

Jacob Eli Turner

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EDUCATION

West Virginia University

Ph.D. in Physics

Advisor: Maura McLaughlin

Morgantown, WV, USA

Aug 2018 – Aug 2023 (Defended)/Dec 2023 (Conferred)

Oberlin College

B.A. with Honors in Physics

Advisor: Dan Stinebring

Oberlin, OH, USA

Aug 2013 – May 2017

PROFESSIONAL EMPLOYMENT AND RESEARCH EXPERIENCE

Green Bank Observatory

Postdoctoral Fellow

Green Bank, WV, USA

August 2023–Present

Using cyclic spectroscopy to study the small-scale structure of the Milky Way via pulsar scintillation. Assisting in the development and testing of the world's first (and currently only) cyclic spectroscopy telescope backend. Training Green Bank Telescope observers, reviewing technical justifications for observing proposals. Serving as the on-call scientist for observations, organizing colloquia and lunch talks. Supervised by Ryan Lynch.

West Virginia University, Department of Physics & Astronomy

Graduate Research Assistant

Graduate Teaching Assistant

Visiting Scholar

Morgantown, WV, USA

2019–2023

2018–2019

2018

University of Wisconsin-Milwaukee, Department of Physics

Research Analyst

Milwaukee, WI, USA

2017

California Institute of Technology, Department of Astronomy

Summer Research Intern, Visiting Undergraduate Research Program

Pasadena, CA, USA

2016

Oberlin College, Department of Physics & Astronomy

Drop-In Tutor

Undergraduate Research Assistant

Undergraduate Teaching Assistant

Oberlin, OH, USA

2017

2015–2017

2015

PUBLICATIONS

(32 publications, 6 lead-author)

[NASA ADS Page](#)

NOTE: Authors with asterisks indicate students ranging from high school to graduate school working under my supervision

Lead-Author Publications

6. [Pulsar Cyclic Spectroscopy in the Partial–Deconvolution Regime: Benefits & Limitations](#)

Turner, J. E., Dolch, T., Demorest, P. B., Lynch R. S., Stinebring, D. R., Jessup C., Jones, N., and Scheithauer, C., 2025, ApJ, 989, 228

5. [The Pulsar Science Collaboratory: Multi-Epoch Scintillation Studies of Pulsars](#)

Turner, J. E., Lebron Medina, J. G. *, Zelensky, Z. *, Gustavson, K. A., Marx, J., Kothapalli, M. *, Cruz Vega, L. D. *, Lee, A. *, Figueroa, C. B. *, Reichart, D. E., Haislip, J. B., Kouprianov, V. V., White, S., Ghigo, F., Heatherly, S. A., and McLaughlin, M. A., 2024, ApJ, 977, 205

4. [A Cyclic Spectroscopy Scintillation Study of PSR B1937+21 I. Demonstration of Improved Scintillometry](#)

Turner, J. E., Dolch, T., Cordes, J. M., Ocker, S. K., Stinebring, D. R., Chatterjee, S., McLaughlin, M. A., Catlett, V. E., Jessup C., Jones, N., and Scheithauer, C., 2024, ApJ, 972, 16

3. [A Simultaneous Dual-Frequency Scintillation Arc Survey of Six Bright Canonical Pulsars Using the Upgraded GiantMetrewave Radio Telescope](#)
Turner, J. E., Joshi, B.C., McLaughlin, M. A., and Stinebring, D. R., 2024, ApJ, 961, 101
2. [Scattering Delay Mitigation in High Accuracy Pulsar Timing: Cyclic Spectroscopy Techniques](#)
Turner, J. E., Stinebring, D. R., McLaughlin, M. A., Archibald, A. M., Dolch, T., and Lynch, R. S., 2023, ApJ, 944, 191
1. [The NANOGrav 12.5-Year Data Set: Monitoring Interstellar Scattering Delays](#)
Turner, J. E., et al. (36 authors), 2021, ApJ, 917, 10

