Jacob Eli Turner

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Education

West Virginia University — Morgantown, WV, USA
Ph.D. in Physics — Aug 2018 – Aug 2023 (Defended)/Dec 2023 (Conferred)
Advisor: Maura McLaughlin

Oberlin College — Oberlin, OH, USA
B.A. with Honors in Physics — Aug 2013 – May 2017
Advisor: Dan Stinebring

Professional Employment and Research Experience

Green Bank Observatory — Green Bank, WV, USA
Postdoctoral Fellow — 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 and 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 — Morgantown, WV, USA
Graduate Research Assistant — 2019–2023
Graduate Teaching Assistant — 2018–2019
Visiting Scholar — 2018

University of Wisconsin-Milwaukee, Department of Physics — Milwaukee, WI, USA
Research Analyst — 2017

California Institute of Technology, Department of Astronomy — Pasadena, CA, USA
Summer Research Intern, Visiting Undergraduate Research Program — 2016

Oberlin College, Department of Physics & Astronomy — Oberlin, OH, USA
Drop-In Tutor — 2017
Undergraduate Research Assistant — 2015–2017
Undergraduate Teaching Assistant — 2015

Publications

(32 total, 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
Exploring The Benefits and Feasibility of Cyclic Spectroscopy in Different Deconvolution Regimes — October 2025

Oregon State University — Corvallis, OR, USA
Pulsar Cyclic Spectroscopy as a Probe of the Interstellar Medium & Gravitational Waves — August 2025

GRASP Lecture Series (Remote) — Cape Town, South Africa
Pulsar Cyclic Spectroscopy as a Probe of the Interstellar Medium & Gravitational Waves — August 2025

Green Bank Observatory Community Zoom — Green Bank, WV, USA
An Extreme Scattering Event Towards PSR B2310+42 — June 2025

Georgia State University — Atlanta, GA, USA
Pulsar Cyclic Spectroscopy as a Probe of the Interstellar Medium & Gravitational Waves — April 2025

University of Kansas (Remote) — Lawrence, KS, USA
Pulsar Cyclic Spectroscopy as a Probe of the Interstellar Medium & Gravitational Waves — April 2025

Scintillometry Workshop 2024 (Florida Space Institute) — Orlando, FL, USA
The Green Bank Observatory Real-Time Cyclic Spectroscopy Backend — October 2024

Florida Space Institute — Orlando, FL, USA
Using Cyclic Spectroscopy to Study the Interstellar Medium with Pulsar Timing Arrays — September 2024

Florida Institute of Technology — Orlando, FL, USA
Using Cyclic Spectroscopy to Study the Interstellar Medium with Pulsar Timing Arrays — September 2024

University of Dallas — Dallas, TX, USA
Two Paths to Radio Astronomy — April 2024

McDaniel College — Westminster, MD, USA
Characterizing the Interstellar Medium through Radio Observations of Pulsars — November 2023

Green Bank Observatory (Remote) — Green Bank, WV, USA
Correcting for Interstellar Scattering Delays in Millisecond Pulsars — November 2020

Oberlin College — Oberlin, OH, USA
Detecting Gravitational Waves with Pulsars: Removing the Effects of the Interstellar Medium — April 2017

Contributed Conference Talks

International Pulsar Timing Array Conference — Caltech
Pulsar Cyclic Spectroscopy in the Partial–Deconvolution Regime: Benefits & Limitations — June 2025

National Radio Astronomy Observatory/Green Bank Observatory Postdoc Symposium 2024 — NRAO
An Extreme Scattering Event Towards PSR B2310+42 — May 2025

Green Bank Observatory Internal Symposium — Green Bank Observatory
An Extreme Scattering Event Towards PSR B2310+42 — May 2025

North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference — University of Michigan
The Pulsar Science Collaboratory: Multi-Epoch Scintillation Studies — October 2024

International Pulsar Timing Array Conference — Sexten Center of Astrophysics
Cyclic Spectroscopy Studies of the ISM in PTA Observing Setups — June 2024

