



West Virginia's **Space Place**



Field Trip Planning Guide



greenbankobservatory.org

Check out the Green Bank Science Center
on Facebook for updated events & specials!

Discover Science!



Experience science and engineering in action when you and your students visit the Green Bank Observatory (GBO). Astronomers from around the world harness the awesome power of the Robert C. Byrd Green Bank Telescope (GBT) to answer mankind's biggest cosmic questions. More than just a tour, a field trip to Green Bank might just inspire your students to join the next generation of scientists and engineers.

Rich in educational programs and activities, with inexpensive on-site lodging and dining, the Green Bank Science Center can assist you in building a visit lasting a few hours to a few days.

**What's a
Black Hole?
How can you
see it?**

**How old is
the Universe?
How big is it?**

**Where did
we come
from?**

**What happens
when a Star dies?
What is a Pulsar
and where does it
come from?**



GBO Field Trip Activities

Standards Grades 4 - 8: Physical Science, Earth Science & Physics, 21st Century Skills

KEY STANDARDS MET



Nature of Science



Content Standards



Application of Science Standards



Standards for 21st Century Learning

Our field trip activities are mapped to State and National Science Standards! As you plan a field trip for your students, use this information to assist in choosing the activities that suit your classroom goals best.

Plan to spend a minimum of 2 hours with us to accomplish the GBO tour, exhibit hall scavenger hunt, and a stop in the gift shop. Most activities are designed for groups of 20. Please plan for a longer stay if you bring a large group, we will need to rotate smaller groups through more than one activity. Radio Astronomer For A Day, highly recommended for students ages 10 and up, requires an overnight stay.



Site Tour 🖐️🖐️🖐️🖐️

Group Size: 40 Suitable for all ages.

Duration: 60 minutes per group.

- All field trips include a tour of the radio telescopes - but that's not all. Our tour includes science demos, a Q/A with a knowledgeable staff person and a short film.

Exhibit Hall Concept Quest 🖐️🖐️🖐️🖐️

Group Size: 40+ Suitable for 3rd Grade and up.

Duration: 30 – 40 minutes per group.

- Students complete a scavenger hunt to answer science and engineering questions as they interact with our hands-on exhibits.

Radio Astronomer For A Day 🖐️🖐️🖐️🖐️

Group Size: 5 – 30 Suitable for 5th graders and up.

Duration: Minimum of 24 hours including one overnight stay.

- Students working in research teams investigate cosmic objects with the 40 foot diameter radio telescope. During an overnight stay, students learn how to operate the telescope and complete inquiry-based projects, becoming, in fact, radio astronomers. RAFAD is a truly unique intensive real-life scientific experience.

Be An RFI Detective 🖐️🖐️🖐️

Group Size: 20 Suitable for all ages.

Duration: 40 minutes per group.

- Our technicians use high tech equipment to hunt down Radio Frequency Interference. Students can join in the hunt as they search the Science Center for sources of man-made radio sources. Fun and eye-opening!

Exploring Our Solar System 🖐️🖐️🖐️

Group Size: 20 Suitable for all ages.

Duration: 30 minutes per activity.

- Students investigate the size and scale of our solar system. We have three hands-on activities to choose from: Pocket Solar System, Worlds in Comparison, and Moon and Earth. You can do one or select all three.

StarLab 🖐️🖐️

Group Size: 20 Suitable for all ages.

Duration: 40 minutes per group.

- Constellations and celestial motions presentation under an inflatable planetarium balloon.

Solar Viewing (weather permitting) 🖐️

Group Size: 20 Suitable for 5th grade and up.

Duration: 30 minutes per group.

- If it's sunny we can pull out our special H-alpha telescope and students can safely view sunspots, solar flares, filaments and plagues.

GBT Engineering Design Challenge 🖐️🖐️🖐️🖐️

Group Size: 40 Suitable for all ages.

Duration: 60 minutes per group.

- Students will investigate engineering by designing, building and testing a support structure that can hold up a "radio telescope dish". Best structure wins!