Other Publications

26. [The NANOGrav 15 yr Data Set: Search for Gravitational-wave Memory](#)
Agazie, G. et al., (105 authors, including Turner, J. E.), 2025, ApJ, 987, 1
25. [The NANOGrav 15 yr Data Set: Harmonic Analysis of the Pulsar Angular Correlations](#)
Agazie, G. et al., (107 authors, including Turner, J. E.), 2025, ApJ, 985, 1
24. [The NANOGrav 15 yr dataset: Posterior predictive checks for gravitational-wave detection with pulsar timing arrays](#)
Agazie, G. et al., (104 authors, including Turner, J. E.), 2025, PhRvD, 111, 4
23. [The NANOGrav 15 yr Data Set: Running of the Spectral Index](#)
Agazie, G. et al., (105 authors, including Turner, J. E.), 2025, ApJL, 978, 2
22. [The NANOGrav 15 Yr Data Set: Removing Pulsars One by One from the Pulsar Timing Array](#)
Agazie, G. et al., (105 authors, including Turner, J. E.), 2025, ApJ, 978, 2
21. [The NANOGrav 15 yr Data Set: Looking for Signs of Discreteness in the Gravitational-wave Background](#)
Agazie, G. et al., (100 authors, including Turner, J. E.), 2025, ApJ, 978, 1
20. [Scintillation Bandwidth Measurements from 23 Pulsars from the AO327 Survey](#)
Sheikh, S., Brown, G. C., MacTaggart, J., Nguyen, T., Fletcher, W. D., Jones, B. L., Koller, E., Petrus, V., Pighini, K. F., Rosario, G., Smedile, V. A., Stone, A. T., You, S., McLaughlin, M. A., Turner, J. E., Deneva, J. S., Lam, M. T., and Shapiro-Albert, B. J., 2024, ApJ, 976, 2
19. [NANOGrav 15-year gravitational-wave background methods](#)
Johnson, A. D. et al., (98 authors, including Turner, J. E.), 2024, PhRvD, 109, 10
18. [Comparing Recent Pulsar Timing Array Results on the Nanohertz Stochastic Gravitational-wave Background](#)
The International Pulsar Timing Array Collaboration, et al., (244 authors, including Turner, J. E.), 2024, ApJ, 966, 1
17. [The NANOGrav 12.5 yr Data Set: A Computationally Efficient Eccentric Binary Search Pipeline and Constraints on an Eccentric Supermassive Binary Candidate in 3C 66B](#)
Agazie, G., et al., (89 authors, including Turner, J. E.), 2024, ApJ, 963, 2
16. [The NANOGrav 12.5 yr Data Set: Search for Gravitational Wave Memory](#)
Agazie, G., et al., (91 authors, including Turner, J. E.), 2024, ApJ, 963, 1
15. [How to Detect an Astrophysical Nanohertz Gravitational Wave Background](#)
Bécsy, B., et al., (96 authors, including Turner, J. E.), 2023, ApJ, 959, 1
14. [The NANOGrav 15 yr Data Set: Search for Anisotropy in the Gravitational-wave Background](#)
Agazie, G., et al., (93 authors, including Turner, J. E.), 2023, ApJL, 956, 1
13. [The NANOGrav 15 yr Data Set: Constraints on Supermassive Black Hole Binaries from the Gravitational-wave Background](#)
Agazie, G., et al., (99 authors, including Turner, J. E.), 2023, ApJL, 952, 2
12. [The NANOGrav 15 yr Data Set: Bayesian Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries](#)
Agazie, G., et al., (99 authors, including Turner, J. E.), 2023, ApJL, 951, 2

