Brent J. Shapiro-Albert

Ph.D. Candidate · Physics and Astronomy
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Education

West Virginia University — *Morgantown, WV*
Ph.D. in Physics and Astronomy — *August 2016 - May 2021*
M.S. in Physics and Astronomy — *August 2016 - December 2018*
Advisor - Maura McLaughlin

Union College — *Schenectady, NY*
B.S. in Physics; Minor in Mathematics; *magna cum laude* — *September 2012 - June 2016*

Research Experience

West Virginia University — *Morgantown, WV*
Research Assistant with Prof. Maura McLaughlin — *Aug. 2016-Present*

- Searched three known globular clusters for milliseconds pulsars for the first time.
- Engineered new custom pulsar timing pipeline software for the NANOGrav collaboration's 15-yr data set, including contributing new functionality to the `PINT` Python package.
- Worked on development of the Pulsar Signal Simulator (`PsrSigSim`) Python package.
- Explored the covariances of frequency-dependent delays in precision pulsar timing with the `PsrSigSim`.
- Studied the noise and interstellar medium properties of seven millisecond pulsars in precision pulsar timing from multi-hour continuous observations.
- Analyzed the single pulses of rotating radio transients to determine various emission properties.

Cornell University — *Ithaca, NY*
Summer Undergraduate Researcher with Prof. James Cordes — *June-Aug. 2015*

- Wrote custom Python code utilizing Monte Carlo sampling of the astrometric measurements of 60 pulsars to search for potential birth regions or past interactions.
- Created a website detailing multi-wavelength and other properties of 60 pulsars with measured parallax properties.

Union College — *Schenectady, NY*
Summer Undergraduate Researcher with Prof. Jonathan Marr — *June 2014-2016*

- Updated a 2-meter radio telescope with a new feedhorn and small noise amplifier and tested laboratory experiments for use in undergraduate laboratory courses.
- Wrote custom Python code to reformat data written from the telescope to work with older analysis software.

Lead Author Publications

3. **Shapiro-Albert, B. J.**, Hazboun, J. S., McLaughlin, M. A., "A Study in Frequency Dependent Effects on Precision Pulsar Timing Parameters with the Pulsar Signal Simulator," arXiv:2010.07301 (2020), submitted to *The Astrophysical Journal*

2. **Shapiro-Albert, B. J.**, McLaughlin, M. A., Lam, M. T., Cordes, J. M., Swiggum, J. K., "Analysis of Multi-Hour Continuous Observations of Seven Millisecond Pulsars," *The Astrophysical Journal*, 890 (2) 123 (2020)

1. **Shapiro-Albert, B. J.**, McLaughlin, M. A., Keane, E. F., "Radio Properties of Rotating Radio Transients: Single-pulse Spectral and Wait-time Analyses," *The Astrophysical Journal*, 866 (2) 152 (2018)

Co-Author Publications

6. Pol, N. S., et al., "Astrophysics Milestones For Pulsar Timing Array Gravitational Wave Detection", arxiv:2010.11950 (2020)

5. Arzoumanian, Z., et al., "The NANOGrav 12.5-year Data Set: Search For An Isotropic Stochastic Gravitational-Wave Background", arXiv:2009.04496 (2020)

4. Arzoumanian, Z., et al., "Multi-Messenger Gravitational Wave Searches with Pulsar Timing Arrays: Application to 3C66B Using the NANOGrav 11-year Data Set", *The Astrophysical Journal*, 900 (2) 102 (2020)

3. Alam, Md F., et al., "The NANOGrav 12.5-year Data Set: Wideband Timing of 47 Millisecond Pulsars", arXiv:2005.06495 (2020), accepted for publication in *The Astrophysical Journal Supplement Series*

2. Alam, Md F., et al., "The NANOGrav 12.5-year Data Set: Observations and Narrowband Timing of 47 Millisecond Pulsars", arXiv:2005.06490 (2020), accepted for publication in *The Astrophysical Supplement Series*

1. Baker, P. T., Brook, P. R., Fiore, W. C., Garver-Daniels, N., Hazboun, J. S., Kaiser, A. R., Lam, M. T., **Shapiro-Albert, B. J.**, Witt, C. W., "Results for the International Pulsar Timing Array Second Mock Data Challenge: New Techniques and Challenges for the Detection of Low-Frequency Gravitational-Wave Signals", arXiv:1912.12939 (2019), to be submitted to PRD

Accepted Observing Proposals

2020	**PI, GBT DDT Proposal**, A Targeted Search for Millisecond Pulsars In Globular Clusters	*WVU*
2020	**Co-I, GBT DDT Proposal**, High Frequency Scintillation Observations of Reactivated Magnetar XTE J1810–197	*WVU*