Plan Your Visit

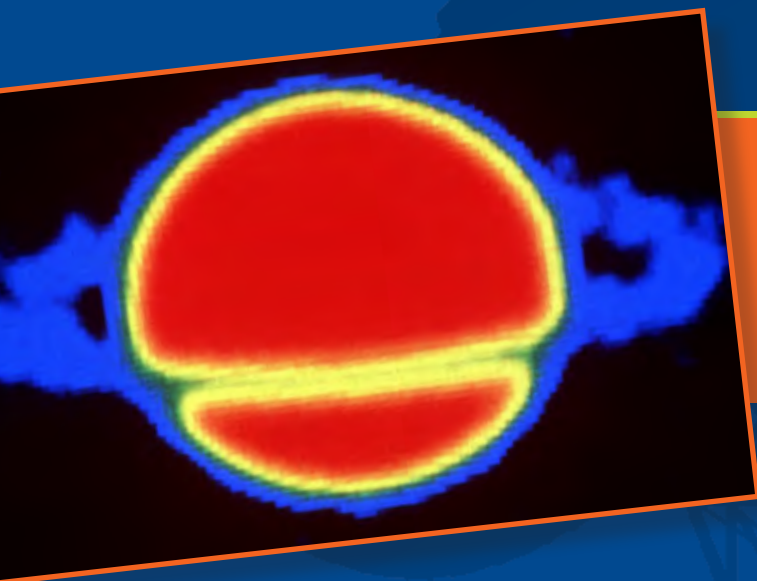
Before you come to Green Bank:

1. Contact us to set the date. Determine how many students and how many chaperones will be on the trip. We recommend 1 chaperone per 10 students. Chaperones should accompany students in all activities. We'll also need to know the grade/age range of your group, and how long you can stay.
2. Select the activities you'd like to do given the size of your group and your time constraints, and we will design a custom itinerary for you.
3. Plan for your meals. If you are planning a day trip, our Starlight Café can provide your lunch. Meal arrangements should be made in advance for groups of 20 or more. You can find our Starlight Café menu and box lunch order form on our website.

Overnight Trips

Educational groups visiting the Green Bank Science Center may stay in the Bunk House, pictured above. This comfortable and affordable dormitory can accommodate up to 60 students (30 girls and 30 boys). Students bring their own sleeping bags or linens. Chaperones stay in separate but attached bedrooms. Meal options are available. Bus driver accommodations may be arranged on-site or nearby.

If you stay overnight, meals are usually arranged at the Observatory Cafeteria. Meals for student groups include: breakfast, lunch and dinner. See our website for pricing. Please bring your tax exempt documentation if you are a school or non-profit group.



Introduce your students to radio astronomy with one of the following activities on our website.

- Take a Multiwavelength Tour of the Orion Constellation
- Make a radio picture
- Tour the Radio Solar System
- Check out Caltech's Multiwavelength Astronomy web site:
<http://www.ipac.caltech.edu/outreach/Multiwave/multiwave.html>

**Contact us at
visit@gbobservatory.org or
304-456-2150**

Area Attractions



Stay overnight at GBO and your students can experience even more outstanding educational opportunities nearby. Here's a sample! For more information contact the Pocahontas County Convention & Visitors Bureau at www.pocahontascountywv.com or 800-336-7009.



Snowshoe Mountain Resort • Snowshoe, WV, 30 min. west of NRAO.

- Year round activities. • Group pricing available.

877-411-4FUN • www.snowshoemtn.com



Cranberry Mountain Nature Center and Cranberry Glades Botanical Area

- Near Hillsboro, WV, 50 min. from NRAO.
- Educational exhibits. • Unique habitat, plants and animals. • Half mile handicap accessible boardwalk through an Arctic Tundra bog. • Open spring through fall.

304-653-4826 • www.fs.fed.us/r9/mnf/sp/naturecenter.html



Beartown State Park • Near Droop, WV, 1 hr. from NRAO.

- Unique natural area featuring massive boulders, overhanging cliffs and unusual rock formations. • Self guided with interpretive signs or guided tours through advanced arrangements. • Open April through October.

304-653-4254 • www.beartownstatepark.com



Edray State Trout Hatchery • Edray, WV 50 min. from NRAO.

- Tour an operating fish farm. • Learn about and see live rainbow, brook and brown trout. • Free tours.
- Reservations are necessary.