11. [The NANOGrav 15 yr Data Set: Search for Signals from New Physics](#)
Afzal, A., et al., (124 authors, including **Turner, J. E.**), 2023, ApJL, 951, 1
10. [The NANOGrav 15 yr Data Set: Detector Characterization and Noise Budget](#)
Agazie, G., et al., (92 authors, including **Turner, J. E.**), 2023, ApJL, 951, 1
9. [The NANOGrav 15 yr Data Set: Observations and Timing of 68 Millisecond Pulsars](#)
Agazie, G., et al., (101 authors, including **Turner, J. E.**), 2023, ApJL, 951, 1
8. [The NANOGrav 15 yr Data Set: Evidence for a Gravitational-wave Background](#)
Agazie, G., et al., (115 authors, including **Turner, J. E.**), 2023, ApJL, 951, 1
7. [Searching for continuous Gravitational Waves in the second data release of the International Pulsar Timing Array](#)
Falxa, M., et al., (127 authors, including **Turner, J.**), 2023, MNRAS, 521, 4
6. [Searching For Gravitational Waves From Cosmological Phase Transitions with the NANOGrav 12.5-year Dataset](#)
Arzoumanian, Z., et al., (64 authors, including **Turner, J. E.**), 2021, PRL, 127, 251302
5. [The NANOGrav 12.5-year data set: Search for Non-Einsteinian Polarization Modes in the Gravitational-Wave Background](#)
Arzoumanian, Z., et al., (71 authors, including **Turner, J. E.**), 2021, ApJL, 923, L22
4. [The NANOGrav 12.5-year Data Set: Search For An Isotropic Stochastic Gravitational-Wave Background](#)
Arzoumanian, Z., et al. (61 authors, including **Turner, J. E.**), 2020, ApJ, 905, L34
3. [The NANOGrav 11-Year Data Set: Evolution of Gravitational Wave Background Statistics](#)
Hazboun, J. S., et al. (63 authors, including **Turner, J. E.**), 2020, ApJ, 890, 108
2. [The NANOGrav 11 yr Data Set: Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries](#)
Aggarwal, K., et al. (63 authors, including **Turner, J. E.**), 2019, ApJ, 880, 116
1. [A Second Chromatic Timing Event of Interstellar Origin toward PSR J1713+0747](#)
Lam, M. T., Ellis, J. A., Grillo, G., Jones, M. L., Hazboun, J. S., Brook, P. R., **Turner, J. E.**, et al. (37 authors), 2018, ApJ, 861, 132

INVITED TALKS

Scintillometry Workshop 2025 (McGill University)	Montreal, Quebec, Canada
<i>Exploring The Benefits and Feasibility of Cyclic Spectroscopy in Different Deconvolution Regimes</i>	October 2025
Oregon State University	Corvallis, OR, USA
<i>Pulsar Cyclic Spectroscopy as a Probe of the Interstellar Medium & Gravitational Waves</i>	August 2025
GRASP Lecture Series (Remote)	Cape Town, South Africa
<i>Pulsar Cyclic Spectroscopy as a Probe of the Interstellar Medium & Gravitational Waves</i>	August 2025
Green Bank Observatory Community Zoom	Green Bank, WV, USA
<i>An Extreme Scattering Event Towards PSR B2310+42</i>	June 2025
Georgia State University	Atlanta, GA, USA
<i>Pulsar Cyclic Spectroscopy as a Probe of the Interstellar Medium & Gravitational Waves</i>	April 2025
University of Kansas (Remote)	Lawrence, KS, USA
<i>Pulsar Cyclic Spectroscopy as a Probe of the Interstellar Medium & Gravitational Waves</i>	April 2025
Scintillometry Workshop 2024 (Florida Space Institute)	Orlando, FL, USA
<i>The Green Bank Observatory Real-Time Cyclic Spectroscopy Backend</i>	October 2024

Florida Space Institute <i>Using Cyclic Spectroscopy to Study the Interstellar Medium with Pulsar Timing Arrays</i>	Orlando, FL, USA September 2024
Florida Institute of Technology <i>Using Cyclic Spectroscopy to Study the Interstellar Medium with Pulsar Timing Arrays</i>	Orlando, FL, USA September 2024
University of Dallas <i>Two Paths to Radio Astronomy</i>	Dallas, TX, USA April 2024
McDaniel College <i>Characterizing the Interstellar Medium through Radio Observations of Pulsars</i>	Westminster, MD, USA November 2023
Green Bank Observatory (Remote) <i>Correcting for Interstellar Scattering Delays in Millisecond Pulsars</i>	Green Bank, WV, USA November 2020
Oberlin College <i>Detecting Gravitational Waves with Pulsars: Removing the Effects of the Interstellar Medium</i>	Oberlin, OH, USA April 2017

