

# CURRICULUM VITAE: Timothy E. Dolch

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## HOMEPAGES (CLICKABLE; LINKS TO PUBLICATION LIST)

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Hillsdale College: <https://www.hillsdale.edu/faculty/timothy-dolch/>

Personal: <https://tdolch.github.io/>

## RESEARCH INTERESTS

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Radio Astronomy, Pulsars, Gravitational Waves, Interstellar Medium, Pulsar Wind Nebulae, Low-Frequency Radio Telescope Instrumentation, Extragalactic Backgrounds, Galaxy Evolution, Education and Public Outreach

## APPOINTMENTS

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<b>Hillsdale College</b> <i>Hillsdale, MI</i> <i>Associate Professor of Physics</i> (2021 – present) <i>Assistant Professor of Physics</i> (2015 – 2021)	2015 – Present
<b>Eureka Scientific</b> <i>Oakland, CA (Remote)</i> <i>Research Scientist</i>	2021 – Present
<b>University of New Mexico</b> <i>Albuquerque, NM</i> <i>Faculty Visitor (Sabbatical)</i>	2021 – 2022
<b>Cornell University</b> <i>Ithaca, NY (Supervisor: Prof. James M. Cordes)</i> <i>NSF Partnerships for International Research and Education (PIRE) Postdoctoral Research Associate</i>	2013 – 2015
<b>Oberlin College</b> <i>Oberlin, OH (Supervisor: Prof. Daniel R. Stinebring)</i> <i>PIRE Postdoctoral Scholar</i>	2011 – 2013

## EDUCATION

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<b>Johns Hopkins University</b> <i>Baltimore, MD</i> Ph.D. in Physics and Astronomy <i>Advisors: Henry C. Ferguson and Timothy M. Heckman</i>	2012
<b>Johns Hopkins University</b> M.A. in Physics and Astronomy	2008
<b>California Institute of Technology (Caltech)</b> <i>Pasadena, CA</i> B.S. in Physics	2003

## SCIENTIFIC COLLABORATION MEMBERSHIPS

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- **North American Nanohertz Observatory for Gravitational Waves (NANOGrav), Senior Personnel (2015 – present), Member (2012 – present; annual re-applications)** primary working groups: Noise Budget, Timing, Education and Public Outreach  
Elected within NANOGrav: **Education and Public Outreach Working Group Chair (2019 – 2021), Co-Chair (2021 – present)**
- **International Pulsar Timing Array (IPTA)** 2012 – present
- **Long-Wavelength Array Swarm Consortium** 2021 – present (includes institutional membership)
- **Green Bank North Celestial Cap Survey (GBNCC)** 2021 – present
- **SETI Institute Affiliate** 2024 – present

## PRESS RELEASES (HILLSDALE, UNLESS OTHERWISE NOTED)

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- **Attended media event at NSF Headquarters in Alexandria, VA (2023):** present with other senior NANOGrav members for announcement of evidence for gravitational waves. Included local watch parties for students at NANOGrav institutions, including Hillsdale
- **Evidence for a Gravitational Wave Background (2023):** <https://www.hillsdale.edu/news-and-media/press-releases/hillsdale-college-physics-alumni-professor-participate-in-groundbreaking-international-research-work-on-gravitational-waves/>
- **Astronomers find possible hints of gravitational waves (2021; Cornell):** <https://news.cornell.edu/stories/2021/01/astronomers-find-possible-hints-gravitational-waves>
- **NSF Physics Frontier Center grant awarded (2021; Eureka):** <https://eurekasci.com/press/>
- **Discovery of Common Pulsar Signal (2021):** <https://www.hillsdale.edu/news-and-media/press-releases/nanograv-astronomers-produce-first-hints-of-gravitational-waves-hillsdale-college-professor-students-on-international-team/>
- **Publication on Center of Solar System (2020):** <https://www.hillsdale.edu/news-and-media/press-releases/hillsdale-college-professor-helps-discover-precise-center-of-solar-system/>
- **Low-Frequency All-Sky Monitor (2018; on-campus telescope):** <https://www.hillsdale.edu/news-and-media/press-releases/hillsdale-college-students-faculty-build-radio-telescope-array-campus/>

## PROFESSIONAL SOCIETIES

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- **American Astronomical Society (AAS)**
- **International Union of Radio Science (URSI)** Senior Member, applied and accepted 7/2020
- **International Astrostatistics Association (IAA)**
- **Sigma Pi Sigma** (participation in undergraduate physics honorary society)
- **Sigma Zeta** (participation in undergraduate scientific honorary society)

## RESEARCH GRANTS AWARDED

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- **Co-Investigator on NSF Partnerships in Astronomy & Astrophysics Research and Education proposal “NANOGrav Student Teams of Astrophysics Researchers Undergraduate Pathways (STARS-UP): Infrastructure for the Two to Four-Year College Transition” (2024 – 2027, PI: Maura McLaughlin):** ~\$594,458
- **Co-Investigator on NASA Hubble Space Telescope proposal “SUPERCAL: Unified Reprocessing of the Large HST Cosmology Survey Fields - New Science, Archival Legacy, and Pathfinder for JWST” (2021 – 2023, PI: Anton Koekoemoer):** ~\$1M awarded for team of collaborators based at STScI
- **Senior Investigator on NSF Physics Frontier Center “North American Nanohertz Observatory for Gravitational Waves” (2021 – 2025, PI: Xavier Siemens):** \$17M awarded for team of collaborators based at Oregon State University
- **Senior Investigator on NSF Astronomy and Astrophysics “Construction of a Pulsar Interstellar Medium Array Detector” (2021 – 2023, PI: Michael Lam):** \$346,753 awarded for team of collaborators based at Rochester Institute of Technology
- **Collaborator on NSF proposal “Improving Gravitational Wave Sensitivity through Real-Time Cyclic Spectroscopy” (2021, PI: Ryan Lynch):** \$1M awarded for new receiver on the Green Bank Telescope at Green Bank Observatory
- **Collaborator on NSF Windows on the Universe: the Era of Multi-messenger Astronomy “Improving Gravitational Wave Sensitivity through Real-Time Cyclic Spectroscopy” (2021, PI: Ryan Lynch):** ~\$1M awarded for new receiver on the Green Bank Telescope at Green Bank Observatory
- **Co-Investigator on NSF proposal International Research Experiences for Students (IRES) (2017 – 2020, PI: Maura McLaughlin):** \$250k awarded for international student travel for West Virginia University-based program
- **Amazon Web Services “AstroCompute in the Cloud” Grant (2015):** applied for and received \$10,000 in funding for scientific computing on the Amazon Web Services cloud cluster in support of radio astronomy big-data projects related to the Square Kilometer Array (SKA) telescope

## AWARDS

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- **2024 ICBS Frontiers of Science Award in Theoretical Physics (2024)** awarded to International Pulsar Timing Array collaboration
- **Hillsdale College Emily Daugherty Award for Teaching Excellence (2020)** awarded to junior faculty member
- **Runner-Up Prize, IPTA Steering Committee Award (2014)**