304-799-6461



Cass Scenic Railroad State Park • Cass, WV 15 min. from NRAO.

- Preserved 19th century logging railway town. • Historic train rides. • Company store gift shop and restaurant.
- Open May through October. • School group discounted rates.

1-800-CALL-WVA • www.cassrailroad.com



Droop Mountain State Park • Droop, WV 55 min. from NRAO.

- Official Civil War Discovery Trail site.
- Free tours. • Guided tours available with advance arrangements.
- Open year round.

304-653-4254 • www.droopmountainbattlefield.com



Pearl S. Buck Birthplace Museum • Near Hillsboro, WV 50 min. from NRAO.

- Tour the preserved birthplace of the Pulitzer Prize and Nobel Laureate author.
- See hundreds of period artifacts.
- Open Mon. – Sat., May – Oct. • Fee applies and reservations are suggested.

304-653-4430 www.pearlsbuckbirthplace.com



Seneca Rocks Discovery Center • Seneca Rocks, WV, 1 hour north of NRAO.

- One of the best known landmarks in West Virginia. • Self-guided interpretive hiking trail open year round.
- Discovery Center (open Apr. – Oct.) features free exhibits, films and gift shop.

304-567-2827 www.fs.fed.us/r9/mnf/sp/srdc.html



Seneca Caverns • Riverton, WV 1 hr. northeast of NRAO.

- West Virginia's largest caverns. • Explore 1 mile of trails 165 feet underground.
- Lesson Plan guides available upon request. • Gemstone mining. • Fee applies, reservations suggested.

304-567-2691 • www.senecacaverns.com



Durbin Greenbrier Valley Railroad • Elkins, WV 60 min from NRAO

- Explore surrounding mountains and valleys from an entirely new perspective – aboard one of four unique trains! • Fee applies, reservations required.

877-686-7245 • ticketinfo@mountainrail.com • mountainrailwv.com



Special Programs

Our education staff in partnership with GBO astronomers and engineers have created captivating special programs for students, youth groups, families and teachers.

Especially for Scouts

In a fun, fast-paced overnight stay, scouts can earn their astronomy badge. As part of the experience, scouts will use GBO's 40 Foot Radio Telescope!

GBO is proud to offer the Electronics Badge experience on a trial basis! Scouts will build a working circuit to take home with them, tour GBO's electronics lab, and conduct tests on our 40 Foot Radio Telescope. An overnight visit is required. We host the Electronics Badge weekend in September.

Girls Scout Badge Programs

Your troop can earn a Brownie Try-It, Junior Badge, or Cadette/ Senior/ Ambassador Interest Project Patch at one of our inspiring badge programs. We can work with you to develop a unique STEM interest badge or provide a program for one of the legacy badges such as Sky Search. An overnight stay is recommended.

Camps

We are super excited to host several summer programs for youth and teachers:

WV GSI

Green Bank Observatory hosts the West Virginia Governor's STEM Institute-- an annual residential program for 60 high school freshmen from West Virginia.

PING

This is a national two-week residential research focused camp for rising high school freshmen. We target minorities and girls for this program

Pulsar Search Collaboratory

Teachers, undergraduate students and high school students join pulsar experts to contribute to the field by learning how to analyze GBT data in the search for new pulsars. There are and summer residential components to the program.



This award winning National Science Foundation sponsored program is a national program- you do not need to be from West Virginia to apply.

Programs for Families

Monthly Star Parties. Rain or Shine. Once a month, GBO staff will treat you to views of the night sky through optical telescopes. If it rains, don't worry. You are invited to an informative indoor program!

Family Science Labs. Select Saturdays from 10-12. Four times a year, GBO staff guide kids of all ages through fun-filled, hands-on science projects. We provide all materials. Each lab highlights a different science/ engineering theme.

Annual Family Science Day. Held each year in the fall, this is our can't miss Open House event. Conduct science experiments, test your engineering skills and participate in rare, behind-the-scenes tours of the Observatory labs and telescopes.

Special events will spark cool programming at the Science Center too. Like our page on Facebook to stay informed about special event!

<https://www.facebook.com/GreenBankObservatory/>



The Green Bank Observatory is a facility of the National Science Foundation operated under cooperative agreement by Associated Universities, Inc.