Jacob Eli Turner

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Education

- **West Virginia University** — Morgantown, WV
  Ph.D. in Physics — *Aug 2018 – Aug 2023 (Defended)/Dec 2023 (Conferred)*
  Advisor: Maura McLaughlin
- **Oberlin College** — Oberlin, OH
  B.A. with Honors in Physics — *Aug 2013 – May 2017*
  Advisor: Dan Stinebring

Publications

Harvard ADS Page

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

Lead-Author Publications

5. **The Pulsar Science Collaboratory: Multi-Epoch Scintillation Studies of Pulsars**
   Turner, J. E., Lebron Medina, J. G.*, Zelensky, Z.*, Gustavso, 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

22. **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

21. **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

20. **NANOGrav 15-year gravitational-wave background methods**
    Johnson, A. D. et al., (98 authors, including **Turner, J. E.**), 2024, PhRvD, 109, 10

19. **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

18. **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

17. **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

16. **How to Detect an Astrophysical Nanohertz Gravitational Wave Background**
Bécsy, B., et al., (96 authors, including **Turner, J. E.**), 2023, ApJ, 959, 1

15. **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

14. **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

13. **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

12. **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

11. **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

10. **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

9. **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

8. **The NANOGrav 15-year Gravitational-Wave Background Analysis Pipeline**
Johnson, A. D., et al., (96 authors, including **Turner, J. E.**), arXiv:2306.16223

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

Professional Employment and Research Experience

- August 2023–Present: **Green Bank Observatory Postdoctoral Fellow**
  Assisted in the development and testing of the world's first (and currently only) cyclic spectroscopy telescope backend, trained Green Bank Telescope observers, reviewed technical justifications for observing proposals, served as the on-call scientist for observations, organized colloquia and lunch talks. Supervised by Ryan Lynch.
  Green Bank Observatory, Green Bank, WV

- 2019–2023: **Graduate Research Assistant**
  Department of Physics & Astronomy, West Virginia University, Morgantown, WV
- 2018–2019: **Graduate Teaching Assistant**
  Introduction to Physics 1 (PHYS 101L) and Introduction to Physics 2 (PHYS 102L)
  Department of Physics & Astronomy, West Virginia University, Morgantown, WV
- 2018: **Visiting Scholar**
  Eberly College of Arts and Sciences, Department of Physics and Astronomy, West Virginia University, Morgantown, WV
- 2017: **Research Analyst**
  North American Nanohertz Observatory for Gravitational Waves/Center for Gravitation, Cosmology, and Astrophysics, College of Letters and Sciences, University of Wisconsin-Milwaukee, Milwaukee, WI
- 2017: **Drop-in Tutor**
  Energy Science and Technology (PHYS 068)
  Department of Physics & Oberlin College, Oberlin OH
- 2016: **Summer Researcher**
  Visiting Undergrad Research Program, California Institute of Technology, Pasadena, CA
- 2015-2017: **Undergraduate Research Assistant**
  Department of Physics & Astronomy, Oberlin College, Oberlin OH
- 2015: **Undergraduate Teaching Assistant**
  Elementary Physics II (PHYS 104)
  Department of Physics & Astronomy, Oberlin College, Oberlin OH

Invited Talks

- Georgia State University, *"Pulsar Cyclic Spectroscopy as a Probe of the Interstellar Medium & Gravitational Waves"*, April 2025
- University of Kansas, *"Pulsar Cyclic Spectroscopy as a Probe of the Interstellar Medium & Gravitational Waves"*, April 2025
- Scintillometry Workshop 2024 (Florida Space Institute), *"The Green Bank Observatory Real-Time Cyclic Spectroscopy Backend"*, October 2024
- Florida Space Institute, *"Using Cyclic Spectroscopy to Study the Interstellar Medium with Pulsar Timing Arrays"*, September 2024
- Florida Tech, *"Using Cyclic Spectroscopy to Study the Interstellar Medium with Pulsar Timing Arrays"*, September 2024
- University of Dallas, *"Two Paths to Radio Astronomy"*, April 2024
- McDaniel College, *"Characterizing the Interstellar Medium through Radio Observations of Pulsars"*, November 2023
- Green Bank Observatory, *"Correcting for Interstellar Scattering Delays in Millisecond Pulsars"*, November 2020
- Oberlin College, *"Detecting Gravitational Waves with Pulsars: Removing the Effects of the Interstellar Medium"*, April 2017