## FELLOWSHIPS, SCHOLARSHIPS, AND OTHER FUNDS GRANTED

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- **Hillsdale College Summer Leave Grants (2017 – 2024):** applied for and received **\$27,047** for student research and professional development travel
- **Xilinx Corporation Donation (2018):** received **~\$3,000** FPGA processor for on campus Low-Frequency All-Sky Monitor Telescope (see Startup Project)
- **NANOGrav Seed-Funding Awards (2015, 2016):** applied for and received **\$4,700** in supplemental collaboration funding for travel
- **AAPT New Faculty Workshop Travel Award (2015)**
- **NSF PIRE Postdoctoral Fellowship (2011 – 2015)**
- **Maryland Space Grant Graduate Fellowship (2009 – 2011)**
- **Graduate Research and Teaching Assistantships, Johns Hopkins University (2004 – 2009, 2011):** included full tuition coverage
- **Caltech Summer Undergraduate Research Fellowships (2000, 2002)**
- **Caltech Alcorn Undergraduate Scholarship (2000 – 2003)**

Research (h-index = 46)
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## STARTUP PROJECT

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- **Low-Frequency All-Sky Monitor Telescope (2017 – present):** constructed radio telescope on the Hillsdale College campus using Science Division startup funds. Telescope consists of 13 LWA antennas, cabling, and backend electronics. Telescope operates with four other stations nationwide to form one 24-hr all-sky array. Twelve students have worked on this project, including a senior thesis.

## BOOK

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- *Radio Telescope Instrumentation for Teaching* (forthcoming). IOP ebooks. Bristol, UK: IOP Publishing, 2025.

## GENERAL AUDIENCE PUBLICATIONS

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- **“Catching Gravitational Waves with Pulsars” (AstroBeat, 2018):** at request of the Astronomical Society of the Pacific, wrote article on pulsar timing arrays for an audience of amateur astronomers.

## FIRST-AUTHORED REFEREED PUBLICATIONS (STUDENT AUTHORS UNDERLINED)

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- **(7) Deconvolving Pulsar Signals with Cyclic Spectroscopy: A Systematic Evaluation (2021)** *Dolch, T.*, Stinebring, D. R., et al., *Astrophysical Journal*, 913, 98
- **(6) First Light for Station V of the Low-Frequency All-Sky Monitor Radio Telescope (2020)** *Dolch, T.*, Andrews, P. ...Dulemba, A. ...Niezbalski, S., Ramette, C., Smith, S. *Radio Science Meeting, 2020 US National Committee of URSI National*
- **(5) Pulsars at Low Radio Frequencies, Cyclic Spectroscopy, and Pulsar Timing Arrays (2019)** *Dolch, T.*, *Radio Science Meeting (USNC-URSI NRSN), 2018 US National Committee of URSI National*

- (4) **Noise Budget and Interstellar Medium Mitigation Advances in the NANOGrav Pulsar Timing Array** (2018), *Dolch, T.*, for the NANOGrav Collaboration, S. Chatterjee, J. M. Cordes, et al., Journal of Physics Conference Series, 957, 012007 (Proceedings of the 12th Edoardo Amaldi Conference on Gravitational Waves, Pasadena, CA)
- (3) **Recent H-alpha Results on Pulsar B2224+65's Bow-Shock Nebula, the "Guitar"** (2016), *Dolch, T.*, Chatterjee, S., Clemens, D. P., Cordes, J. M., Cashmen, L. R., Taylor, B. W. Journal of Astronomy and Space Sciences, 33, 167
- (2) **Single-Source Gravitational Wave Limits From the J1713+0747 24-hr Global Campaign** (2016) *Dolch, T.*, Ellis, J. E., et al., Journal of Physics: Conference Series, Volume 716, 012014 (Proceedings of the 11th Edoardo Amaldi Conference on Gravitational Waves, Gwangju, South Korea)
- (1) **A 24 hr Global Campaign to Assess Precision Timing of the Millisecond Pulsar J1713+0747** (2014) *Dolch, T.*, Lam, M. T., Cordes, J. M., et al. Astrophysical Journal, 794, 21

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#### CO-AUTHORED REFEREED PUBLICATIONS (STUDENT AUTHORS UNDERLINED)

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- (89) **Exploring pulsar timing precision: A comparative study of polarization calibration methods for NANOGrav data from the Green Bank Telescope** (2024) Dey, L., ...*Dolch T.*, et al., submitted to the Astrophysical Journal, <https://arxiv.org/abs/2406.13463>
- (88) **The NANOGrav 15 yr Data Set: Chromatic Gaussian Process Noise Models for Six Pulsars** (2024) Larsen, B., ...*Dolch T.*, et al., submitted to the Astrophysical Journal, <https://arxiv.org/abs/2405.14941>
- (87) **A Cyclic Spectroscopy Scintillation Study of PSR B1937+21 I. Demonstration of Improved Scintillometry** (2024) Turner, J. E., *Dolch T.*, et al., accepted for publication in the Astrophysical Journal, <https://arxiv.org/abs/2404.13796>
- (86) **The NANOGrav 15 yr Data Set: Looking for Signs of Discreteness in the Gravitational-wave Background** (2024) Agazie, G., ...*Dolch T.*, et al., submitted to the Astrophysical Journal, <https://arxiv.org/abs/2404.07020>
- (85) **Pulsar Scintillation through Thick and Thin: Bow Shocks, Bubbles, and the Broader Interstellar Medium** (2024) Ocker S. K., Cordes J. M., Chatterjee S., Stinebring D. R., *Dolch T.*, Pelgrims V., McKee J. W., C. Giannokopoulos et al., Monthly Notices of the Royal Astronomical Society, 527, 7568
- (84) **The Green Bank North Celestial Cap Survey IX: Timing Follow-up for 128 Pulsars** (2023) McEwen, A. E. ...*Dolch T.* et al., accepted for publication in the Astrophysical Journal, <https://arxiv.org/abs/2312.07471>
- (83) **The NANOGrav 15-year data set: Search for Transverse Polarization Modes in the Gravitational-Wave Background** (2023) Agazie, G... *Dolch T.* et al., submitted to the Astrophysical Journal, <https://arxiv.org/abs/2310.12138>
- (82) **The NANOGrav 12.5-year data set: Multi-messenger targeted search for gravitational waves from an eccentric supermassive binary in 3C 66B** (2023) Agazie, G... *Dolch T.* et al., submitted to the Astrophysical Journal, <https://arxiv.org/abs/2309.17438>
- (81) **How to Detect an Astrophysical Nanohertz Gravitational-Wave Background** (2023) Bécsy, B. ...*Dolch, T.*, et al., accepted for publication in the Astrophysical Journal, <https://arxiv.org/abs/2309.04443>
- (80) **Comparing recent PTA results on the nanohertz stochastic gravitational wave background** (2023) International Pulsar Timing Array Collaboration and Agazie, G., ...*Dolch, T.*, et al., submitted to Monthly Notices of the Royal Astronomical Society, <https://arxiv.org/abs/2309.00693>
- (79) **The NANOGrav 12.5 yr Data Set: Search for Gravitational Wave Memory** (2023) Agazie, G., ...*Dolch, T.*, et al., submitted to the Astrophysical Journal, <https://arxiv.org/abs/2307.13797>
- (78) **The NANOGrav 12.5 yr Data Set: Bayesian Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries** (2023) Valentina Sosa Fiscella, S, ...*Dolch, T.*, et al., submitted to the Astrophysical Journal, <https://arxiv.org/abs/2307.13248>
- (77) **The NANOGrav 12.5 yr Data Set: Bayesian Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries** (2023) Arzoumanian, Z., ...*Dolch, T.*, et al., Astrophysical Journal, 951L, 28
- (76) **The NANOGrav 15 yr Data Set: Constraints on Supermassive Black Hole Binaries from the Gravitational-wave Background** (2023) Agazie, G., ...*Dolch, T.*, et al., Astrophysical Journal, 952L, 37
- (75) **The NANOGrav 15 yr Data Set: Bayesian Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries** (2023) Agazie, G., ...*Dolch, T.*, et al., Astrophysical Journal, 951L, 50