CONTRIBUTED CONFERENCE TALKS

International Pulsar Timing Array Conference <i>Pulsar Cyclic Spectroscopy in the Partial-Deconvolution Regime: Benefits & Limitations</i>	Caltech June 2025
National Radio Astronomy Observatory/Green Bank Observatory Postdoc Symposium 2024 <i>An Extreme Scattering Event Towards PSR B2310+42</i>	NRAO May 2025
Green Bank Observatory Internal Symposium <i>An Extreme Scattering Event Towards PSR B2310+42</i>	Green Bank Observatory May 2025
North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference <i>The Pulsar Science Collaboratory: Multi-Epoch Scintillation Studies</i>	University of Michigan October 2024
International Pulsar Timing Array Conference <i>Cyclic Spectroscopy Studies of the ISM in PTA Observing Setups</i>	Sexton Center of Astrophysics June 2024
Fields, Flows, and Filaments in the Magnetic ISM Workshop <i>Cyclic Spectroscopy Studies of the ISM in PTA Observing Setups</i>	Stanford University May 2024
National Radio Astronomy Observatory/Green Bank Observatory Internal Symposium <i>The Pulsar Science Collaboratory: Multi-Epoch Scintillation Studies of Pulsars</i>	Green Bank Observatory May 2024
National Radio Astronomy Observatory/Green Bank Observatory Internal Symposium <i>The Pulsar Science Collaboratory: Multi-Epoch Scintillation Studies of Pulsars</i>	Green Bank Observatory May 2024
National Radio Astronomy Observatory/Green Bank Observatory Postdoc Symposium <i>Using Cyclic Spectroscopy in High-Accuracy Pulsar Timing Efforts</i>	Green Bank Observatory March 2024
Scintillometry Workshop 2023 <i>Using Cyclic Spectroscopy in High-Accuracy Pulsar Timing Efforts</i>	ASIAA November 2023
North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference <i>Scattering Delay Mitigation in High Accuracy Pulsar Timing: Cyclic Spectroscopy Techniques</i>	Oregon State University March 2023
241 st American Astronomical Society Meeting <i>Characterizing and Mitigating Scattering Delays in Radio Observations of Pulsars</i>	Seattle, WA, USA January 2023

North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference
The NANOGrav 12.5-Year Data Set: Monitoring Interstellar Scattering Delays

Cornell University
October 2019

International Pulsar Timing Array Conference
The NANOGrav 12.5-Year Data Set: Monitoring Interstellar Scattering Delays

NCRA-TIFR
June 2019

CONFERENCE POSTERS

Scintillometry Workshop 2024
Evidence of an Extreme Scattering Event towards PSR J2313+4253

Florida Space Institute
October 2024

243rd American Astronomical Society Meeting
Cyclic Spectroscopy-Aided Studies of the ISM in PTA Observing Setups

New Orleans, LA, USA
January 2024

North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference
Cyclic Spectroscopy-Aided Studies of the ISM in PTA Observing Setups

UBC
October 2023

International Pulsar Timing Array Conference
The NANOGrav 12.5-Year Data Set: Monitoring Interstellar Scattering Delays

Albuquerque, NM, USA
June 2018

NANOGrav Physics Frontiers Center Reverse Site Visit
Preliminary Continuous Wave Limits from NANOGrav 11-Year Dataset

West Virginia University
October 2017

NANOGrav Physics Frontiers Center Reverse Site Visit
NANOGrav Timing Pipeline: Adding a Scattering Delay Correction

West Virginia University
October 2017

TEACHING EXPERIENCE

Green Bank Observatory
Lecturer/Research Mentor
Pulsar Science Collaboratory Camp