Fields, Flows, and Filaments in the Magnetic ISM Workshop — Stanford University
Cyclic Spectroscopy Studies of the ISM in PTA Observing Setups — May 2024

National Radio Astronomy Observatory/Green Bank Observatory Internal Symposium — Green Bank Observatory
The Pulsar Science Collaboratory: Multi-Epoch Scintillation Studies of Pulsars — May 2024

National Radio Astronomy Observatory/Green Bank Observatory Internal Symposium — Green Bank Observatory
The Pulsar Science Collaboratory: Multi-Epoch Scintillation Studies of Pulsars — May 2024

National Radio Astronomy Observatory/Green Bank Observatory Postdoc Symposium — Green Bank Observatory
Using Cyclic Spectroscopy in High-Accuracy Pulsar Timing Efforts — March 2024

Scintillometry Workshop 2023 — ASIAA
Using Cyclic Spectroscopy in High-Accuracy Pulsar Timing Efforts — November 2023

North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference — Oregon State University
Scattering Delay Mitigation in High Accuracy Pulsar Timing: Cyclic Spectroscopy Techniques — March 2023

241st American Astronomical Society Meeting — Seattle, WA, USA
Characterizing and Mitigating Scattering Delays in Radio Observations of Pulsars — January 2023

North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference — Cornell University
The NANOGrav 12.5-Year Data Set: Monitoring Interstellar Scattering Delays — October 2019

International Pulsar Timing Array Conference — NCRA-TIFR
The NANOGrav 12.5-Year Data Set: Monitoring Interstellar Scattering Delays — June 2019

Conference Posters

Scintillometry Workshop 2024 — Florida Space Institute
Evidence of an Extreme Scattering Event towards PSR J2313+4253 — October 2024

243rd American Astronomical Society Meeting — New Orleans, LA, USA
Cyclic Spectroscopy-Aided Studies of the ISM in PTA Observing Setups — January 2024

North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference — UBC
Cyclic Spectroscopy-Aided Studies of the ISM in PTA Observing Setups — October 2023

International Pulsar Timing Array Conference — Albuquerque, NM, USA
The NANOGrav 12.5-Year Data Set: Monitoring Interstellar Scattering Delays — June 2018

NANOGrav Physics Frontiers Center Reverse Site Visit — West Virginia University
Preliminary Continuous Wave Limits from NANOGrav 11-Year Dataset — October 2017

NANOGrav Physics Frontiers Center Reverse Site Visit — West Virginia University
NANOGrav Timing Pipeline: Adding a Scattering Delay Correction — October 2017

Teaching Experience

Green Bank Observatory — Green Bank, WV, USA
Lecturer/Research Mentor — August 2025
Pulsar Science Collaboratory Camp

Green Bank Observatory — Green Bank, WV, USA
Lecturer/Observing Mentor — October 2024
Green Bank Telescope Semester 24B Observer Training

Green Bank Observatory — Green Bank, WV, USA
Lecturer/Research Mentor — July 2024
Green Bank Observatory Single Dish Summer School

Green Bank Observatory — Green Bank, WV, USA
Lecturer/Research Mentor — June 2024
Pulsar Science Collaboratory Camp

Green Bank Observatory — Green Bank, WV, USA
Lecturer/Observing Mentor — February 2024
Green Bank Telescope Semester 24A Observer Training

West Virginia University — Morgantown, WV, USA
Guest Lecturer — Spring 2020
ASTR 700: Radio Astronomy

West Virginia University — Morgantown, WV, USA
Graduate Teaching Assistant — Spring 2019
PHYS 102L: Introductory Physics 2 Laboratory

West Virginia University — Morgantown, WV, USA
Graduate Teaching Assistant — Fall 2018
PHYS 101L: Introductory Physics 1 Laboratory

Oberlin College Oberlin, OH, USA
Drop-in Tutor Spring 2017
PHYS 068: Energy Science & Technology