- **(74) The NANOGrav 15 yr Data Set: Search for Signals from New Physics** (2023) Afzal, A., ...*Dolch, T.*, et al., *Astrophysical Journal*, 951L, 11
- **(73) The NANOGrav 15 yr Data Set: Detector Characterization and Noise Budget** (2023) Agazie, G., ...*Dolch, T.*, et al., *Astrophysical Journal*, 951L, 10
- **(72) The NANOGrav 15 yr Data Set: Observations and Timing of 68 Millisecond Pulsars** (2023) Agazie, G., ...*Dolch, T.*, ... *Jessup, C.*, ... *Salo, L.*, et al., *Astrophysical Journal*, 951L, 9
- **(71) The NANOGrav 15 yr Data Set: Evidence for a Gravitational-wave Background** (2023) Agazie, G., ...*Dolch, T.*, et al., *Astrophysical Journal*, 951L, 8
- **(70) The NANOGrav 15-year Gravitational-Wave Background Analysis Pipeline** (2023) Johnson, A. D., ...*Dolch, T.*, et al., submitted to the *Astrophysical Journal*, <https://arxiv.org/abs/2306.16223>
- **(69) The NANOGrav 15-year Data Set: Search for Anisotropy in the Gravitational-Wave Background** (2023) Agazie, G., ...*Dolch, T.*, et al., accepted for publication in the *Astrophysical Journal*, <https://arxiv.org/abs/2306.16221>
- **(68) Searching for continuous Gravitational Waves in the second data release of the International Pulsar Timing Array** (2023) Falxa, M., ...*Dolch, T.*, et al., *Monthly Notices of the Royal Astronomical Society* 521, 5077
- **(67) The Green Bank North Celestial Cap Survey. VIII. 21 New Pulsar Timing Solutions** (2023) Fiore, W., ...*Dolch, T.*, et al., accepted for publication in the *Astrophysical Journal*, 944, 154, <https://arxiv.org/abs/2305.13624>
- **(66) Scattering Delay Mitigation in High-accuracy Pulsar Timing: Cyclic Spectroscopy Techniques** (2023) Turner, J. E., Stinebring, D. R., McLaughlin, M. A., Archibald, A. M., *Dolch, T.*, Lynch, R. S., et al., *Astrophysical Journal*, 944, 191
- **(65) The Green Bank North Celestial Cap Survey. VII. 12 New Pulsar Timing Solutions** (2023) Swiggum J. K., Pleunis Z., Parent E., Kaplan D. L., McLaughlin M. A., Stairs I. H., Spiewak R., ...*Dolch, T.*, et al., *Astrophysical Journal*, 944, 154
- **(64) An unusual pulse shape change event in PSR J1713+0747 observed with the Green Bank Telescope and CHIME** (2022) Jennings R. J., Cordes J. M., Chatterjee S., McLaughlin M. A., Demorest P. B., ...*Dolch, T.*, et al., 2022, submitted to the *Astrophysical Journal*, <https://arxiv.org/abs/2210.12266>
- **(63) The International Pulsar Timing Array second data release: Search for an isotropic Gravitational Wave Background** (2022) Antoniadis, J., Arzoumanian, Z., Babak, S., ...*Dolch, T.*, et al., *Monthly Notices of the Royal Astronomical Society*, 510, 4873
- **(62) Bayesian Solar Wind Modeling with Pulsar Timing Arrays** (2022) Hazboun, J. S., ...*Dolch, T.*, et al., *Astrophysical Journal*, 929, 39
- **(61) The NANOGrav 12.5-year data set: Search for Non-Einsteinian Polarization Modes in the Gravitational-Wave Background** (2021) Arzoumanian, Z., Baker, P. T., ...*Dolch, T.*, ... Laal, N., et al., *Astrophysical Journal Letters*, 923, L22
- **(60) An In Situ Study of Turbulence Near Stellar Bow Shocks** (2021) Ocker, S. K., Cordes, J. M., Chatterjee, S., *Dolch, T.*, *Astrophysical Journal*, 922, 233
- **(59) Searching For Gravitational Waves From Cosmological Phase Transitions With The NANOGrav 12.5-year dataset** (2021) Arzoumanian, Z., Baker, P. T., ...*Dolch, T.*, ... Mitridate, A., ...Taylor, S. R., et al., *Physical Review Letters*, 127, 251302
- **(58) The NANOGrav 12.5-Year Data Set: Polarimetry, Rotation Measures, and Galactic Magnetic Field Strengths from NANOGrav Observations with the Green Bank Telescope** (2021) Wahl, H. M., McLaughlin, M. A., Gentile, P. A., ...*Dolch, T.*, et al., *Astrophysical Journal*, 926, 168
- **(57) Refined Mass and Geometric Measurements of the High-Mass PSR J0740+6620** (2021) Fonseca, E., Cromartie, H. T., Pennucci, T. T. ...*Dolch, T.*, et al., *Astrophysical Journal*, 915, 12
- **(56) The NANOGrav 11yr Data Set: Limits on Supermassive Black Hole Binaries in Galaxies within 500Mpc** (2021) Arzoumanian, Z., Baker, P. T., ...Charisi, M., ...*Dolch, T.*, et al., *Astrophysical Journal*, 914, 121
- **(55) The NANOGrav 12.5-year Data Set: Search For An Isotropic Stochastic Gravitational-Wave Background** (2020) Arzoumanian, Z., Baker, P. T., Blumer, H., Becsy, B., ...*Dolch, T.*, ... Simon, J., et al., *Astrophysical Journal Letters*, 905, L34
- **(54) The NANOGrav 12.5-Year Data Set: Monitoring Interstellar Scattering Delays** (2021) Turner, J. E., McLaughlin, M. A., Cordes, J. M., Lam, M. T., Shapiro-Albert, B. J., Stinebring, D. R., ...*Dolch, T.*, et al., *Astrophysical Journal*, 917, 10
- **(53) Astrophysics Milestones For Pulsar Timing Array Gravitational Wave Detection** (2021) Pol, N. S., Taylor S. R., Kelley... *Dolch, T.*, et al., *Astrophysical Journal Letters* 911, L34