Skills

Programming	Python, bash, Git, LaTeX, Wordpress, Microsoft Office, Google Suites, html5, Matlab, Mathematica
Astronomy Software	TEMPO, TEMPO2, PSRCHIVE, PINT, PRESTO, Peasoup
Telescope Observing	Trained for remote observing with the Green Bank Telescope, Trained to operate Celestron Computerized Telescopes

Honors & Awards

May 2020	**Graduate Scholarship**, O. Rex Ford Scholarship in Physics	*WVU*
Nov. 2019	**EQT Corporation's Good Neighbors Award**, for the Physics & Astronomy Graduate Student Organization Outreach Committee	*WVU*
2016-2019	**Graduate Fellow**, WVU STEM Mountain of Excellence Graduate Fellowship	*WVU*
Jan. 2016	**AAS Chambliss Award**, 227th Meeting American Astronomical Society	*Orlando, FL*
June 2014	**Undergraduate Research Fellow**, NASA New York Space Grant	*Union College*

Talks

A Guide for Using Dead Stars to Find Black Holes: Detecting Gravitational Waves with Pulsar Timing Arrays — *Schenectady, NY*

Union College Physics & Astronomy Virtual Colloquium Speaker - Invited — *April 2020*

Exploring Frequency Dependent Effects with the Pulsar Signal Simulator — *Orlando, FL*

The North American Nanohertz Gravitational Wave Observatory Spring Meeting — *March 2020*

Exploring Frequency Dependent Effects with the Pulsar Signal Simulator — *Ithaca, NY*

The North American Nanohertz Gravitational Wave Observatory Fall Meeting — *October 2019*

Timing Error Budget: Characterizing White Noise in Long Observations of NANOGrav Pulsars — *Albuquerque, NM*

The International Pulsar Timing Array Meeting — *June 2018*

Outreach

Astrobites *WVU*

Astrobites Contributing Writer *Jan. 2020 - Present*

- Wrote summaries of technical research papers in astronomy and astrophysics to be accessible to undergraduate physics and astronomy students.
- Assisted in peer review of other writers summaries to check for clarity, accessibility, and formatting.

Physics Demonstrator *WVU*

Selected Science Outreach Events *2016-Present*

- Yuri's Night at West Virginia University, March 2019, Morgantown, WV
- A Day in the Park STEM Festival, Oct. 2019-20, The NASA/Katherine Johnson IV&V Education Resource Center, Fairmont, WV
- Spark! Imagination and Science Center's Space Day, March 2017-19, Morgantown, WV
- Mountain State Invitational STEM Carnival, July 2019, Fairmont, WV
- Kindergarten STEM Demonstrations at North Elementary School, April 2019, Morgantown, WV
- West Virginia Alliance for STEM & the Arts Film Festival, Feb. 2019, Huntington, WV
- Maker Night at Skyview Elementary School, Oct. 2018, Morgantown, WV
- Spark! Imagination and Science Center's Science Day, Oct. 2016-18, Morgantown, WV
- STEM Night at West Preston Elementary School, Nov. 2017, Reedsville, WV
- Celebrating Einstein at West Virginia University, April 2017, Morgantown, WV

Adopt-a-Physicist

Volunteer Physicist *Fall 2018, 2020*

- Ran a message board for three different high school physics classes to answer questions students asked about physics and research for three weeks.

WVU Physics and Astronomy "So You Want to do Outreach" Workshop *Morgantown, WV*

WVU Department of Physics and Astronomy *April 2019, Feb. 2020*

- Organized and ran a short workshop for members of the WVU Department of Physics & Astronomy teaching best outreach practices and showing many ways to get involved in science outreach.
- Workshop activities included group discussions, and small group practice demonstration presentations.

WVU Community Physics Festival *Morgantown, WV*

WVU Department of Physics and Astronomy *July 2019*

- Co-founded the first WVU Department of Physics and Astronomy Community Day where we offered free laboratory tours, planetarium shows, pubic lectures, and demonstrations to the public.
- Co-managed 28 volunteers to help with various aspects of the event.
- Co-organized and helped run public lectures and physics demonstrations for about 300 attendees over five hours.

American Astronomical Society Ambassadors Workshop *Seattle, WA*

233rd American Astronomical Society Meeting *Jan. 2019*

- Attended the Ambassadors Workshop to improve outreach skills and start building a network of outreach advice and materials.

