

# 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 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

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 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

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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 &amp; Gravitational Waves</i>	August 2025
GRASP Lecture Series (Remote)	Cape Town, South Africa
<i>Pulsar Cyclic Spectroscopy as a Probe of the Interstellar Medium &amp; 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 &amp; Gravitational Waves</i>	April 2025
University of Kansas (Remote)	Lawrence, KS, USA
<i>Pulsar Cyclic Spectroscopy as a Probe of the Interstellar Medium &amp; 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

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International Pulsar Timing Array Conference <i>Pulsar Cyclic Spectroscopy in the Partial-Deconvolution Regime: Benefits &amp; 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 <sup>st</sup> 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

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

Florida Space Institute  
October 2024

243<sup>rd</sup> 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

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**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

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**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

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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

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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

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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 <math>C_1</math> 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

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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

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Green Bank Observatory <b>Students Contribute to New Understanding of “Twinkling” Pulsars</b>	2025
West Virginia University <b>WVU faculty, students contribute to cosmic breakthrough uncovering evidence of low-frequency gravitational waves</b>	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, L<sup>A</sup>T<sub>E</sub>X, TEMPO/TEMPO2, PSRCRIVE, DSPSR, Slurm, Jupyter/IPython