- **(52) The Space Public Outreach Team** (2020) Des Jardins, A... *Dolch, T.*, et al., Journal of Computers in Mathematics and Science Teaching, 39, 4
- **(51) Multi-Messenger Gravitational Wave Searches with Pulsar Timing Arrays: Application to 3C66B Using the NANOGrav 11-year Data Set** (2020) Arzoumanian, Z., Baker, P. T., Brazier, A...*Dolch, T.*... et al., Astrophysical Journal 900, 102
- **(50) The NANOGrav 12.5-year Data Set: Wideband Timing of 47 Millisecond Pulsars** (2021) Alam, M. F., Arzoumanian, Z., Baker, P. T., *Dolch, T.*... *Halmrast, D.*... *Jessup, C.*... *Ramette, J.*... *Tripepi, M.* et al., Astrophysical Journal Supplements 252, 5
- **(49) The NANOGrav 12.5-year Data Set: Observations and Narrowband Timing of 47 Millisecond Pulsars** (2021) Alam, M. F., Arzoumanian, Z., Baker, P. T... *Halmrast, D.*... *Jessup, C.*... *Ramette, J.*... *Tripepi, M.* et al., Astrophysical Journal Supplements 252, 4
- **(48) On Frequency-dependent Dispersion Measures and Extreme Scattering Events** (2020) Lam, M. T., Lazio, T. J. W., *Dolch, T.*, et al., Astrophysical Journal, 892, 89
- **(47) Modeling the uncertainties of solar-system ephemerides for robust gravitational-wave searches with pulsar timing arrays** (2020) Vallisneri, M., Taylor, S. R., Simon, J. ...*Dolch, T.*... et al., Astrophysical Journal, 893, 112
- **(46) The NANOGrav 11-year Data Set: Constraints on Planetary Masses Around 45 Millisecond Pulsars** (2020) Behrens, E. A., Ransom, S. M., Madison, D. R. ...*Dolch, T.*... et al., Astrophysical Journal Letters, 893, L8
- **(45) The NANOGrav 11-Year Data Set: Limits on Gravitational Wave Memory** (2020) Aggarwal, K., Baker, P. T., ...*Dolch, T.*... et al., Astrophysical Journal, 889, 38
- **(44) A pulsar-based timescale from the international pulsar timing array** (2020) Hobbs, G., ...*Dolch, T.*... et al., Monthly Notices of the Royal Astronomical Society 491, 5951
- **(43) Relativistic Shapiro delay measurements of an extremely massive millisecond pulsar** (2020) Cromartie, H. T., Fonseca, E., Ransom, S. M., ...*Dolch, T.*... et al., Nature Astronomy, 439
- **(42) The NANOGrav 11-Year Data Set: Evolution of Gravitational Wave Background Statistics** (2020) Hazboun, J. S., Simon, J., Taylor, S. R., ...*Dolch, T.*... et al., Astrophysical Journal 890, 108
- **(41) The International Pulsar Timing Array: Second data release** (2019) Perera, B. B. P., DeCesar, M. E., Demorest, P. B., ...*Dolch, T.*... et al., Monthly Notices of the Royal Astronomical Society, 490, 4666
- **(40) The CANDELS/SHARDS Multiwavelength Catalog in GOODS-N: Photometry, Photometric Redshifts, Stellar Masses, Emission-line Fluxes, and Star Formation Rates** (2019) Barro, G., Pérez-González, P. G., Cava, A., ...*Dolch, T.*... et al., Astrophysical Journal, 243, 22
- **(39) The NANOGrav 11-Year Data Set: Limits on Gravitational Waves from Individual Super-massive Black Hole Binaries** (2019) Aggarwal, K., Arzoumanian, Z., Baker, P. T., ...*Dolch, T.*... et al., Astrophysical Journal, 880, 116
- **(38) The Astrophysics of Nanohertz Gravitational Waves** (2019) Burke-Spolaor, S., Taylor, S. R., Charisi, M., ...*Dolch, T.*... et al., Astronomy and Astrophysics Review, 27, 5
- **(37) High-Precision X-ray Timing of Three Millisecond Pulsars with NICER: Stability Estimates and Comparison with Radio** (2019) Deneva, J. S., Ray, P. S., Lommen, A., ...*Dolch, T.*... et al., Astrophysical Journal, 874, 160
- **(36) The NANOGrav 12.5-yr Data Set: The Frequency Dependence of Pulse Jitter in Precision Millisecond Pulsars** (2019) Lam, M. T., McLaughlin, M. A., Arzoumanian, Z., ...*Dolch, T.*... et al., Astrophysical Journal, 872, 193
- **(35) The NANOGrav 11 yr Data Set: Solar Wind Sounding through Pulsar Timing** (2019) Madison, D. R., Cordes, J. M., Arzoumanian, Z., ...*Dolch, T.*... et al., Astrophysical Journal, 872, 150
- **(34) Tests of gravitational symmetries with pulsar binary J1713+0747** (2019) Zhu, W. W., Desvignes, G., Wex, N., ...*Dolch, T.*... et al., Monthly Notices of the Royal Astronomical Society, 482, 3249
- **(33) Science with the Next-Generation VLA and Pulsar Timing Arrays** (2018) *The NANOGrav Collaboration*, <https://arxiv.org/abs/1810.06594>, to be published in the ASP Monograph Series, “Science with a Next-Generation VLA”, ed. E. J. Murphy (ASP, San Francisco, CA)
- **(32) PSR J2234+0611: A New Laboratory for Stellar Evolution** (2019) Stovall, K., Freire, P. C. C., Antoniadis, J., ...*Dolch, T.*... et al., Astrophysical Journal, 870, 74
- **(31) Studying the Solar system with the International Pulsar Timing Array** (2018) Caballero, R. N., Guo, Y. J., Lee, K. J., ...*Dolch, T.*... et al., Monthly Notices of the Royal Astronomical Society, 481, 5501
- **(30) The NANOGrav 11-year Data Set: Pulse Profile Variability** (2018) Brook, P. R., Karastergiou, A., McLaughlin, M. A., ...*Dolch, T.*... et al., Astrophysical Journal, 868, 122

