope Periods

The process of scheduling GBT observations begins with the preparation of the proposal using the NRAO Proposal Submission Tool (PST). Proposals accepted by the selection committee become GBT *projects* that appear in the DSS system and are identified by an assigned project ID (e.g. GBT09C-001).

Projects are divided into *sessions*, which have associated parameters that define how the observation should be scheduled. These parameters include sky position, time allocated, observing frequency, and minimum and maximum durations acceptable for a single, contiguous block. Sessions for monitoring observations have additional parameters describing how often to repeat the observation. The project investigators initially define the session parameters in the proposal, but the parameters may be modified during the refereeing process. With the initial DSS software release observers will be able to see the most critical session parameters on the DSS web pages. A complete session parameter browser is planned for a later DSS software release.

Completing the observations for a session may require scheduling multiple segments. Each contiguous block of scheduled time is called a *telescope period*.

As telescope periods are completed, the project will be “billed” the time. If any time is lost to weather or an equipment failure, the observer may consult with the telescope scheduler and request that the project not be billed for the lost time.

Controlling Your Project with the DSS

Users can access their DSS account by logging in to the system at <https://dss.gb.nrao.edu>. The DSS username and password are the same as those used for NRAO Interactive Services (i.e. the Proposal Submission Tool).

From the DSS web site, users can view and manage the scheduling information for their projects. Users can control when their project is scheduled by enabling or disabling sessions, individually. Sessions are enabled for observing simply by clicking a check box. Once enabled, an observing session enters the pool of sessions eligible for scheduling. Note that astronomers intending to observe remotely must be trained and approved by GB staff before the project can be authorized and made eligible for scheduling.

Observers can also enter personal blackout dates. If all observers for a given project are blacked out at a given time, that project will not get scheduled. Observers with more than one project will find that they need to enter blackout dates only once, and the dates will be applied to all their projects.

Observers can also specify how they should be contacted, prior to and during their observations. *The GBT operations staff stress that it is critical to keep contact information current.* Each observer can provide “dynamic contact” information in a free-format text box. Here the observer should provide home and cell phone numbers and any other relevant contact information.

Observers will also be able to specify the order in which they should be contacted by GBT operations, in the event of any schedule changes or in case there is need to contact the observer for any reason prior to the scheduled start time.

The DSS Software

Upon logging in to the DSS system, users arrive at their DSS home page (Figure 1) where they see a list of active projects on which they appear as co-investigator. From the DSS home page, users can:

- Access the project page for each of their affiliated projects
- See a list of upcoming observations
- See a list of upcoming Green Bank room reservations
- See their “static” contact information, as entered in the NRAO Interactive Services system (<http://my.nrao.edu>)
- Set “dynamic” contact information
- Set blackout dates
- Link to the current GBT fixed schedule

By selecting a project ID, observers are presented with the project page, where they can:

- See a project calendar
- Inspect session parameters
- Specify observers from the project team, and set the order they should be contacted by GBT operations
- See a list of blackout dates for all observers on the project
- See a list of completed telescope periods

The project calendar gives observers an idea when their project is eligible for scheduling. Regardless of the weather, there will be times when a project is not eligible for scheduling, for example because of no receiver availability, observer blackouts, fixed maintenance, and other fixed projects appearing on the GBT schedule. Times not eligible for scheduling will be grayed out on the project calendar.

The project calendar helps with planning in a number of ways. By identifying days that *are* eligible for observing, observers can see the best times to plan observing visits to Green Bank. Also, by identifying days when they are not eligible to be scheduled, observers can “tune out” of the DSS system for a while. However, it is important to understand that a session’s eligibility can change from “not eligible” to “eligible” at any time. Therefore, if observers wish to take a break from observing based on the calendar

outlook, they should either disable all sessions until they are ready to resume with the observing, or enter blackout dates to cover the period they do not wish to observe.

The project page includes a panel with project team members listed. Using a checkbox, team members can select or deselect those identified as observers. They can also rearrange the order observers are listed. The top observer in the list is expected to observe the next scheduled session. If there is a change in schedule, this person will be called first.

DYNAMIC SCHEDULING SYSTEM

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Projects

PCode	Name
BB261	The Megamaser Cosmology Project: Year 2
GBT09C-051	The Megamaser Cosmology Project: Year 3
GBT08C-035	The Megamaser Cosmology Project: Year 2
BB278	The Megamaser Cosmology Project: Year 3

Dynamic Contact Information

Here is a place where we can provide contact information for GBT operations staff. For example "During the observing run tonight I will be on Mauna Kea. The phone here is 919-555-1212. My cell number is 617-555-9898"

[edit](#)

Static Contact Information

Email(s)
jbraatz@nrao.edu

Phone(s)
434-296-0251

Postal Address(es)
520 Edgemont Rd., Charlottesville, Virginia, 22903, United States, (Office)

Affiliation(s)
National Radio Astronomy Observatory

Blackout Dates

Begin	End	Time Zone	Repeat	Until	Description
2009-09-23 00:00:00	2009-09-30 00:00:00	UTC-4	Once		Conference edit delete

[add](#)

Upcoming Observations

- BB261-03: Tue, Oct 27 15:00 UTC for 12:30 hrs
- BB261-03: Fri, Oct 30 15:00 UTC for 12:30 hrs
- BB261-03: Sat, Nov 28 15:00 UTC for 12:15 hrs
- BB261-03: Sun, Nov 29 15:00 UTC for 12:15 hrs
- BB261-03: Sun, Dec 06 10:45 UTC for 12:30 hrs
- BB261-03: Mon, Dec 07 10:45 UTC for 12:30 hrs
- BB261-03: Fri, Jan 15 08:00 UTC for 12:30 hrs
- BB261-03: Sat, Jan 16 08:00 UTC for 12:30 hrs
- BB261-02: Tue, Dec 08 13:15 UTC for 12:30 hrs
- BB261-02: Thu, Dec 10 13:15 UTC for 12:30 hrs
- BB261-01: Sun, Nov 08 05:00 UTC for 12:30 hrs
- BB261-01: Mon, Nov 09 05:45 UTC for 11:45 hrs

Figure 1: A sample DSS home page

Responsibilities of the Project Personnel

Each project has a Principal Investigator (PI) and, optionally, a list of additional investigators. An investigator is eligible to be an *observer* for a given project if that person is qualified for remote observing or is on site in Green Bank.

