Jacob Eli Turner

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Education

- **West Virginia University** — Morgantown, WV
  Ph.D. in Physics — *Aug 2018 - Dec 2023*
  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: Students I've mentored are indicated by an asterisk

Lead-Author Publications

- **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., arXiv:2405.19434, (Submitted to ApJ)
- **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
- **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
- **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
- **The NANOGrav 12.5-Year Data Set: Monitoring Interstellar Scattering Delays**, **Turner, J. E.**, et al. (36 authors), 2021 ApJ, 917, 10

Other Publications

- **NANOGrav 15-year gravitational-wave background methods**, Johnson, A. D. et al., (98 authors, including **Turner, J. E.**), 2024, PhRvD, 109, 10
- **Comparing recent PTA results on the nanohertz stochastic gravitational wave background**, The International Pulsar Timing Array Collaboration, et al., (244 authors, including **Turner, J. E.**), ApJ, 966, 1
- **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
- **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
- **How to Detect an Astrophysical Nanohertz Gravitational Wave Background**, Bécsy, B., et al., (96 authors, including **Turner, J. E.**), 2023, ApJ, 959, 1
- **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
- **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
- **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

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

- 2023–Present: **Green Bank Observatory Postdoctoral Fellow**
  Trained Green Bank Telescope observers, reviewed technical justifications for observing proposals, assisted in the development and testing of the real-time cyclic spectroscopy backend, served as the on-call scientist for observations, organized colloquia and lunch talks
  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

- 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

- 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
- Spring 2024 GBO-NRAO 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 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 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

- 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 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: Instructor/Observing Mentor, Green Bank Observatory, *Green Bank Telescope Semester 24B Observer Training*
- 2024: Instructor/Research Mentor, Green Bank Observatory, *Green Bank Observatory Single Dish Summer School*
- 2024: Research Mentor, Green Bank Observatory, *Pulsar Science Collaboratory Camp*
- 2024: Instructor/Observing Mentor, Green Bank Observatory, *Green Bank Telescope Semester 24A Observer Training*
- 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/Graduate Student, Penn State/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)*
  - — Authored Peer-Reviewed Paper With 6 Students
- 2024–2025: Undergraduate Senior Thesis Project Mentor
  - — Katelyn Bryant (Undergrad, University of Arkansas
- 2024: Green Bank Observatory REU Summer Student Mentor
  - — Students: *Rachel King (Undergrad, West Virginia University)*

Outreach

- 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 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*

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*

Telescope Time Allocations

- Green Bank Telescope, GBT24B-040, 50 hours (Group B)
  Multi-Hour Scintillation Studies by the PSC: GBT Follow-up to GBO 20m Campaign (Observation PI)
- Green Bank Telescope, GBT24B-039, 45 hours (Group B)
  Cyclic Spectroscopy of Three Pulsars with Considerable Pulse Broadening (Observation PI)
- Green Bank Telescope, GBT24A-475, 4 hours (Group C)
  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 (Group A)
  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)

Organizations

- American Astronomical Society: *Full Member*
- North American Nanohertz Observatory for Gravitational Waves (NANOGrav): *Full Member*

Professional Community Service/Leadership

- 2024-Present, Observing Proposal Scientific Reviewer, *Upgraded Giant Metrewave Radio Telescope*
- 2024: LOC, *NRAO/GBO Postdoc Symposium*

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

- John Frederick Oberlin Scholarship, 2013