- **(29) The NANOGrav 11-Year Data Set: Polarimetry and Pulse Microcomponents** (2018) Gentile, P. A., McLaughlin, M. A., Demorest, P. B., ...*Dolch, T.*... et al., *Astrophysical Journal*, 862, 47
- **(28) The NANOGrav 11-year Data Set: Pulsar-timing Constraints On The Stochastic Gravitational-wave Background** (2018) Arzoumanian, Z.... *Dolch, T.*... et al. (NANOGrav Collaboration), *Astrophysical Journal*, 859, 47
- **(27) The NANOGrav 11-year Data Set: High-precision timing of 47 Millisecond Pulsars** (2018) Arzoumanian, A.... *Dolch, T.*... *Halmrast, D.*... *Jessup, C.* et al. (NANOGrav Collaboration + Hillsdale College students), *Astrophysical Journal Supplement*, 235, 37
- **(26) A Second Chromatic Timing Event of Interstellar Origin toward PSR J1713+0747** (2018) Lam, M. T... *Dolch, T.*, et al., *Astrophysical Journal*, 861, 132
- **(25) Solar-System Studies with Pulsar Timing Arrays** (2018) Caballero, R. N... *IPTA*... et al., *Pulsar Astrophysics the Next Fifty Years*, 337, 154
- **(24) The NANOGrav Nine-Year Data Set: Measurement and Interpretation of Variations In Dispersion Measures** (2017) Jones, M... *Dolch, T.*, et al., *Astrophysical Journal*, 841, 125
- **(23) CANDELS Multiwavelength Catalogs: Source Identification and Photometry in the CANDELS Extended Groth Strip** (2017) Stefanon, M... *Dolch, T.*... et al., *Astrophysical Journal Supplement*, 229, 32
- **(22) CANDELS Multi-Wavelength Catalogs: Source Detection and Photometry in the COSMOS Field** (2017) Nayyeri, H... *Dolch, T.*... et al., *Astrophysical Journal Supplement*, 228, 7
- **(21) The NANOGrav Nine-Year Data Set: Excess Noise in Millisecond Pulsar Arrival Times** (2017) Lam, M. T...*Dolch, T.*... et al., *Astrophysical Journal*, 834, 35
- **(20) The NANOGrav Nine-year Data Set: Mass and Geometric Measurements of Binary Millisecond Pulsars** (2016) Fonseca, E... *Dolch, T.*, et al., *Astrophysical Journal*, 832, 167
- **(19) Statistical Analyses for NANOGrav 5-year Timing Residuals** (2016) Wang, Y... *Dolch, T.*, et al., *Research in Astronomy and Astrophysics*, 17, 19
- **(18) PSR J1024–0719: A Millisecond Pulsar in an Unusual Long-Period Orbit** (2016) Kaplan, D. L... *Dolch, T.*, et al., *Astrophysical Journal*, 826, 86
- **(17) The NANOGrav Nine-Year Data Set: Noise Budget For Pulsar Arrival Times on Intraday Timescales** (2016) Lam, M. T., Cordes, J. M., Chatterjee, S... *Dolch, T.*, et al., *Astrophysical Journal*, 819, 155
- **(16) The NANOGrav Nine-Year Data Set: Monitoring Interstellar Scattering Delays** (2016) Levin, L., McLaughlin, M. A., Jones, G... *Dolch, T.*, et al., *Astrophysical Journal*, 818, 166
- **(15) The NANOGrav Nine-Year Data Set: Astrometric Measurements of 37 Millisecond Pulsars** (2016) Matthews, A... *Dolch, T.*, et al., *Astrophysical Journal*, 818, 92
- **(14) From Spin-Noise to Systematics: Stochastic Processes in the First International Pulsar Timing Array Data Release** (2016) Lentati, L... *Dolch, T.*, et al. (IPTA Collaboration), *Monthly Notices of the Royal Astronomical Society*, 458, 2161
- **(13) The International Pulsar Timing Array: State, Data Challenges and Potential** (2016) Verbiest, J. P. W... *Dolch, T.*, et al. (IPTA Collaboration), *Monthly Notices of the Royal Astronomical Society*, 458, 1267
- **(12) NANOGrav Limits On the Isotropic Stochastic Gravitational Wave Background Using the 9-Year Data Release** (2016) Arzoumanian, Z... *Dolch, T.*, Ellis, J. A... et al. (NANOGrav Collaboration), *Astrophysical Journal*, 821, 13
- **(11) A Measurement of the UV Luminosity Density of the Universe During the Epoch of Reionization** (2015) Mitchell-Wynne, K... *Dolch, T.*, et al. *Nature Communications* 6, 7945
- **(10) The NANOGrav Nine-Year Data Set: Observations, Arrival Time Measurements, and Analysis of 37 Millisecond Pulsars** (2015) Arzoumanian, Z... Demorest, P. B., *Dolch, T.*, et al. (NANOGrav Collaboration), *Astrophysical Journal*, 810, 150
- **(9) NANOGrav Constraints On Gravitational Wave Bursts With Memory** (2015) Arzoumanian, Z... *Dolch, T.*, et al. (NANOGrav Collaboration), *Astrophysical Journal*, 810, 150
- **(8) Testing Theories of Gravitation Using 21-Year Timing of Pulsar Binary J1713+0747** (2015) Zhu, W. W... *Dolch, T.*, et al., *Astrophysical Journal*, 809, 41
- **(7) Pulsar Timing Errors from Asynchronous Multi-frequency Sampling of Dispersion Measure Variations** (2015) Lam, M. T., Cordes, J. M., Chatterjee, C., *Dolch, T.*, *Astrophysical Journal*, 801, 130
- **(6) NANOGrav Limits on Gravitational Waves From Supermassive Black Hole Binaries in Circular Orbits** (2014) Arzoumanian, Z... *Dolch, T.*, et al. (NANOGrav Collaboration), *Astrophysical Journal*, 794, 141
- **(5) Practical Application of Cyclic Spectroscopy to Pulsar Signals** (2013) Jones, G., Cordes, J. M., Demorest, P. B., *Dolch, T.*, McLaughlin, M. A., Palliyaguru, N., Stinebring, D. R. *Radio Science Meeting (USNC-URSI NRSN)*, 2013 US National Committee of URSI National

- (4) **The International Pulsar Timing Array** (2013) Manchester, R. N. & *IPTA*, Classical and Quantum Gravity, 30, 224010
- (3) **CANDELS Multiwavelength Catalogs: Source Identification and Photometry in the CANDELS UKIDSS UDS Field** (2013) Galametz, A., Grazian, A., Fontana, A., *CANDELS Team* Astrophysical Journal Supplement, 206, 10
- (2) **CANDELS: The Cosmic Assembly Near-infrared Deep Extragalactic Legacy Survey – The Hubble Space Telescope Observations, Imaging Data Products, and Mosaics** (2011) Koekemoer, A. M., Faber, S., Ferguson, H. C., Riess A. ...*Dolch, T.*, et al. (CANDELS Collaboration), Astrophysical Journal Supplement, 197, 36
- (1) **CANDELS: The Cosmic Assembly Near-infrared Deep Extragalactic Legacy Survey** (2011) Grogin, N., Kocevski, D., Faber, S., Ferguson, H. C., ... Riess, A.<sup>1</sup> ...*Dolch, T.*, et al. (CANDELS Collaboration), Astrophysical Journal Supplement, 197, 35

