

Brent J. Shapiro-Albert

SCIENCE WRITER & COMMUNITY ADVOCATE · UNIVERSE SANDBOX

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Education

West Virginia University

Morgantown, WV

Ph.D. in Physics and Astronomy – Thesis: *Pulsar Noise Processes and Emission Physics*

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

Work Experience

Giant Army

Remote

Science Writer & Community Advocate

March 2021-Present

- Created interactive in-game guided tutorials and simulations for Universe Sandbox to educate users on topics including physics, astronomy, and cutting-edge astronomical research.
- Collaborated with management, programmers, and stakeholders, like users, to show new simulation features, evaluate and iterate on internal strategic planning, and create social media campaigns.
- Communicated between Universe Sandbox users and the development team to report bugs, share development plans, and resolve gameplay issues online and through video calls.
- Independently planned and created written blog posts with images and videos to communicate new game features and the physics and limitations of Universe Sandbox simulation.

West Virginia University

Morgantown, WV

Research Assistant with Prof. Maura McLaughlin

Aug. 2016-March 2021

- 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.

Skills

Programming

Python, Unity, Microsoft Office, Google Suites, DaVinci Resolve, GIMP bash, Git, LaTeX, Wordpress, html5

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

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), accepted for publication in *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)

Outreach

Astrobiters

WVU

Astrobiters Contributing Writer

Jan. 2020 - March 2021

- 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 writer’s summaries to check for clarity, accessibility, and formatting.

Physics Demonstrator

WVU

Selected Science Outreach Events

2016-2021

- 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, 2020-2023

- 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, public 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 - March 2021

- 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 - May 2021

- 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 - March 2021

- 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 - May 2021

- 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 - May 2021

- 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.

Talks

Let's Talk About Talking About Science

NORTHWESTERN UNIVERSITY - CIERA & REACH PROGRAM SPEAKER - INVITED

Evanston, IL

July 2023

Quantifying Radio Frequency-Dependent Effects on Precision Pulsar Timing

THE 237TH MEETING OF THE AMERICAN ASTRONOMICAL SOCIETY - DISSERTATION TALK

Virtual

Jan 2021

A Guide for Using Dead Stars to Find Black Holes: Detecting Gravitational Waves with Pulsar Timing Arrays

UNION COLLEGE PHYSICS & ASTRONOMY VIRTUAL COLLOQUIUM SPEAKER - INVITED

Schenectady, NY

April 2020

Exploring Frequency Dependent Effects with the Pulsar Signal Simulator

THE NORTH AMERICAN NANOHERTZ GRAVITATIONAL WAVE OBSERVATORY SPRING MEETING

Orlando, FL

March 2020

Exploring Frequency Dependent Effects with the Pulsar Signal Simulator

THE NORTH AMERICAN NANOHERTZ GRAVITATIONAL WAVE OBSERVATORY FALL MEETING

Ithaca, NY

October 2019

Timing Error Budget: Characterizing White Noise in Long Observations of NANOGrav Pulsars

THE INTERNATIONAL PULSAR TIMING ARRAY MEETING

Albuquerque, NM

June 2018

Teaching

ASTR 106: Introductory Astronomy Lecture

with Dr. Kathryn Williamson

WVU

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

with Dr. Kathryn Williamson

WVU

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.

Co-Author Publications

26. Johnson, A. D., et al., "The NANOGrav 15-year Gravitational-Wave Background Analysis Pipeline", *The Astrophysical Journal Letters*, arXiv:2306.16223 (2023)

25. Bécsy, B., et al., "How to Detect an Astrophysical Nanohertz Gravitational Wave Background", *The Astrophysical Journal*, 959 (1) 1 (2023)

24. Agazie, G., et al., "The NANOGrav 15 yr Data Set: Search for Anisotropy in the Gravitational-wave Background", *The Astrophysical Journal Letters*, 956 (1) L3 (2023)

23. Agazie, G., et al., "The NANOGrav 15-year data set: Search for Transverse Polarization Modes in the Gravitational-Wave Background", arXiv:2310.12138 (2023)

22. Agazie, G., et al., "Comparing recent PTA results on the nanohertz stochastic gravitational wave background", arXiv:2309.00693 (2023), submitted to *The Astrophysical Journal Letters*

21. Agazie, G., et al., "The NANOGrav 15 yr Data Set: Constraints on Supermassive Black Hole Binaries from the Gravitational-wave Background", *The Astrophysical Journal Letters*, 951 (2) L37 (2023)

20. Arzoumanian, Z., et al., "The NANOGrav 12.5 yr Data Set: Bayesian Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries", *The Astrophysical Journal Letters*, 951 (2) L28 (2023)

