

Nihan Pol

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Research Interests:

- Pulsar timing arrays and gravitational waves
- Binary neutron star systems
- Pulsar population modeling and searching
- Fast radio bursts and propagation effects

Education:

- 08/2015 — M.S and Ph.D. in Physics and Astronomy, West Virginia University, Morgantown, WV.
 08/2020 Dissertation: “Modeling binary pulsar populations”
 Advisor: Maura McLaughlin
- 08/2011 — B.E. in Electronics and Telecommunications, University of Pune, MH, India.
 07/2015

Professional Experience:

- 09/2024 — Assistant Professor,
 Department of Physics and Astronomy, Texas Tech University.
- 04/2023 — Co-chair, Gravitational Wave Analysis working group
 02/2025 International Pulsar Timing Array.
- 09/2023 — Visiting Scientist,
 07/2024 Department of Physics and Astronomy, University of Wisconsin, Milwaukee, WI.
- 09/2023 — Postdoctoral Scientist,
 07/2024 Department of Physics, Oregon State University, Corvallis, OR.
- 9/2020 — VIDA Postdoctoral Fellow
 8/2023 Department of Physics and Astronomy, Vanderbilt University, Nashville, TN.
- 5/2016 — Graduate Research Assistant
 7/2020 Department of Physics and Astronomy, West Virginia University, Morgantown, WV.
- 8/2015 — Graduate Teaching Assistant
 4/2016 Department of Physics and Astronomy, West Virginia University, Morgantown, WV.
- 10/2014 — Visiting scholar
 5/2015 National Centre for Radio Astrophysics, Pune, Maharashtra, India.

Publication Summary:

89 papers in total with >8000 citations, of which 29 are lead or significant contributing author papers with >3000 citations.

Prizes and Awards:

- 2025 *International Congress of Basic Science Frontiers of Science Award, as a contributor to Strong-field tests of GR with the Double Pulsar.*
- 2024 *International Congress of Basic Science Frontiers of Science Award, as a leading contributor to NANOGrav 15yr analyses.*
- 2020 *Vanderbilt Initiative in Data-intensive Astrophysics (VIDA) Prize Postdoctoral Fellowship.*
- 2019 *Research Trust Fund Mohindar Seehra Research Award* for recognition of a doctoral student who is advancing research by publishing research in high-quality peer-reviewed journals.
- 2017 *O. Rex Ford Scholarship* for high grades as a physics major.
- 2016 *Arthur Weldon Prize* for academically outstanding student in their first year of graduate school.

Panel Reviews: National Science Foundation Astronomy division, 2025; National Radio Astronomy Observatory Science Review Panel on Gravitational Waves and Transients, 2025.

Reviewer for international journals: Monthly Notices of the Royal Astronomical Society, The Astrophysical Journal, Astronomy & Astrophysics, Journal of Cosmology and Astroparticle Physics, European Physical Journal.

Professional Affiliations: North American Nanohertz Observatory for Gravitational Waves [NANOGrav], International Pulsar Timing Array [IPTA], American Astronomical Society, American Physical Society

Accepted Telescope Proposals:

- Parkes Murriyang Radio Telescope, P1129, 2021, 2022, Testing J0837-2454 as a Milky Way Halo Pulsar, *Role:* Principal Investigator
- Green Bank Observatory, GBT19B-199, 2019, Timing and General Relativity in the Double Pulsar System, *Role:* Co-Investigator
- Green Bank Observatory, GBT19A-181, 2019, Continued timing of an eccentric, relativistic binary pulsar, *Role:* Co-Investigator
- Green Bank Observatory, GBT18A-508, 2018, Constraining the Neutral Hydrogen Mass Estimate of NGC1052-DF2, *Role:* Co-Principal Investigator

Teaching Experience:

2025	ASTR 4305/PHYS 5300–005: Radiative Processes in Astronomy, Texas Tech University, Lubbock, Tx.
2025	ASTR 3300/PHYS 5300–003: Astrostatistics, Texas Tech University, Lubbock, TX.
2023	<i>Guest Lecturer</i> , ASTR175, Lead Instructor: Dr. D. Erb, University of Wisconsin, Milwaukee.
2023	<i>Guest Lecturer</i> , ASTR103, Lead Instructor: Dr. S. Vigeland, University of Wisconsin, Milwaukee.
2022	<i>Pulsar timing tutorial</i> PTA GW Astrophysics Summer School, 2022.
2020	<i>GW Detection workshop for PTAs</i> , NANOGrav
2020	<i>Advanced Programming with Python workshop: Pandas, seaborn and statsmodels</i> , West Virginia University
2019	<i>Guest Lecturer</i> , ASTR 298A, Lead instructor: Dr. P. Breiding, West Virginia University
2018	<i>Advanced Programming with Python workshop: Functions and pipelines</i> , West Virginia University
2018	<i>Guest Lecturer</i> , PHYS 101, Lead instructor: Dr. S. Burke-Spoliar, West Virginia University
2018	<i>Guest Lecturer</i> , PHYS 101, Lead instructor: Dr. M. Holcomb, West Virginia University
2018	<i>Guest Lecturer</i> , PHYS 101, Lead instructor: Dr. A. Kobelski, West Virginia University
2015—2016	<i>Graduate Teaching Assistant</i> : 6 lab sections for PHYS 101, West Virginia University
2017—	<i>Instructor with The Carpentries</i> , a non-profit organization whose mission is to teach foundational computational and data science skills to researchers. <i>Number of workshops taught: 7</i> <i>Locations:</i> West Virginia University (2), Texas Tech University, Stanford University, Swarthmore University, Carnegie Mellon University, Vanderbilt University

Research advising:

- 2024— *Zachary Zelensky*, graduate student, Texas Tech University,
Graduate advisor.
- 2024— *Kushagra Narain Nag*, graduate student, Texas Tech University,
Graduate advisory .
- 2024— *Taha Moursy*, graduate student, Texas Tech University,
Graduate advisor.
- 2022—2025 *Levi Schult*, graduate student, Vanderbilt University,
Searching for Frequency-resolved Anisotropy in PTA Datasets.
- 2022—2023 *Ryan Wu*, undergraduate student, Vanderbilt University,
MCMC Visualization Application, Part II.
- 2021—2022 *Caitlin Witt*, graduate student, West Virginia University,
Separating GW signals from individual SMBHBs from the GW background.
- 2021—2022 *Andrew Kaiser*, graduate student, West Virginia University,
Detecting Multiple Background processes with PTAs, [Paper published in ApJ](#).
- 2021—2025 *Terrence Pierre Jacques*, graduate student, West Virginia University,
Constraints on the Galactic Neutron star-Black hole merger rate.
- 2021 *Alexander Douglas*, undergraduate student, Vanderbilt University,
[MCMC Visualization Application, Part I](#)

Panels, Committees, Service, and Organisation of Conferences:

- 2023—2025 Co-chair, IPTA Gravitational Wave Analysis working group
- 2021— Co-lead, IPTA DR3 GWB analysis
- 2022 Panel on Future of NANOGrav, NANOGrav Fall Meeting, 2022
- 2022 Organization committee for the PTA GW Astrophysics Summer School 2022
- 2021 Panel on NANOGrav 15 yr GWB analysis, NANOGrav Fall Meeting, 2021
- 2021 NANOGrav Fall Meeting, Local Organizing Committee
- 2020 NANOGrav Fall Meeting, Science Organizing Committee
- 2018 – 2019 President of the Physics and Astronomy Graduate Student Organization, West Virginia University

Outreach Experience:

- 05/2019 “Community Physics Festival”, Morgantown, West Virginia University.
Role: Organizer, Public talk. Demonstration of use of portable Dobsonian optical telescopes.
- 04/2019 “Yuri’s Night”, West Virginia University: A commemoration of the first human to launch into space.
Role: Organization of Physics and Astronomy demos and demonstration of use of portable Dobsonian optical telescopes.
- 01/2019 NANOGrav outreach booth, American Astronomical Society meeting in Seattle, WA.
Role: Volunteer at the booth and interact with participants to describe the concept and science of NANOGrav.
- 04/2017 “Celebrating Einstein”, West Virginia University, 2017, a celebration of 100 years of Einstein’s General Theory of Relativity.
Role: Operation of different Physics and Astronomy demonstrations across three days of the event.
- 10/2016 NANOGrav booth, National Science and Engineering Festival, Washington DC, 2016.
Role: Volunteer at the booth and interact with middle and high-school students, along with general public to describe the concept and science of NANOGrav.

Select Invited Talks:

- 01/2024 “Beyond the Isotropic Gravitational Wave Background: Search for Other Signals in the NANOGrav 15 yr Dataset”, American Astronomical Society 243’rd meeting, New Orleans, LA, USA
- 07/2023 “The NANOGrav 15-yr dataset: Evidence for a gravitational wave background”, Green Bank Observatory, Green Bank, USA
- 03/2023 “The Dawn of Pulsar Timing Array Gravitational-wave Astronomy”, APS DGRAV seminar, USA
- 02/2023 “Exploring the gravitational-wave landscape using pulsars”, University of Mississippi, Mississippi, USA
- 12/2022 “The Landscape of Nanohertz Gravitational Wave Astronomy in this Decade”, CCAPP at The Ohio State University, Ohio, USA
- 02/2022 “The NANOGrav 12.5 yr GWB Results and Prospects for the Future”, Pulsar Search Collaboratory, West Virginia University, USA
- 02/2022 “The IPTA DR2 GWB Results and Astrophysics Milestones For Pulsar Timing Array Gravitational Wave Detection”, CERN, Switzerland
- 11/2021 “The NANOGrav 12.5 yr GWB Results and Astrophysics Milestones For Pulsar Timing Array Gravitational Wave Detection”, Indian Institute of Technology, Hyderabad, India
- 04/2021 “Astrophysics Milestones For Pulsar Timing Array Gravitational Wave Detection”, Carnegie Mellon University
- 03/2021 “Astrophysics Milestones For Pulsar Timing Array Gravitational Wave Detection”, National Center for Radio Astrophysics, Pune, India

Lead Author Publications:

1. [“The NANOGrav 15-year Data Set: Search for Anisotropy in the Gravitational-Wave Background”](#), *Lead author:* Nihan Pol, for the NANOGrav collaboration; ApJ.
- Press Coverage:** [“A Background Hum Pervades the Universe. Scientists Are Racing to Find Its Source”](#), Scientific American.
2. [“Forecasting pulsar timing array sensitivity to anisotropy in the stochastic gravitational wave background”](#), Nihan Pol, Stephen Taylor, Joseph Romano; ApJ.
3. [“Insights into the Milky Way pulsar–black hole population using radio and gravitational wave observations”](#), Nihan Pol, Maura McLaughlin, Duncan Lorimer; arXiv, 2109.04512.
4. [“Astrophysics Milestones For Pulsar Timing Array Gravitational Wave Detection”](#), Nihan Pol, Stephen Taylor, et al.; ApJL.
5. [“On the detectability of ultra-compact binary pulsar systems”](#), Nihan Pol, Maura McLaughlin, Duncan Lorimer; ApJ.
6. [“The Search for a Supernova Remnant Around Young Galactic Halo Pulsar J0837–2447”](#), Nihan Pol, Sarah Burke-Spolaor, et al.; ApJ.
7. [“Modeling the Galactic Compact Binary Neutron Star Population and Studying the Double Pulsar System”](#), Nihan Pol, PhD Dissertation, 2020.
8. [“An Updated Galactic Double Neutron Star Merger Rate Based on Radio Pulsar Populations”](#), Nihan Pol, Maura McLaughlin, Duncan Lorimer; RNAAS.
9. [“Estimates of Fast Radio Burst Dispersion Measures from Cosmological Simulations”](#), Nihan Pol, Michael Lam, et al.; ApJ.