## WHITE PAPERS, NON-REFEREED PUBLICATIONS (STUDENTS UNDERLINED)

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- (19) **Snowmass 2021 Cosmic Frontier White Paper: The Dense Matter Equation of State and QCD Phase Transitions** (2022) Bogdanov S., Fonseca E., Kashyap R., Kurkela A., Lattimer J. M., Read J. S., Sathyaaprakash B. S., ...*Dolch, T.* et al., Submitted to the Proceedings of the US Community Study on the Future of Particle Physics (Snowmass 2021), <https://arxiv.org/abs/2209.07412>
- (18) **Heliosphere Meets Interstellar Medium, in a Galactic Context** (2022) Ocker, S. K., Chatterjee, S., ...*Dolch, T.* et al., submitted to the Heliophysics 2024 Decadal Survey, <https://arxiv.org/abs/2208.11804>
- (17) **The Future Of The Arecibo Observatory: The Next Generation Arecibo Telescope** (2021) Anish Roshi, D., ...*Dolch, T.*, et al., <https://arxiv.org/abs/2103.01367>
- (16) **Investigating the Impact of Slicing on Fitted Timing Model Parameters** (2020) Andrews, P., Lam, M. T., *Dolch, T.*, et al., NANOGrav Memo Series #4
- (15) **The Swarm Development Concept for the LWA** (2019) Taylor, G., Dowell, J., Pihlström, Y., ...*Dolch, T.*, et al., BAAS 51, 2
- (14) **Pulsar Timing Arrays: Gravitational Waves from Supermassive Black Holes and More** (2019) Stairs, I., Kaspi, V., Demorest, P., ...*Dolch, T.*, et al., Canadian Long Range Plan for Astronomy and Astrophysics White Papers, 2020, 16
- (13) **Fundamental Physics with Pulsars** (2019) Fonseca, E., Stairs, I., Kaspi, V., ...*Dolch, T.*, et al., Canadian Long Range Plan for Astronomy and Astrophysics White Papers, 2020, 23
- (12) **NANOGrav Education and Outreach: Growing a Diverse and Inclusive Collaboration for Low-Frequency Gravitational Wave Astronomy** (2019) *Dolch, T.*, Baker, P. T., Blumer, H., et al., <https://arxiv.org/abs/1907.07348>
- (11) **Twelve Decades: Probing the Interstellar Medium from kiloparsec to sub-AU scales** (2019) Stinebring, D. R., Chatterjee, S., Clark, S. E., et al., BAAS, 51, 492
- (10) **The Virtues of Time and Cadence for Pulsars and Fast Transients** (2019) Lynch, R., Brook, P., Chatterjee, S., ...*Dolch, T.*... et al., BAAS, 51, 461
- (9) **Magnetic Fields of Extrasolar Planets: Planetary Interiors and Habitability** (2019) Lazio, J., Hallinan, G., Airapetian, A., ...*Dolch, T.*, et al., BAAS, 51, 135
- (8) **Interpreting the Recent Upper Limit on the Gravitational Wave Background from the Parkes Pulsar Timing Array** (2016) *The NANOGrav Collaboration*, <http://arxiv.org/abs/1602.06301>
- (7) **Astrophysical Studies with New Horizons Instruments During an Extended Mission** (2015) Zemcov, M., Cooray, A. R... *T. Dolch*, et al. internal white paper for New Horizons Science Team coordinated for NASA Astrophysics Science Mission Directorate
- (6) **Morphologies of low-redshift AGN host galaxies: what role does AGN luminosity play?** (2013) Villforth, C... *CANDELS Collab.* Proceedings of the conference “Nuclei of Seyfert galaxies and QSOs – Central engine & conditions of star formation” held in Bonn, Germany, 2012
- (5) **Discovery of a Type Ia Supernova in MACSJ1423** (2013) Rodney, S. A., Holoien, T., Jones, D. O., Graur, O., Frederiksen, T., *CANDELS Team*, The Astronomer’s Telegram, #4778
- (4) **Why Gravitational Wave Science Needs Pulsar Timing Arrays And Why Pulsar Timing Arrays Need Both Arecibo and the GBT: A Response to the NSF-AST Portfolio Review from the NANOGrav Collaboration** (2012) *The NANOGrav Collaboration*, <http://arxiv.org/abs/1210.5998>
- (3) **Optical and Infrared Backgrounds From the Hubble Space Telescope** (2012) *Dolch, T.*, Ph. D. Thesis, <http://adsabs.harvard.edu/abs/2012PhDT.....142D>



- **(2) A New Era in Extragalactic Background Light Absolute and Fluctuation Measurements** (2009)  
Cooray, A. R... *Dolch, T....* Mather, J., et al. Astro2010: Science White Papers, no. 54
- **(1) Extragalactic Background Light Measurements Outside the Interplanetary Cloud** (2008), *Dolch, T.,* Ferguson, H. C., Petro, L., internal white paper responding to NASA “New Science Investigations Using Existing NASA Spacecraft” Request For Information

## INVITED RESEARCH TALKS

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<b>American Association of Physics Teachers Summer Meeting</b> <i>Boston, MA</i>	7/2024
<b>Lunch Talk</b> <i>National Radio Astronomy Observatory, Socorro, NM</i>	6/2024
<b>LAASTRO Astrophysics Seminar</b> <i>Los Alamos National Laboratory, Los Alamos, NM</i>	6/2024
<b>Student-Driven Radio Observations of the Sun and the Ionosphere During the 2024 Total Solar Eclipse</b> <i>Cleveland State University, OH</i>	2/2024
<b>Physics Colloquium</b> <i>Grand Valley State University, Grand Rapids, MI</i>	12/2023
<b>Physics &amp; Astronomy Colloquium</b> <i>University of New Mexico, Albuquerque, NM</i>	9/2023
<b>Nuclear Theory Seminar</b> <i>Los Alamos National Laboratory, Los Alamos, NM</i>	6/2023
<b>NRAO Socorro Friday Colloquium</b> <i>National Radio Astronomy Observatory, Socorro, NM</i>	5/2022
<b>Department of Physics Seminar</b> <i>Cleveland State University, Cleveland, OH</i>	3/2022
<b>Center for Astrophysics Research and Technology Seminar</b> <i>University of New Mexico, Albuquerque, NM</i>	11/2021
<b>LAASTRO Astrophysics Seminar</b> <i>Los Alamos National Laboratory, Los Alamos, NM</i>	9/2021
<b>Astrophysics Colloquium, Department of Physics &amp; Astronomy</b> <i>Michigan State University, East Lansing, MI</i>	10/2019
<b>Colloquium, Department of Physics</b> <i>College of Wooster, Wooster, OH</i>	4/2019
<b>International Union of Radio Science (URSI) National Radio Science Meeting Special Session “Cosmology and Astrophysics at Low Radio Frequencies”</b> <i>University of Colorado, Boulder, CO</i>	1/2019
<b>Friday Lunch Seminar Hour</b> <i>National Optical Astronomy Observatory, Tucson, AZ</i>	10/2017
<b>Status Report: The IPTA’s 24-hr, Global Campaign on Pulsar J1713+0747</b> <i>IPTA Meeting, Leura, Australia (given remotely from Hillsdale, MI)</i>	7/2015
<b>Physics Seminar, Department of Physics and Chemistry</b> <i>Keene State College, Keene, NH</i>	3/2015
<b>Physics Seminar, Department of Physics and Chemistry</b> <i>LaGrange College, LaGrange, GA</i>	3/2015
<b>Seminar, Department of Physics</b> <i>Hillsdale College, Hillsdale, MI</i>	3/2015
<b>Colloquium, Department of Physics and Astronomy</b> <i>Ithaca College, Ithaca, NY</i>	3/2015
<b>Colloquium, Department of Physics and Astronomy</b> <i>Oberlin College, Oberlin, OH</i>	2/2015