Oberlin College Oberlin, OH, USA
Undergraduate Teaching Assistant Spring 2015
PHYS 104: Elementary Physics II Laboratory

Student Research Mentorship Supervision

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

— Students: Juan G. Lebron Medina (Graduate Student, University of Puerto Rico-Mayaguez), Zachary Zelensky (Graduate Student, Texas Tech), Manvith Kothapalli (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 (Graduate Student, University of Puerto Rico-Mayaguez), Martina Salichs-Maidana (Undergrad, University of Puerto Rico-Mayaguez), Sanjit Subramaniam (High School Student), Katelyn Bryant (Graduate Student, West Virginia University), Dhruva Kalyani (Undergrad, University of Wisconsin-Madison), Adrian Hsu (High School Student), Lahari Ganti (High School Student), Kaito Hasebe (Undergrad, University of Washington-Bothell)

— 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 — GBT25B-264, 45 hours
Cyclic Spectroscopy of Scattered NANOGrav Pulsars: Pilot for CS Observations — Observation PI

Green Bank Telescope — GBT25B-040, 40 hours
Tracking A Multiple Order-of-Magnitude Change in Scintillation Towards A Pulsar — Observation PI

Green Bank Telescope — GBT24B-040, 50 hours
Multi-Hour Scintillation Studies by the PSC — Observation PI

Green Bank Telescope — GBT24B-039, 45 hours
Cyclic Spectroscopy of Three Pulsars with Considerable Pulse Broadening — Observation PI

Green Bank Telescope — GBT24A-475, 45 hours
Constraining the Scintillation Constant C_1 in a Scatter-Broadened Pulsar — Observation PI

Upgraded Giant Metrewave Radio Telescope — 44_035, 25 hours
Examining the Relation Between Scintillation Arc Curvature and Asymmetry — Observation PI

Upgraded Giant Metrewave Radio Telescope — 40_019, 24 hours
Scintillation Arcs and Dispersion Measure Changes: A Follow-up to Pilot Observations — Observation PI

Green Bank Telescope — GBT20A-588, 12 hours
A Cyclic Spectroscopy Pilot Program: Baseband Observations of Three MSPs

Upgraded Giant Metrewave Radio Telescope — 38_041, 24 hours
Scintillation Arcs and Dispersion Measure Changes: A Pilot Project — Observation PI

Professional Community Service/Leadership

Journal Referee — 2025–Present
The Astrophysical Journal

Observing Proposal Scientific Reviewer — 2024–Present
Upgraded Giant Metrewave Radio Telescope

LOC — 2024
National Radio Astronomy Observatory/Green Bank Observatory Postdoc Symposium

Colloquium/Science Lunch Talk Organizer — 2023–Present
Green Bank Observatory Postdoc Symposium

Moderator — 2022
North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference

Moderator — 2021
North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference

Media Appearances

Green Bank Observatory — 2025
Students Contribute to New Understanding of "Twinkling" Pulsars

West Virginia University — 2023
WVU faculty, students contribute to cosmic breakthrough uncovering evidence of low-frequency gravitational waves

Panels

Walter Payton College Preparatory High School — March 2024
Alumni STEM Panel

Awarded Grants

West Virginia University Eberly College of Arts & Sciences Travel Grant — 2022
3V459 A. Keith and Sandra F. McClung Enrichment Endowment — $600
Principal Investigator

Honors and Awards

Green Bank Observatory — 2023-Present
Green Bank Observatory Postdoctoral Fellowship

West Virginia University — 2019-2023
Graduate Research Assistantship

West Virginia University — 2018-2019
Graduate Teaching Assistantship

Oberlin College — 2016-2017
Oberlin College Department of Physics & Astronomy Honors Program

Oberlin College — 2013-2017
John Frederick Oberlin Scholarship

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, PSRCHIVE, DSPSR, Slurm, Jupyter/IPython