



Remote Radio Astronomy: ARCC@UWM

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Goals

- Integrate students into research at a very early stage, with low initial commitment
 - Years I-4, Physics & non-physics
- Learn about modern scientific research methods, attract into STEM fields
- Offer opportunities for students to gain personal investment in research
- Gain assistance in finding new pulsars (still very labor intensive)

Arecibo Remote Command Center

- Started at University of Texas Brownsville
 - Part of PALFA pulsar survey
- Expanded to UWM in 2008 (X. Siemens): ARCC@UWM
- Now at least 3 other universities offer ARCC programs

Major Activities

- I.Students conduct remote observing at Arecibo and Green Bank radio telescopes as part of pulsar surveys
- 2.Students examine pulsar candidates to identify "real" signals
- 3.UWM Astronomy Club: exploration of modern research and cohort formation

Candidate Rating Training

- Initial lectures in "what is a pulsar" and "radio astronomy basics"
- Discussion of what distinguishes real pulsars from other signals
- Once trained, students examine pulsar candidates from web interface at home (or elsewhere)
 - Paid work (\$11/hour)

Observing Training

- Remote observing requires significant training & apprenticeship:
 - GBT requires on-site, Arecibo does not
- Use older students to mentor new students until they are trained and comfortable
- Gradual increase in responsibilities





ARCC Network

- Weekly meetings at each University led by team leader
 - UWM has 2 teams
 - Offers leadership opportunities for senior students
- Monthly meetings across Universities, including presentations about other science
- Space Presentation Outreach Talks (SPOT) delivered to local high schools

UWMAstronomy Club Led by 3 faculty, including non-pulsar researcher

- Weekly meetings led by faculty (not students)
- Presentations, guest speakers, activities, discussion of news items, etc.
- Introduce students to modern research: give them context
- Field trips: Yerkes Observatory, Fermilab, Adler Planetarium, ...

2015/2016:

- Astronomy Jeopardy
- Coffeeshop Astrophysics: New • LIGO Horizons
- Planetarium: Planetarium
- SETI
- Galaxies
- NANOGrav metronome
- Fermilab

- Pulsars
- Demo DayMWA Transients

 - FRBs
- Science & Cinema Weather/NOAA
 - Cratering
 - GW Memory
 - White Dwarfs
 - Galaxy scales
 - Star party



Rewards

- \$11/hour: not negligible for many students (they often live on this)
 - Funding from NSF and local offices
- Paper authorship
- Pulsar discoveries: proprietary feeling
- Observing trips (visit observatories!)
- Conference presentations (AAS and other)
- Students interact on equal footing with top-tier researchers
- Best students recruited for leadership positions and more in-depth activities (including NANOGrav PIRE), ideally leading to papers

Statistics

- ~20% of observing for recent pulsar surveys conducted by UWM undergraduates
- ~100 students total at UWM have gone through ARCC@UWM program
- I0 pulsars from ARCC@UWM, 50 pulsars for ARCC total
 - Includes a number of interesting pulsars
- ~75% say activities increase likelihood of STEM career
- Range of actual outcomes (need better tracking):
 - Grad school, industry, elsewhere

Concerns

- Students can be unreliable (variable schedules, etc)
 - Have lost remarkably few observing sessions, but still have trouble filling schedule over breaks/ holidays
- UWM is a diverse campus, but ARCC students are not fully representative
 - Working hard to increase & retain

Other Efforts/Next Steps

- High school students (Pulsar Search Collaboratory)
- More in-depth exploration of discoveries (see talk by J. Swiggum)
- Extend to interferometry?
- Extend to optical?

Pulsar Search Collaboratory

Home

Join

Online Workshop

Guides

Emily

Login

Meet the PSC Students









Ellery



Susan

Sean See all students... Ethan

The Green Bank Telescope and the PSC



The Pulsar Search Collaboratory (PSC) is a joint project, between the National Radio Astronomy Observatory (NRAO) and West Virginia University (WVU), funded by the National Science Foundation (NSF). The goal of the PSC is to give high school students experience doing real research. With this experience they gain the confidence they need to succeed in STEM majors in college!

In 2007, the Green Bank Telescope was in need of repairs. Specifically, it needed a new track. While this track was being replaced, the telescope was unable to move and could only point at a fixed position in the sky. During this time, two astronomers from WVU, Dr. Maura McLaughlin and Dr. Duncan Lorimer used the Green Bank Telescope to observe the sky as it drifted overhead. And as the sky drifted by, they took data. And more data. And more data. By the end, they had over 300 hours of observing time and acquired more than 30 terabytes of data! And they want to use this data to search for new

News & Announcements

Search

PSC Camp Dates

Q Search ...

PSC Camp is back! Mark the calendar for July 17-23 at NRAO in Green Bank, WV! We will accept ... read more ...

The PSC is seeking teachers and students!

The Pulsar Search Collaboratory is expanding with funding from the National Science Foundation, Learn more about the program and then ... read more

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