<b>Physics Seminar, Department of Physics</b> <i>Trinity University, San Antonio, TX</i>	11/2014
<b>IPTA Science Week Preview Talk</b> <i>IPTA Student Week, Banff, AB, Canada</i>	6/2014
<b>Special Astrophysics Seminar, Department of Physics</b> <i>McGill University, Montreal, QC, Canada</i>	4/2014
<b>Colloquium, Department of Physics (YouTube: <a href="https://goo.gl/D0bDx2">https://goo.gl/D0bDx2</a>)</b> <i>University of Vermont, Burlington, VT</i>	4/2014
<b>Colloquium, Department of Astronomy</b> <i>Cornell University, Ithaca, NY</i>	3/2014
<b>Colloquia</b> <i>Arecibo Observatory, Arecibo Observatory, Puerto Rico</i>	2/2014, 8/2012
<b>Center for Astrophysical Sciences Seminar</b> <i>Johns Hopkins University, Baltimore, MD</i>	5/2011
<b>Colloquium, Department of Physics</b> <i>Université Laval, Québec, QC, Canada</i>	3/2011
<b>Colloquium, Department of Physics and Astronomy</b> <i>Oberlin College, Oberlin, OH</i>	3/2011

#### CONTRIBUTED RESEARCH TALKS (STUDENT AUTHORS UNDERLINED)

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<b>Epoch-dependent Interstellar Scintillations and Timing Variations for Millisecond Pulsar B1937+21</b> <i>International Pulsar Timing Array Meeting, Sesto, Italy</i>	6/2024
<b>Radio Observations During the 2024 Total Solar Eclipse: Cassiopeia A, Cygnus A, Taurus A, and the Sun</b> <i>Compact Objects in Michigan and Ontario, Henry Ford College, Dearborn, MI</i>	5/2024
<b>Epoch-dependent Interstellar Scintillations and Timing Variations for Millisecond Pulsar B1937+21</b> <i>NANOGrav Spring Meeting (virtual)</i>	3/2024
<b>Observations at Long Wavelength Array Frequencies During the 2024 Total Solar Eclipse</b> <i>American Astronomical Society Meeting, New Orleans, LA</i>	1/2024
<b>Epoch-dependent Interstellar Scintillations and Timing Variations for the Millisecond Pulsar B1937+21</b> <i>American Astronomical Society Meeting, Albuquerque, NM</i> <i>Dolch, T., ...<u>Jessup, C.</u> ...<u>Jones, N.</u>, <u>Scheithauer, C.</u>, et al.</i>	6/2023
<b>Observations at LWA Frequencies During the 2024 Total Solar Eclipse</b> <i>LWA Users Meeting, Albuquerque, NM</i>	6/2023
<b>A Multiwavelength Characterization of the Guitar Nebula and Its Radio Pulsar</b> <i>American Astronomical Society Meeting, Seattle, WA</i> <i>Dolch, T., ...<u>Armstrong, L.</u> ...<u>Salo, L.</u>, et al.</i>	1/2023
<b>Bubble Expansion in the Guitar Nebula</b> <i>Fall NANOGrav Meeting 2022, University of Wisconsin–Milwaukee</i>	10/2022
<b>The Student Teams of Astrophysics ResearcherS (STARS) Undergraduate Program in the North American Nanohertz Observatory for Gravitational Waves</b> <i>American Astronomical Society Meeting, Pasadena, CA (deferred from canceled January AAS meeting)</i> <i>Dolch, T., ...<u>West, N.</u>, et al.</i>	6/2022
<b>The LWA and Contributions to NANOGrav and Pulsar Wind Nebula Science</b> <i>Spring NANOGrav Meeting 2022, Flatiron Institute, NY</i>	3/2022
<b>The LWA-Swarm Radio Telescope: Bringing the Benefits of New Mexico's Long-Wavelength Array to Undergraduate-focused Academic Institutions</b> <i>New Mexico Symposium, Socorro, NM</i>	11/2021

<b>The LWA Swarm and Pulsar Astrophysics</b> <i>LWA Users Meeting, Albuquerque, NM</i>	8/2021
<b>Deconvolving Pulsar Signals with Cyclic Spectroscopy: A Systematic Evaluation</b> <i>Compact Objects in Michigan and Ontario, Wayne State University (remote)</i>	5/2021
<b>Deconvolving Pulsar Signals with Cyclic Spectroscopy: A Systematic Evaluation</b> <i>American Physical Society April Meeting (remote)</i>	4/2021
<b>Deconvolving Pulsar Signals with Cyclic Spectroscopy: A Systematic Evaluation</b> <i>American Astronomical Society Winter Meeting (remote)</i>	1/2021
<b>Deconvolving Pulsar Signals with Cyclic Spectroscopy: A Systematic Evaluation</b> <i>Fall NANOGrav Meeting 2020, Vanderbilt University (remote)</i>	10/2020
<b>Deconvolving Pulsar Signals with Cyclic Spectroscopy: A Systematic Evaluation</b> <i>Midwest Relativity Meeting 2020, Notre Dame University (remote)</i>	10/2020
<b>Deconvolving Pulsar Signals with Cyclic Spectroscopy: A Systematic Evaluation</b> <i>IPTA Catch-Up Meeting 2020, Hobart, Australia (remote)</i>	9/2020
<b>The LWA and Pulsar Timing Arrays</b> <i>LWA Users Meeting, Albuquerque, NM (remote)</i>	7/2020
<b>First Light for Station V of the Low-Frequency All-Sky Monitor Radio Telescope</b> <i>AP-S/URSI Meeting, Montreal, QC (remote)</i> <i>Dolch, T., Andrews, P. ...Dulemba, A. ...Niedbalski, S., Ramette, C., Smith, S., et al.</i>	7/2020
<b>Student Teams of Astrophysics ResearcherS (STARS) in the North American Nanohertz Observatory for Gravitational Waves</b> <i>American Astronomical Society Summer Meeting, Madison, WI (remote)</i>	6/2020
<b>Update on the North American Nanohertz Observatory for Gravitational Waves</b> <i>Compact Objects in Michigan and Ontario, Michigan State University (remote)</i>	6/2020
<b>Education and Public Outreach in the North American Nanohertz Observatory for Gravitational Waves Physics Frontiers Center</b> <i>APS April Meeting, Washington, DC (remote)</i>	4/2020
<b>New Pulsar Detections with the LWA</b> <i>NANOGrav Spring Meeting, University of Central Florida, Orlando, FL (remote)</i>	3/2020
<b>Education and Public Outreach in the North American Nanohertz Observatory for Gravitational Waves Physics Frontiers Center</b> <i>American Astronomical Society Winter Meeting, Honolulu, HI</i>	1/2020
<b>The Benefits of a Long-Wavelength Array (LWA) “Swarm” Telescope for NANOGrav + Recent Student Project Overviews</b> <i>Fall 2019 NANOGrav Meeting, Cornell University, Ithaca, NY</i>	10/2019
<b>The North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Pulsar Timing Array</b> <i>APS Midwest Relativity Meeting, Grand Valley State University, MI</i>	10/2019
<b>There and Back Again: How the Stinebring Pulsar Lab Taught Me the Art of Growing a Student Research Group</b> <i>Stinebring Retirement Symposium, Oberlin College, Oberlin, OH</i>	5/2019
<b>The North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Pulsar Timing Array</b> <i>Compact Objects in Michigan Workshop, Wayne State University</i>	3/2019
<b>Low-Frequency Radio Searches Supporting Gravitational-Wave Detection</b> <i>International Pulsar Timing Array Meeting, Albuquerque, NM</i>	6/2018
<b>Introduction to Radio Pulsars</b> <i>Low-Frequency All-Sky Monitor Team Leader Meeting, Washington, DC</i>	6/2018
<b>Low-Frequency Radio Searches Supporting Gravitational-Wave Detection</b> <i>American Physical Society Meeting, Columbus, OH</i>	4/2018

