

# The Washington Post

## Science students get stars in their eyes

By Eric Niiler

Special to The Washington Post

Monday, October 4, 2010; 10:17 PM

When the giant [Green Bank Telescope](#) in West Virginia got stuck in one position a few years ago, astronomers collected a big pile of electronic data from one part of the sky but had nobody willing to sift through it.

So they did what many of us do for boring chores: They found some teenagers.

They set teams of high school science students to scanning thousands of computerized "star plots" in search of pulsars, blinking beacons of deep-space radio energy that offer clues to the makeup of the universe. It's been a galactic treasure hunt, and two students have already hit the jackpot.

One was Shay Bloxton, a junior from Summersville, W. Va., who discovered a pulsar last October.

"When I first saw it, I didn't want to get my hopes up," Bloxton said. "Then they confirmed it a few weeks later, and I was really excited."

To find that pulsar, Bloxton spent hours at her home computer using downloaded software that translates the data gathered by the telescope into graphs. The graphs describe the strength, frequency and distance from Earth of a source of radio energy; a series of graphs makes up a star plot.

"I looked through 2,000 individual plots before I found one," Bloxton said. "You have to be able to understand a bit of science and what a pulsar is. It's not extremely difficult, but it takes a while."

### World's largest

The Robert C. Byrd Green Bank Telescope, built in 2000 and named for the late West Virginia senator, is the world's largest fully steerable telescope. Its 100-meter-wide surface area gives it the ability to pick up extremely faint signals from the distant reaches of space. It is one of five telescopes at the National Radio Astronomy Observatory, a federal facility tucked into a corner of Pocahontas County that since 1958 has been designated a "national radio quiet zone" where radio transmissions are limited or banned to limit interference with scientific inquiry.

But in 2007, the 16-million-pound telescope started sinking into the ground. While workers fixed the tracks at its base, the huge instrument was frozen in position. That cut off the telescope's usual clientele - astronomers who schedule, far in advance, a period of "observing time" on the the telescope, when they point it at the particular sector of the sky they want to study.

Instead, for 21/2 months, the telescope recorded data from 70,000 "pointings" that no astronomer had asked for.

Advertisement



The advertisement features the Zulily logo at the top, which consists of a green banner with the word 'zulily' in white lowercase letters. Below the logo is a photograph of a dark green, double-breasted coat with a matching belt and a hood. The coat is displayed against a light background with faint floral patterns. At the bottom of the advertisement, the text 'up to 70% OFF COATS' is written in green, with 'COATS' in a larger, bold font. A green circular button with a white right-pointing arrow is positioned below the text.

It would have been a shame to waste it. That's when scientists at NRAO and West Virginia University conceived the Pulsar Search Collaboratory and started recruiting students to scan this unwanted trove of data. The scientists get research help; the students get real-world experience about how astronomy works.

"It's like looking for a needle in a haystack," said Rachel Rosen, director of the student pulsar search program and a Green Bank astronomer. "We don't know exactly from any given section of the sky if there will be a pulsar, but we can make a bunch of guesses. The students are then filling in the blanks."

Launched in July 2008 at two dozen West Virginia high schools, the collaboratory has been expanded to Virginia, Maryland and seven other states. So far, more than 200 students at 33 schools have taken part.

One thing they learn is that those "eureka" moments of scientific discovery take months, if not years, of painstaking, often repetitive work.

"The two students who made the discoveries were really hard workers," Rosen said. "They improved their chances by looking through the data consistently. The teams that tend to be diligent about it build a social network, a club. That really helps."

Rosen noted that girls make up half the pulsar program's roster. "Girls see themselves as scientists, and that's an important predictor of future success," she said.

### **'I stay up all night'**

A pulsar emits a rotating beam of electromagnetic radiation at a precise and constant time interval. (Think of an interstellar lighthouse.) Because the flashes are so accurate, they act as celestial clocks and can help scientists understand the dimensions of the universe. Pulsars may also help researchers prove the existence of "gravitational waves," ripples in the fabric of space first theorized by Albert Einstein.

The first pulsar was discovered by a British graduate student in 1967, and since then about 1,800 have been found. Thousands are thought to exist. Based on mathematical estimates about the distribution of pulsars in the universe, Rosen and other astronomers believe there may be about 30 pulsars hiding in the student data set from the Green Bank telescope. So far, students have looked through about 10 percent and found two objects.

Rosen notes that the students are looking at raw data, which has not been pre-screened by astronomers. They also have to sift out interference from television signals, satellite communications and AM radio. After a student thinks he has found a pulsar, his data are checked by the experts - and, if necessary, by using the massive telescope itself.

Firas Nasr is hoping he'll be the next to find one. Nasr, a senior at Robinson Secondary School in Fairfax County, was among a group of students who spent a week this summer at Green Bank, an experience the kids dubbed "nerd camp."

The biggest hardship, Nasr said, was turning in their cellphones, iPods and digital cameras because of the observatory's ban on radio interference. In return, the students were allowed to operate the Byrd telescope to determine if any of the objects they'd found in their data were actually pulsars. (They weren't.)

Back at school, Nasr is recruiting and training other Robinson students to join the pulsar-hunting team. After class one day, eight students gather in a physics classroom, break out laptop computers and log on to the pulsar search Web site. Nasr helps the others look through the data.

"You're sitting at the computer and you get a huge adrenaline rush when you think you've found

something," Nasr said. He says he has long been more of an arts person but is warming to the idea of going into science. "This experiment has had a huge impact on my life," Nasr said. "Before this, I didn't think science had much purpose.

For Hiwot Abate, whose family moved to Fairfax from Ethiopia last year, the search for deep-space pulsars has become a bit obsessive. "I stay up all night doing this," says Abate, a Robinson junior.

Robinson physics teacher Melissa Booker says even though the program is empowering, it's definitely not for everyone. "It does take time and a particularly tenacious student," she says.

Just ask Lucas Bolyard of Harrison, W.Va., who found a signal last fall that seemed to turn on and off. Most pulsars emit a constant signal, so the Green Bank astronomers initially dismissed his discovery. But follow-up observations proved it was a "rotating radio transient": a pulsar that switches its signal. The finding got Bolyard and his family invited to a White House party for young astronomers, where he got to meet President Obama.

"I wanted to meet him for a long time. I got to speak with him for about a minute about the project, and it was one of the most cherished moments of my life," Bolyard says.

Pretty good for a high school freshman. Now Bolyard is thinking about college. A career in astronomy, perhaps?

"I'm thinking about it," Bolyard said. "Actually, I'm interested in politics."

**Niiler is a freelance journalist in Chevy Chase.**

[View all comments](#) that have been posted about this article.

### Post a Comment

[View all comments](#) that have been posted about this article.

Comments that include profanity or personal attacks or other inappropriate comments or material will be removed from the site. Additionally, entries that are unsigned or contain "signatures" by someone other than the actual author will be removed. Finally, we will take steps to block users who violate any of our posting standards, terms of use or privacy policies or any other policies governing this site. Please review the [full rules](#) governing commentaries and discussions. You are fully responsible for the content that you post.



#### Try Equifax

Take control of your credit with Equifax Complete™ Premier  
[www.equifax.com](http://www.equifax.com)



#### Extended Stay America

Official Site. Free WIFI, Kitchens. Our best rates here, guaranteed.  
[www.extendedstayamerica.com](http://www.extendedstayamerica.com)



#### Travel Guard® Insurance

Get Travel Insurance Coverage for Your Vacation!  
[www.travelguard.com](http://www.travelguard.com)

[Buy a link here](#)

© 2010 The Washington Post Company