Contributed Conference Talks

- NRAO/GBO Postdoc Symposium 2024, *"An Extreme Scattering Event Towards PSR B2310+42"*, NRAO Charlottesville/Remote, May 2025
- GBO Internal Symposium, *"An Extreme Scattering Event Towards PSR B2310+42 "*, Green Bank Observatory, May 2025
- North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference, *"The Pulsar Science Collaboratory: Multi-Epoch Scintillation Studies"*, University of Michigan, October 2024
- International Pulsar Timing Array Conference, *"Cyclic Spectroscopy Studies of the ISM in PTA Observing Setups"*, June 2024

- Fields, Flows, and Filaments in the Magnetic ISM Workshop, *"Cyclic Spectroscopy Studies of the ISM in PTA Observing Setups"*, Stanford University, May 2024
- NRAO/GBO Internal Symposium, *"The Pulsar Science Collaboratory: Multi-Epoch Scintillation Studies of Pulsars"*, Green Bank Observatory, May 2024
- NRAO/GBO Postdoc Symposium 2024, *"Using Cyclic Spectroscopy in High-Accuracy Pulsar Timing Efforts"*, Green Bank Observatory March 2024
- Scintillometry Workshop 2023, *"Using Cyclic Spectroscopy in High-Accuracy Pulsar Timing Efforts"*, The Academia Sinica Institute of Astronomy and Astrophysics, November 2023
- North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference, *"Scattering Delay Mitigation in High Accuracy Pulsar Timing: Cyclic Spectroscopy Techniques"*, Oregon State University, March 2023
- 241st American Astronomical Society Meeting, *"Characterizing and Mitigating Scattering Delays in Radio Observations of Pulsars"*, 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"*, June 2019

Conference Posters

- Scintillometry Workshop 2024 , *"Evidence of an Extreme Scattering Event towards PSR J2313+4253"*, October 2024
- 243rd American Astronomical Society Meeting , *"Cyclic Spectroscopy-Aided Studies of the ISM in PTA Observing Setups"*, January 2024
- North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference, *"Cyclic Spectroscopy-Aided Studies of the ISM in PTA Observing Setups"*, The University of British Columbia, October 2023
- International Pulsar Timing Array Conference, *"The NANOGrav 12.5-Year Data Set: Monitoring Interstellar Scattering Delays"*, June 2018
- North American Nanohertz Observatory for Gravitational Waves Physics Frontiers Center Reverse Site Visit, *"Preliminary Continuous Wave Limits from NANOGrav 11-Year Dataset "*, West Virgnia University October 2017
- North American Nanohertz Observatory for Gravitational Waves Physics Frontiers Center Reverse Site Visit, *"NANOGrav Timing Pipeline: Adding a Scattering Delay Correction"*, West Virginia University, October 2017

Teaching Experience

- 2024: Lecturer/Research Mentor, Green Bank Observatory, *Green Bank Observatory Single Dish Summer School*
- 2024: Lecturer/Observing Mentor, Green Bank Observatory, *Green Bank Telescope Semester 24A Observer Training*
- 2020: Guest Lecturer, West Virginia University: *ASTR 700: Radio Astronomy*
- 2019: Graduate Teaching Assistant, West Virginia University: *PHYS 102L: Introductory Physics 2 Laboratory*
- 2018: Graduate Teaching Assistant, West Virginia University: *PHYS 101L: Introductory Physics 1 Laboratory*
- 2017: Drop-in Tutor, Oberlin College: *PHYS-068: Energy Science & Technology*
- 2015: Undergraduate Teaching Assistant, Oberlin College: *Physics 104: Elementary Physics II Laboratory*

