

Brent J. Shapiro-Albert

PH.D. CANDIDATE · PHYSICS AND ASTRONOMY

Department of Physics and Astronomy

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Education

West Virginia University

Ph.D. in Physics and Astronomy

M.S. in Physics and Astronomy

Advisor - Maura McLaughlin

Morgantown, WV

August 2016 - May 2021

August 2016 - December 2018

Union College

B.S. in Physics; Minor in Mathematics; *magna cum laude*

Schenectady, NY

September 2012 - June 2016

Research Experience

West Virginia University

Research Assistant with Prof. Maura McLaughlin

Morgantown, WV

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

Summer Undergraduate Researcher with Prof. James Cordes

Ithaca, NY

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

Summer Undergraduate Researcher with Prof. Jonathan Marr

Schenectady, NY

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.

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

Lead Author Publications

3. **Shapiro-Albert, B. J.**, Hazboun, J. S., Baker, P. T., Pennucci, T. T., McLaughlin, M. A., Demorest, P. B., “A Study in Frequency Dependent Effects on Precision Pulsar Timing Parameters with the Pulsar Signal Simulator,” *in prep*, to be 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

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”, 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)
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)
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)

Skills

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

Honors & Awards

2019-2020	Graduate Scholarship , O. Rex Ford Scholarship in Physics	WVU
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

Outreach

Astrobites

WVU

Astrobites Contributing Writer

Jan. 2020 - Present

- Wrote summaries of technical research papers in astronomy in 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.

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.

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.

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

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 - 2020

References

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