Telescope Manager *Morgantown, WV*

WVU Department of Physics and Astronomy *Aug. 2018-2019*

- Fabricated and managed a program where certified members of the WVU community could borrow small department-owned telescopes for personal or professional activities.
- Ran telescope certification workshops to teach members of the WVU community proper telescope use and care.
- Fixed STT-8300 CCD camera to be used for undergraduate astronomy courses and astronomy outreach.

Pulsar Search Collaboratory Mentor *Green Bank, WV*

Pulsar Search Collaboratory Summer Camp *July 2018*

- Taught and mentored high school students about the basics of pulsars and pulsar research.
- Developed and taught a pulsar research project for high school students to use standard analysis software to analyze data they took.

Service

WVU Physics & Astronomy Graduate Student Organization *WVU*

President, Secretary, Outreach Chair, and Graduate Student Member *August 2016 - Present*

- Attended monthly meetings to discuss the goings-on of the physics & astronomy department and address issues graduate students have.
- Served as Outreach Committee Chair, organizing and helping with organization outreach events from Sept. 2016-2017 and from Sept. 2019-2020.
- Served as organization President, organizing meetings and addressing graduate student problems from Sept. 2017-2018.
- Served as organization Secretary, sending communications, organizing elections, and taking meeting minutes, from Sept. 2018-2019.

Graduate Student Mentoring *WVU*

Peer Mentor *May 2020 - Present*

- Served as a peer mentor for incoming first year graduate students, starting after they accept a place in the program.
- Answered questions about research, graduate school, and life in the surrounding area over email, as well as during check-in meetings every two weeks.

WVU APS-IDEA Team *WVU*

Graduate Student Member *April 2020 - Present*

- Attend bi-weekly meetings to discuss how to apply ideas from the program to issues of diversity, equity, and inclusion within the WVU Physics & Astronomy department.
- Attended first APS-IDEA's virtual workshop on shared leadership.
- Presented and led Departmental DEI journal club discussion on shared leadership.

WVU Astronomy Journal Club *WVU*

Organizer *Aug. 2019 - Present*

- Organized weekly astronomy journal club, including making sure enough papers had been selected and read and facilitating discussions.

Undergraduate Mentoring *WVU*

Graduate Student Mentor *Jan. 2019 - Present*

- Compiled processing scripts and tutorials for undergraduate students.
- Participated, and occasionally led, weekly meetings with undergraduate students to discuss their projects.
- Held remote and in-person meetings with undergraduate students and communicated over Slack and email to discuss results or issues in a timely manner.

Undergraduate Remote Summer Research Program *WVU*

Graduate Student Mentor *June 2020 - August 2020*

- Conceptualized and organized potential projects for undergraduate summer research students.
- Participated in weekly meetings with undergraduate summer research students to discuss their projects.
- Held remote one-on-one meetings with students when necessary to check in and help address specific issues.

Student Workshop Organizing Committee - NANOGrav Spring 2020 *Orlando, FL*

Committee Member *March 2020*

- Helped to plan the student workshop for the NANOGrav Spring meeting, including talks, speakers, workshop exercises, and social activities.
- Presented a talk introducing students to pulsar timing and led a workshop activity where students practiced timing pulsars.

Teaching

ASTR 106: Introductory Astronomy Lecture *WVU*

with Dr. Kathryn Williamson *Aug. 2016 - May. 2019*

- Ran a weekly help center to tutor students on lecture concepts, assist with homework sets, and prepare for exams.
- Helped students use and analyze data from Skynet facilities including Cerro Tololo Inter-American Observatory (CTIO).
- Assisted with lecture demonstrations to help teach core class concepts to students.
- Substitute taught full lecture classes when needed.

ASTR 107: Introductory Astronomy Lab *WVU*

with Dr. Kathryn Williamson *Aug. 2017 - May. 2018*

- Assisted with one laboratory experiment each semester requiring students to operate and observe using a 16-in. Celestron telescope.
- Substitute taught a laboratory experiment to teach students how to use data they had taken with Skynet facilities, including CTIO. to look for asteroids.

Professional Memberships

National Science Policy Network

Early Career Scientist Member *Oct. 2020 - Present*

American Physical Society

Graduate Student Member *Oct. 2020 - Present*

North American Nanohertz Observatory for Gravitational Waves (NANOGrav)

Full Member *Dec. 2019 - Present*

Associate Member *Jan. 2017 - Dec. 2019*

American Astronomical Society Astronomy Ambassador's Program

Ambassador *Jan. 2019 - Present*

American Astronomical Society

Graduate Student Member *Oct. 2018 - Present*

References

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