Student Research Mentorship Supervision

- 2021–Present: Pulsar Science Collaboratory Research Team Leader, Scintillation Measurement Project
  - — Students: Juan G. Lebron Medina (PostBac Student/Graduate Student, UPR), Zachary Zelensky (PostBac Student, Penn State/Graduate Student, Texas Tech), Manvith Kothapalli (High School Student), Luis D. Cruz Vega (Undergrad, UPR), Alexander Lee (Undergrad, UWashington), Caryelis B. Figueroa (Undergrad/Graduate Student, UPR), Martina Salichs-Maidana (Undergrad, UPR), Sanjit Subramaniam (High School Student), Katelyn Bryant (Undergrad, University of Arkansas), Dhruva Kalyani (Undergrad, University of Wisconsin-Madison)
  - — Authored Peer-Reviewed Paper With 6 Students
  - — Authored Successful Telescope Observing Proposal With 5 Students (Awarded 50 Hours)
- 2024–2025: Undergraduate Senior Thesis Project Co-Mentor
  - — Katelyn Bryant (Undergrad, University of Arkansas)
- 2024-2025 : Green Bank Observatory REU Summer Student Mentor
  - — Students: Rachel King (West Virginia University), Dhruva Kalyani (University of Wisconsin-Madison)

Outreach

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

Outreach Talks

- Green Bank Observatory Summer Student Bootcamp, *"Using Pulsars to Study the Interstellar Medium", May 2025*
- Green Bank Observatory PING (Physicists Inspiring the Next Generation) Workshop, *"Using Pulsars to Explore the Universe", July 2024*
- Green Bank Observatory Single Dish Summer School, *"Pulsars", June 2024*
- Green Bank Observatory Summer Student Bootcamp, *"Using Pulsars to Study the Interstellar Medium", May 2024*
- Pulsar Science Collaboratory (PSC) Talk Series, *"Using Pulsars to Study the Interstellar Medium", April 2024*

Telescope Time Allocations

- Green Bank Telescope, GBT25B-264, 45 hours (Observation PI)
  Cyclic Spectroscopy of Scattered NANOGrav Pulsars: Pilot for CS Observations
- Green Bank Telescope, GBT25B-040, 40 hours (Observation PI)
  A Multiple Order-of-Magnitude Change in Scintillation Towards A Pulsar
- Green Bank Telescope, GBT24B-040, 50 hours (Observation PI)
  Multi-Hour Scintillation Studies by the PSC: GBT Follow-up to GBO 20m Campaign
- Green Bank Telescope, GBT24B-039, 45 hours (Observation PI)
  Cyclic Spectroscopy of Three Pulsars with Considerable Pulse Broadening
- Green Bank Telescope, GBT24A-475, 4 hours (Observation PI)
  Constraining the Scintillation Constant C_1 in a Scatter-Broadened Pulsar
- Upgraded Giant Metrewave Radio Telescope, 44_035, 25 hours (Observation PI)
  Examining the Relation Between Scintillation Arc Curvature and Asymmetry
- Upgraded Giant Metrewave Radio Telescope, 40_019, 24 hours (Observation PI)
  Scintillation Arcs and Dispersion Measure Changes: A Follow-up to Pilot Observations
- 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 (Observation PI)
  Scintillation Arcs and Dispersion Measure Changes: A Pilot Project

Professional Community Service/Leadership

- 2025−Present, Journal Referee, *The Astrophysical Journal*
- 2024−Present, Observing Proposal Scientific Reviewer, *Upgraded Giant Metrewave Radio Telescope*
- 2024: LOC, *NRAO/GBO Postdoc Symposium*
- Spring 2022: Moderator, *North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference*
- Fall 2021: Moderator, *North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference*

Media Appearances

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

Panels

- Walter Payton College Preparatory High School, *Alumni STEM Panel, March 2024*

Awarded Grants

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

Organizations

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

Skills

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

Honors and Awards

- Green Bank Observatory Postdoctoral Fellowship, Green Bank Observatory, 2023-Present
- Graduate Research Fellowship, West Virginia University, 2019-2023
- Graduate Teaching Fellowship, West Virginia University, 2018-2019
- Oberlin Physics & Astronomy Department Honors Program 2016-2017
- John Frederick Oberlin Scholarship, Oberlin College, 2013