Green Bank, WV, USA
August 2025

Green Bank Observatory
Lecturer/Observing Mentor
Green Bank Telescope Semester 24B Observer Training

Green Bank, WV, USA
October 2024

Green Bank Observatory
Lecturer/Research Mentor
Green Bank Observatory Single Dish Summer School

Green Bank, WV, USA
July 2024

Green Bank Observatory
Lecturer/Research Mentor
Pulsar Science Collaboratory Camp

Green Bank, WV, USA
June 2024

Green Bank Observatory
Lecturer/Observing Mentor
Green Bank Telescope Semester 24A Observer Training

Green Bank, WV, USA
February 2024

West Virginia University
Guest Lecturer
ASTR 700: Radio Astronomy

Morgantown, WV, USA
Spring 2020

West Virginia University
Graduate Teaching Assistant
PHYS 102L: Introductory Physics 2 Laboratory

Morgantown, WV, USA
Spring 2019

West Virginia University
Graduate Teaching Assistant
PHYS 101L: Introductory Physics 1 Laboratory

Morgantown, WV, USA
Fall 2018

Oberlin College
Drop-in Tutor
PHYS 068: Energy Science & Technology

Oberlin, OH, USA
Spring 2017

Oberlin College
Undergraduate Teaching Assistant
PHYS 104: Elementary Physics II Laboratory

Oberlin, OH, USA
Spring 2015

STUDENT RESEARCH MENTORSHIP SUPERVISION

Pulsar Science Collaboratory Research Team Leader, Scintillation Measurement Project 2021–Present

— Students: Juan G. Lebron Medina (PostBac Student/Graduate Student, University of Puerto Rico-Mayaguez), Zachary Zelensky (PostBac Student, Penn State/Graduate Student, Texas Tech), Manvith Kothapalli (High School Student/Undergrad, University of Washington-Seattle), Luis D. Cruz Vega (Undergrad, University of Puerto Rico-Mayaguez), Alexander Lee (Undergrad, University of Washington-Seattle), Caryelis B. Figueroa (Undergrad/Graduate Student, University of Puerto Rico-Mayaguez), Martina Salichs-Maidana (Undergrad, University of Puerto Rico-Mayaguez), Sanjit Subramaniam (High School Student), Katelyn Bryant (Undergrad, University of Arkansas), Dhruva Kalyani (Undergrad, University of Wisconsin-Madison), Adrian Hsu (Middle School Student/High School Student), Lahari Ganti (Middle School Student)

- Authored Peer-Reviewed Paper With 6 Students
- Authored Successful Green Bank Telescope Observing Proposal With 5 Students (Awarded 50 Hours)
- Authored Successful Green Bank Telescope Observing Proposal With 1 Student (Awarded 40 Hours)

Undergraduate Senior Thesis Project Co-Mentor 2024–2025

- Katelyn Bryant (Undergrad, University of Arkansas)

Green Bank Observatory REU Summer Student Mentor 2024-2025

- Students: Rachel King (West Virginia University), Dhruva Kalyani (University of Wisconsin-Madison)

OUTREACH

Pocahontas County Science Fair Judge February 2024
Scientist Presenter for SETI tours at Green Bank Observatory 2024–Present
Adopt-A-Physicist 2023–Present
Skype A Scientist (over 20 talks given to various elementary, middle, and high schools) 2020–Present

OUTREACH TALKS

Rose City Astronomers August 2025
Neutron Stars: Nature's Most Versatile Laboratories

Astronomy on Tap Corvallis August 2025
Neutron Stars: Nature's Most Versatile Laboratories

Green Bank Observatory PING (Physicists Inspiring the Next Generation) Camp July 2025
Neutron Stars: Nature's Most Versatile Laboratories

West Virginia Governor's STEM Institute July 2025
Neutron Stars: Nature's Most Versatile Laboratories

Green Bank Observatory PING (Physicists Inspiring the Next Generation) Camp July 2024
Using Pulsars to Explore the Universe