It is essential that one of the observers for a scheduled project contact GBT operations at least 30 minutes prior to the start of the observation. Observers can contact the GBT operator by telephone (304-456-2341), by the CLEO chat program (for qualified remote observers), or by showing up in the GBT control room. If the GBT operator has not been contacted within 30 minutes of a session's start time, the operator will phone observers in the order they are listed on their project web page.

The PI is responsible for:

- Managing the project
- Identifying all associated observers
- Working with project team members and the GBT project Friend to ensure that observing scripts are properly and promptly prepared.
- Enabling each session by clicking the “enable” button on the project's web page. Sessions should be enabled only if they will be ready for observing in the next 24 hours.
- Ensuring that all associated observers have provided contact information, including a current telephone number and an email address for each observer.
- Ensuring that a project's scheduling information is current. This includes checking the hours remaining on the project and ensuring that the session parameters are up-to-date and accurate.
- Ensuring that each scheduled telescope period has an observer who is available at least 30 minutes before the session is scheduled to begin.

Observers are responsible for:

- Ensuring that the DSS project web page has their current contact information. For remote observers, this includes entering telephone numbers where they can be reached at the time of observation.
- Contacting GBT operations 30 minutes prior to the start time of an observation.
- Attending to observations during a scheduled telescope period.
- Notifying GBT operations if they find conditions unsuitable for their session.

Remote Observing and the DSS

The policies and instructions relating to remote observing remain the same. To use the GBT remotely, observers must first be trained and certified by Green Bank staff. In general, astronomers must observe at least once in Green Bank before being certified for remote observing. Please note that students should be trained on site by GBT staff, not off site by others. Training and certification received prior to the DSS test period are still valid. Experienced observers, when using instruments or observing modes unfamiliar to them, should plan to visit Green Bank if they require assistance. Additional information on remote observing is available at:

<http://www.gb.nrao.edu/gbt/remoteobserving.shtml>

Contact your project Friend or the DSS helpdesk (helpdesk-dss@gb.nrao.edu) if you believe the DSS does not have you listed properly as a qualified remote observer.

The Daily Schedule

Each day by 10:00 AM ET the telescope schedule is fixed for the 24-hour period beginning 8:00 AM ET the next day. For example, by 10:00 AM Monday, the observing schedule is fixed for the period 8:00 AM Tuesday through 8:00 AM Wednesday. Shortly after 10:00 AM the daily schedule is published and can be viewed on the DSS web site by anyone. Those with projects on the 24-hour fixed schedule will be notified by email.

Observers must ensure that their blackout dates and “session enabled” flags are up to date each day by 8:00 AM ET. Changes made after this time may not be reflected in the upcoming day’s schedule.

It is possible that weather conditions may change after a schedule is published, compromising the observing efficiency for some scheduled telescope periods. The observer or GBT staff may then decide to cancel a telescope period and substitute an alternate “backup” observation in its place. Note that the observer may decide that the weather conditions are too poor even after beginning the observation. Equipment failure can also lead to cancellations. If GBT staff must change the 24-hour schedule for these reasons, affected observers will be notified immediately by email or telephone.

Backup Projects

When a scheduled telescope period is cancelled, a backup project will fill the time. Backup projects can come in two categories: observer-run and operator-run.

Observer-run backup projects are those for which observers have volunteered to be called on short notice. The notice could be as little as 15 minutes, although the GBT staff will attempt to make the lead time as long as possible. Backup project observers should be ready to take control of the telescope at any time of the day or night, consistent with their observing program and blackout dates. These call-outs are expected to be rare. By volunteering as a backup project, observers improve their project’s chances of getting observing time. Note that identifying a project as a backup does not penalize that project during the normal scheduling procedure. The project will compete for regular scheduling on an equal footing with all other projects, but the PI is agreeing to make the project available as a backup *in addition* to regular scheduling. Note that observer-run backup projects will not be called on to observe during times they have blacked out on their DSS calendar.

Operator-run projects contain observing scripts that may be run by the GBT operator, without need for direction from project team members. The observational strategy must be simple. Operator-run projects are characterized by:

- Minimal calibration requirements, e.g. a single pointing/focus calibration at the beginning of the run. If the observation requires more calibration than a single pointing/focus or simple repetition of a pointing/focus script at regular intervals then it will not qualify as an operator-run candidate.
- Minimal changes in observing mode.
- Use of only one receiver.
- No scientist intervention required. An operator can be expected to determine if a point/focus measurement is reliable but cannot be asked to judge the quality of astronomical data. The operator also cannot be asked to judge which source would be best to observe at any given time. If there is any doubt whether an observation will produce reliable “blind” results then this project is not suitable as an operator-run candidate.
- Clearly written instructions for the telescope operator describing the observing procedure, including which scripts to run

These requirements bias operator-run projects to low frequency observations, but high frequency projects can be considered as well. There is no intention to implement “service observing” by GBT scientific staff. Green Bank scientific staff will not be on hand to check operator-run projects.

Getting a project approved as an operator-run backup requires consent from the GBT Friend and the GBT DSS staff. To identify your project as a backup project of either sort, inform your GBT Friend.