10. "Future prospects for ground-based gravitational wave detectors – The Galactic double neutron star merger rate revisited",
Nihan Pol, Maura McLaughlin, Duncan Lorimer; ApJ.
11. "A direct measurement of sense of rotation of PSR J0737-3039A",
Nihan Pol, Maura McLaughlin, et al; ApJ.
12. "Seyfert 1 composite spectrum using SDSS Legacy survey data",
Nihan, Pol; Yogesh, Wadadekar; MNRAS.

Significant Contributing Author:

1. "The NANOGrav 15-year Data Set: Evidence for a Gravitational-Wave Background",
Gabriella Agazie, ..., Nihan Pol, et al.; ApJL.
Press Coverage: "The Cosmos Is Thrumming With Gravitational Waves, Astronomers Find", New York Times.
"Gravitational waves spark hunt for cosmic strings and dark matter", New Scientist.
"Spinning stars help scientists detect nanohertz gravitational waves in universe for the first time", The Print.
2. "The NANOGrav 15-year Data Set: Observations and Timing of 68 Millisecond Pulsars",
Gabriella Agazie, ..., Nihan Pol, et al.; ApJL.
3. "Disentangling Multiple Stochastic Gravitational Wave Background Sources in PTA Datasets ",
Andrew Kaiser, Nihan Pol, et al.; ApJ.
4. "The International Pulsar Timing Array second data release: Search for an isotropic gravitational wave background",
J. Antoniadis, ..., Nihan Pol, et al.; MNRAS.
5. "Strong-Field Gravity Tests with the Double Pulsar",
Michael Kramer, ..., Nihan Pol, et al.; PRX.
6. "The NANOGrav 12.5-year Data Set: Search For An Isotropic Stochastic Gravitational-Wave Background",
Zaven Arzoumanian, ..., Nihan Pol, et al.; ApJL.
7. "Asymmetric mass ratios for bright double neutron-star mergers",
Robert Ferdman, Paulo Freire, Ben Perera, Nihan Pol, et al.; Nature.
8. **Astro2020 Decadal survey science white paper:** "Radio Pulsar Populations",
Duncan Lorimer, Nihan Pol, ...; Bulletin of the American Astronomical Society, 51, 261.
9. **Astro2020 Decadal survey science white paper:** "The Virtues of Time and Cadence for Pulsars and Fast Transients",
Ryan Lynch, Paul Brook, ..., Nihan Pol, ...; Bulletin of the American Astronomical Society, 51, 461.
10. "Binary neutron star formation and the origin of GW170817",
Kevin Belczynski, ..., Nihan Pol, et al.; arxiv:1812.10065.
11. "PALFA discovery of a highly relativistic double neutron star binary",
Kevin Stovall, ..., Nihan Pol, et al., ApJL.
12. "The NANOGrav 11-year Data Set: Pulsar-timing Constraints On The Stochastic Gravitational-wave Background",
Zaven Arzoumanian, ..., Nihan Pol, et al.; ApJ.
13. "Constraints On The HI Mass for NGC 1052–DF2: A Galaxy Lacking Dark Matter",
Amy Sardone, ..., Nihan Pol; ApJL.