19. Agazie, G., et al., “The NANOGrav 15 yr Data Set: Detector Characterization and Noise Budget”, *The Astrophysical Journal Letters*, 951 (1) L10 (2023)
18. Agazie, G., et al., “The NANOGrav 15 yr Data Set: Evidence for a Gravitational-wave Background”, *The Astrophysical Journal Letters*, 951 (1) L8 (2023)
17. Agazie, G., et al., “The NANOGrav 15 yr Data Set: Observations and Timing of 68 Millisecond Pulsars”, *The Astrophysical Journal Letters*, 951 (1) L9 (2023)
16. Afzal, A., et al., “The NANOGrav 15 yr Data Set: Search for Signals from New Physics”, *The Astrophysical Journal Letters*, 951 (1) L11 (2023)
15. Falxa, M., et al., “Searching for continuous Gravitational Waves in the second data release of the International Pulsar Timing Array”, *MNRAS*, 521 4 (2023)
14. Jennings, R. J., et al., “An unusual pulse shape change event in PSR J1713+0747 observed with the Green Bank Telescope and CHIME”, arxiv:2210.12266 (2023)
13. Antoniadis, J., et al., “The International Pulsar Timing Array second data release: Search for an isotropic gravitational wave background”, *MNRAS*, 510 4 (2022)
12. Arzoumanian, Z., et al., “Searching for Gravitational Waves from Cosmological Phase Transitions with the NANOGrav 12.5-Year Dataset”, *Physical Review Letters*, 127 25 (2021)
11. Arzoumanian, Z., et al., “The NANOGrav 12.5-year Data Set: Search for Non-Einsteinian Polarization Modes in the Gravitational-wave Background”, *The Astrophysical Journal Letters*, 923 (2) L22 (2021)
10. Fonseca, E. F., et al. “Refined Mass and Geometric Measurements of the High-mass PSR J0740+6620,” *The Astrophysical Journal Letters*, 915 (2) L12 (2021)
9. Hazboun et al., “The Pulsar Signal Simulator: A Python package for simulating radio signal data from pulsars,” *Journal of Open Source Software*, 6(58), 2757, (2021)
8. Arzoumanian, Z., et al., “The NANOGrav 11yr Data Set: Limits on Supermassive Black Hole Binaries in Galaxies within 500Mpc”, *The Astrophysical Journal*, 914 (2) 121 (2021)
7. Turner, J. E., McLaughlin, M. A., Cordes, J. M., Lam, M. T., **Shapiro-Albert, B. J.**, Stinebring, D. R., et al., “The NANOGrav 12.5-Year Data Set: Monitoring Interstellar Scattering Delays”, *The Astrophysical Journal*, 917 (1) 10 (2021)
6. Pol, N. S., et al., “Astrophysics Milestones For Pulsar Timing Array Gravitational Wave Detection”, *The Astrophysical Journal Letters*, 911 (2) L34 (2021)
5. Arzoumanian, Z., et al., “The NANOGrav 12.5-year Data Set: Search For An Isotropic Stochastic Gravitational-Wave Background”, *The Astrophysical Journal Letters*, 905 (2) L34 (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”, *The Astrophysical Journal Supplement Series*, 252 (1) 1 (2021)
2. Alam, Md F., et al., “The NANOGrav 12.5-year Data Set: Observations and Narrowband Timing of 47 Millisecond Pulsars”, *The Astrophysical Journal Supplement Series*, 252 (1) 4 (2021)
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)

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

Honors & Awards

Dec. 2020	Graduate Scholarship , WVU Foundation Distinguished Doctoral Scholarship	WVU
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

Professional Memberships

National Science Policy Network

EARLY CAREER SCIENTIST MEMBER	Oct. 2020 - May 2021
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American Physical Society

GRADUATE STUDENT MEMBER	Oct. 2020 - May 2021
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North American Nanohertz Observatory for Gravitational Waves (NANOGrav)

LEGACY MEMBER	May 2021 - Present
FULL MEMBER	Dec. 2019 - May 2021
ASSOCIATE MEMBER	Jan. 2017 - Dec. 2019

American Astronomical Society Astronomy Ambassador's Program

AMBASSADOR	Jan. 2019 - May 2021
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American Astronomical Society

GRADUATE STUDENT MEMBER	Oct. 2018 - May 2021
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References

Maura McLaughlin 304-293-4812 maura.mclaughlin@mail.wvu.edu	Department of Physics and Astronomy White Hall, Box 6315, West Virginia University Morgantown, WV 26506-6315
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