Pulsar Science Collaboratory (PSC) Talk Series April 2024
Using Pulsars to Study the Interstellar Medium

TELESCOPE TIME ALLOCATIONS

Green Bank Telescope <i>Cyclic Spectroscopy of Scattered NANOGrav Pulsars: Pilot for CS Observations</i>	GBT25B-264, 45 hours Observation PI
Green Bank Telescope <i>Tracking A Multiple Order-of-Magnitude Change in Scintillation Towards A Pulsar</i>	GBT25B-040, 40 hours Observation PI
Green Bank Telescope <i>Multi-Hour Scintillation Studies by the PSC</i>	GBT24B-040, 50 hours Observation PI
Green Bank Telescope <i>Cyclic Spectroscopy of Three Pulsars with Considerable Pulse Broadening</i>	GBT24B-039, 45 hours Observation PI
Green Bank Telescope <i>Constraining the Scintillation Constant C_1 in a Scatter-Broadened Pulsar</i>	GBT24A-475, 45 hours Observation PI
Upgraded Giant Metrewave Radio Telescope <i>Examining the Relation Between Scintillation Arc Curvature and Asymmetry</i>	44_035, 25 hours Observation PI
Upgraded Giant Metrewave Radio Telescope <i>Scintillation Arcs and Dispersion Measure Changes: A Follow-up to Pilot Observations</i>	40_019, 24 hours Observation PI
Green Bank Telescope <i>A Cyclic Spectroscopy Pilot Program: Baseband Observations of Three MSPs</i>	GBT20A-588, 12 hours
Upgraded Giant Metrewave Radio Telescope <i>Scintillation Arcs and Dispersion Measure Changes: A Pilot Project</i>	38_041, 24 hours Observation PI

PROFESSIONAL COMMUNITY SERVICE/LEADERSHIP

Journal Referee <i>The Astrophysical Journal</i>	2025–Present
Observing Proposal Scientific Reviewer <i>Upgraded Giant Metrewave Radio Telescope</i>	2024–Present
LOC <i>National Radio Astronomy Observatory/Green Bank Observatory Postdoc Symposium</i>	2024
Colloquium/Science Lunch Talk Organizer <i>Green Bank Observatory Postdoc Symposium</i>	2023–Present
Moderator <i>North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference</i>	2022
Moderator <i>North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference</i>	2021

MEDIA APPEARANCES

Green Bank Observatory Students Contribute to New Understanding of “Twinkling” Pulsars	2025
West Virginia University WVU faculty, students contribute to cosmic breakthrough uncovering evidence of low-frequency gravitational waves	2023

PANELS

Walter Payton College Preparatory High School
Alumni STEM Panel

March 2024

AWARDED GRANTS

West Virginia University Eberly College of Arts & Sciences Travel Grant
3V459 A. Keith and Sandra F. McClung Enrichment Endowment
Principal Investigator

2022

\$600

HONORS AND AWARDS

Green Bank Observatory
Green Bank Observatory Postdoctoral Fellowship

2023-Present

West Virginia University
Graduate Research Fellowship

2019-2023

West Virginia University
Graduate Teaching Fellowship

2018-2019

Oberlin College
Oberlin College Department of Physics & Astronomy Honors Program

2016-2017

Oberlin College
John Frederick Oberlin Scholarship

2013-2017

ORGANIZATIONS

- North American Nanohertz Observatory for Gravitational Waves (NANOGrav): *Full Member*
- International Pulsar Timing Array (IPTA): *Full Member*
- American Astronomical Society: *Full Member*

SKILLS

- **Programming Languages:** Python, Bash, C shell, Unix/Linux, HTML
 - **Scientific Python Packages:** Numpy, Scipy, Matplotlib, Astropy, PyCyc, Scintools, Pypulse
- **Software Packages:** Simulink, \LaTeX , TEMPO/TEMPO2, PSRCRIVE, DSPSR, Slurm, Jupyter/IPython