Contributing Author:

1. “The NANOGrav 15 yr Data Set: Constraints on Supermassive Black Hole Binaries from the Gravitational-wave Background”,
Gabriella Agazie, ..., Nihan Pol, et al.; ApJ.
2. “The NANOGrav 12.5-year Data Set: Search for Gravitational Wave Memory”,
Gabriella Agazie, ..., Nihan Pol, et al.; ApJ.
3. “The NANOGrav 12.5-Year Data Set: Dispersion Measure Mis-Estimation with Varying Bandwidths”,
Gabriella Agazie, ..., Nihan Pol, et al. ApJ.
4. “The NANOGrav 15 yr Data Set: Bayesian Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries”,
Gabriella Agazie, ..., Nihan Pol, et al.; ApJ.
5. “The NANOGrav 12.5 yr Data Set: Bayesian Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries”,
Zaven Arzoumanian, ..., Nihan Pol, et al.; ApJ.
6. “The NANOGrav 15 yr Data Set: Search for Signals from New Physics”,
Gabriella Agazie, ..., Nihan Pol, et al.; ApJ.
7. “The NANOGrav 15 yr Data Set: Detector Characterization and Noise Budget”,
Gabriella Agazie, ..., Nihan Pol, et al.; ApJ.
8. “The NANOGrav 15-year Gravitational-Wave Background Analysis Pipeline”,
Aaron Johnson, ..., Nihan Pol, et al.; ApJ.
9. “Searching for continuous Gravitational Waves in the second data release of the International Pulsar Timing Array ”,
Mikel Falxa, ... Nihan Pol, et al.; MNRAS.
10. “An unusual pulse shape change event in PSR J1713+0747 observed with the Green Bank Telescope and CHIME”,
Ross Jennings, ..., Nihan Pol, et al.; submitted to ApJ.
11. “A Parallelized Bayesian Approach To Accelerated Gravitational-Wave Background Characterization”,
Stephen Taylor, ..., Nihan Pol, et al; PRD.
12. “Searching for Gravitational Waves from Cosmological Phase Transitions with the NANOGrav 12.5-Year Dataset”,
Zaven Arzoumanian, ..., Nihan Pol, et al.; PRL.
13. “The NANOGrav 11 yr Data Set: Limits on Supermassive Black Hole Binaries in Galaxies within 500 Mpc”,
Zaven Arzoumanian, ..., Nihan Pol, et al; ApJ.
14. “Refined Mass and Geometric Measurements of the High-mass PSR J0740+6620”,
Emmanuel Fonseca, ..., Nihan Pol, et al; ApJ.
15. “The NANOGrav 12.5-year Data Set: Search for Non-Einsteinian Polarization Modes in the Gravitational-wave Background”,
Zaven Arzoumanian, ..., Nihan Pol, et al; ApJ.
16. “The NANOGrav 12.5 Year Data Set: Monitoring Interstellar Scattering Delays”,
Jacob Turner, ..., Nihan Pol, et al; ApJ.

17. "Multi-Messenger Gravitational Wave Searches with Pulsar Timing Arrays: Application to 3C66B Using the NANOGrav 11-year Data Set",
Zaven Arzoumanian, ..., Nihan Pol, ...; ApJ.
18. "The NANOGrav 12.5-year Data Set: Wideband Timing of 47 Millisecond Pulsars",
Md. F. Alam, ..., Nihan Pol, ...; ApJS.
19. "The NANOGrav 12.5-year Data Set: Observations and Narrowband Timing of 47 Millisecond Pulsars",
Md. F. Alam, ..., Nihan Pol, ...; ApJS.
20. "Modeling the uncertainties of solar-system ephemerides for robust gravitational-wave searches with pulsar timing arrays",
Michele Vallisneri, ..., Nihan Pol, ...; ApJ.
21. "The NANOGrav 11-year data set: Limits on gravitational wave memory from merging supermassive black hole binaries",
Paul Baker, ..., Nihan Pol, ...; ApJ.
22. "The NANOGrav 11-Year Data Set: Evolution of Gravitational Wave Background Statistics",
Jeff Hazboun, ..., Nihan Pol, ...; ApJ.
23. "The NANOGrav 11-Year Data Set: Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries",
Kshitij Aggarwal, ..., Nihan Pol, et al.; ApJ.