



Join the Pulsar Search Collaboratory (West)!

Teacher Workshop. March 2-4, 2012. Yerkes Observatory

The National Radio Astronomy Observatory and West Virginia University cordially invite you and your students to collaborate with us in the grand adventure of scientific discovery!

How? By joining the **Pulsar Search Collaboratory (PSC)**. Students in school-based **PSC** teams will:

- Gain first-hand experience in conducting scientific research;
- Improve their 21st Century Skills;
- Learn more about Science, Mathematics, Technology and Engineering (STEM) careers;
- All while actually helping astronomers search the Galaxy for new pulsars!

Project Background

The world's largest fully steerable telescope, the Green Bank Telescope, is a RADIO telescope, operated by the National Radio Astronomy Observatory located in Green Bank, WV. In summer of 2007, the GBT was "immobilized" to enable NRAO to replace the track on which the 17 million pound structure rotates.



Obviously, since the telescope couldn't pivot, the kinds of experiments that could be done were extremely limited. But, an international group of scientists had an idea. They would use the telescope to survey the sky for new pulsars--rapidly rotating stellar corpses that emit radio waves. Over the summer, this team surveyed over 25% of the sky and amassed 130 TERABYTES of data.

That's a lot of data. We thought: with mountains of data to explore, and new discoveries to be made, why not involve middle school and high school students in the search for new pulsars? The National Science Foundation thought it was a good idea, and in 2008, they awarded a grant to NRAO and WVU. And the PSC was born!

"PSC-West" has been developed to provide teachers in Illinois and Wisconsin an opportunity to get their students involved and is made possible by the additional support from faculty and students at the University of Wisconsin-Milwaukee, Yerkes Observatory, and teachers who participated in the PSC summer program and want to make this happen!

PSC-West Project Information

Up to 20 teacher applicants will be selected to participate in PSC-West.

- Teachers may be science teachers teaching grades 8-12.
- Multiple teachers from the same school are encouraged to apply.
- For the training, you must have access to a laptop computer.

Astronomy knowledge is not a prerequisite for participation! But a desire to involve your students in research is! The application process is easy, and online! Go here to complete an online application:

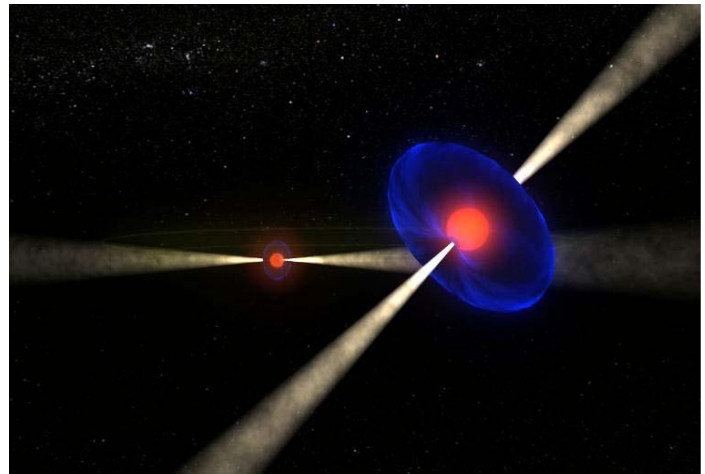
http://www.surveymonkey.com/s/pscwest_apply

Training for Teachers and Students.

1. Workshops for teachers. In order to be selected by the PSC, you must be able to:

- Complete 4 online sessions in February (held weekly--dates TBD by majority vote of participants) to gain background knowledge and familiarity with the PSC website. You will need access to the internet in order to attend the sessions and to complete homework. (Sessions will be archived if you can't join us in real-time on occasion.)
- Join staff from UW-Milwaukee, and the National Radio Astronomy Observatory at Yerkes for the PSC weekend workshop March 2 - 4. We'll bring you up to speed on how to analyze pulsar data, and share how to get your students involved. Teachers should aim to arrive by 8 PM on March 2. We'll wrap things up by mid-afternoon on Sunday the 4th.

2. Online help from NRAO and UW-Milwaukee faculty and undergraduate students • Your students can post interesting data, and ask astronomers and undergraduate experts questions any time using the PSC website!



Unique Double Pulsar System discovered by astronomers involved in the PSC program!

Scientific Discovery • 21st Century Skills • STEM Careers



Lucas Bolyard, 2009 Pulsar Search Collaboratory participant and WV high school student, discovered an anomalous pulsar with the GBT, shown here with President Barack Obama and First Lady Michelle Obama during an astronomy event on the South Lawn of the White House, October 7, 2009. Participants include: Dr. John Holdren, Office of Science and Technology Policy; Caroline Moore, the youngest person to discover a supernova.

3. Ongoing online training for teachers and students • Pulsar astronomers and others lead online classes on topics that ranging from basic astronomy content to Q/A sessions with you and your students on pulsars and pulsar data.

Teacher Responsibilities.

- Conduct short inquiry-based activities that provide your students with a taste for what it's like to do astronomy research. You will need access to a computer lab for these activities.
- Form a student PSC team. Once team members pass a data analysis "test" they will be granted access to the database and can begin searching real data!
- Oversee the teams—make sure that teams are meeting and working on data—often this occurs after school or during "club" time. You will have access to the data your school team has analyzed.
- Assist in preparing students for Capstone: In May, PSC teams will share the results of their research with each other at a Capstone Seminar. Plans are underway to hold Capstone at the UW-Milwaukee. Students who are active participants in the PSC will be eligible to attend.

Teacher Benefits.

- Room and Board for the 2-day workshop at Yerkes Observatory is paid by the grant;
- Stipends (\$200 for completion of the teacher training);
- Three Hours of Graduate Credit in astronomy is available (but optional) through WVU (admission and off campus fees add up to about \$230);
- A great feeling from helping students participate in real science.

Relevance of the PSC to National Science Education Standards.

1. Nature of Science/Science as Inquiry.

The PSC provides students with experience in conducting scientific research. At the same time, core content can be introduced. The PSC integrates the teaching of the facts of science with the practice of scientific research.

2. **Content.** Pulsars, rapidly spinning highly magnetized neutron stars, are fascinating objects for study. Research into their extreme properties has impacted most areas of fundamental physics. The PSC will allow students to gain first-hand insights into several areas of the NSES Physical Science Content Standards:

- **Motions and forces**
- **Conservation of energy**
- **Interactions of energy with matter**

3. **21st Century skills.** The PSC requires students to work in teams, to communicate the their results to one another and to use technology to improve their ability to do science

Need more information about the training? Contact:

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