<b>The North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Pulsar Timing Array</b>	10/2017
<i>Midwest Relativity Meeting, Ann Arbor, MI</i>	
<b>Noise Budget and Interstellar Medium Mitigation in NANOGrav</b>	7/2017
<i>12th Amaldi Conference on Gravitational Waves, Pasadena, CA</i>	
<b>Analyzing Single Pulses in the J1713 24-hr Global Campaign</b>	7/2017
<i>IPTA Meeting, Sevrès, France</i>	
<b>Interstellar Medium Effects on Radio Pulsars PSR B1937+21 and PSR B2224+65, and Implications for Gravitational Wave Detection</b>	1/2017
<i>American Astronomical Society Winter Meeting, Grapevine, TX</i>	
<i>T. Dolch... D. Halmrast, C. Jessup... J. Ramette, et al.</i>	
<b>Searching for H-alpha Bow-Shocks around NANOGrav Pulsars</b>	10/2016
<i>IFall NANOGrav Meeting, University of Illinois, Urbana-Champaign</i>	
<b>The Interstellar Medium and Dense Pulsar Timing Campaigns in the Era of MeerKAT, CHIME, and Beyond</b>	6/2016
<i>IPTA Meeting, Stellenbosch, South Africa</i>	
<b>Recent H-alpha Results on Pulsar B2224+65's Bow-Shock Nebula, the "Guitar"</b>	1/2016
<i>6th Fermi Asian Meeting Workshop, Muju, South Korea</i>	
<b>Small-Scale Extragalactic Background Fluctuations with the CANDELS fields</b>	7/2015
<i>CANDELS Meeting, UC Santa Cruz, Santa Cruz, CA</i>	
<b>Intermediate Frequency Gravitational Wave Determination in the Microhertz to Millihertz Band Using Dense Pulsar Timing Campaigns</b>	6/2015
<i>11th Amaldi Conference on Gravitational Waves, Gwangju, South Korea</i>	
<b>Intermediate Frequency Gravitational Wave Determination in the 10 micro-Hertz to 20 milli-Hertz Band Using Dense Pulsar Timing Campaigns</b>	4/2015
<i>American Physical Society Meeting, Baltimore, MD</i>	
<b>On Gravitational Wave Limit Determination in the 10 micro-Hertz to 20 milli-Hertz Band Using Millisecond Pulsar Timing</b>	1/2015
<i>American Astronomical Society Winter Meeting, Seattle, WA</i>	
<b>Recent Happenings with Cyclic Spectroscopy and Other ISM Matters</b>	12/2014
<i>NANOGrav Science Seminar (given remotely from Ithaca, NY)</i>	
<b>What Is the Near-IR/Optical Background Trying to Tell Us?</b>	11/2014
<i>Astronomy Lunch Talk, Cornell University, Ithaca, NY</i>	
<b>The J1713+0747 Global Campaign</b>	6/2014
<i>IPTA Meeting, Banff, AB, Canada</i>	
<b>Update on the J1713+0747 Global Campaign</b>	2/2014
<i>Spring NANOGrav Meeting, Arecibo Observatory, Puerto Rico</i>	
<b>A Day in the Life of Millisecond Pulsar J1713+0747</b>	1/2014
<i>American Astronomical Society Winter Meeting, Washington, DC</i>	
<b>Preliminary Results From the J1713+0747 Global Campaign</b>	10/2013
<i>Fall NANOGrav Meeting, Franklin and Marshall College, Lancaster, PA</i>	
<b>A Systematic Evaluation of Deconvolution With Cyclic Spectroscopy</b>	6/2013
<i>IPTA Meeting, Krabi, Thailand</i>	
<b>Summary of the J1713+0747 Global Campaign</b>	5/2013
<i>Spring NANOGrav Meeting, Green Bank Observatory, Green Bank, WV</i>	
<b>High-Frequency Interstellar Scattering of Pulsar B1937+21</b>	1/2013
<i>Aspen Center for Physics, Aspen, CO</i>	
<b>Covariances Between ISM and Timing Parameters in MSPs</b>	6/2012
<i>IPTA Meeting, Kiama, Australia</i>	
<b>Optical and Infrared Backgrounds from HST and Beyond</b>	5/2011
<i>American Astronomical Society Dissertation Talk, Boston, MA</i>	
<i>T. Dolch, H. C. Ferguson, A. M. Koekemoer, R. Chary, A. Cooray, S. Ravindranath, T. Sukhbold</i>	

**SELECTED POSTERS (RESEARCH STUDENT AUTHORS UNDERLINED)**

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- **A Bow-Shock Pulsar Wind Nebula Search in Deep Images** (2024) Lennington, H.... *Dolch, T., et al.*, LAUREATES poster symposium, Hillsdale College
- **Giant Pulses: Single Pulse Search on Pulsar J1713+0747** (2024) Lettow, P.... *Dolch, T., et al.*, LAUREATES poster symposium, Hillsdale College
- **Construction of Radio Interferometer for Ionospheric Measurements During 2024 Solar Eclipse** (2024) Petullo, J., Reed, P.,... *Dolch, T., et al.*, LAUREATES poster symposium, Hillsdale College
- **Searching for Bow-Shock Pulsar Wind Nebulae in Archived Datasets** (2024) Sibert, N.... *Dolch, T., et al.*, LAUREATES poster symposium, Hillsdale College
- **Cyclic Spectroscopy-Aided Studies of the ISM in PTA Observing Setups** (2024) *Turner, J., Dolch, T....* C. Jessup Astronomical Society Meeting #243 402.22
- **The NANOGrav Student Teams of Astrophysics ResearcherS (STARS) Program** (2023) *Crawford, F., Dolch, T., & Nanograv Physics Frontiers Center*, American Astronomical Society Meeting #241 171.01
- **Short-Timescale Gravitational Waves in the North American Nanohertz Observatory for Gravitational Waves** (2022) West, N.... *Dolch, T., et al.*, LAUREATES poster symposium, Hillsdale College
- **Investigating the Impact of Data Set Slicing on Pulsar Timing Model Fit Parameters** (2021) Andrews, P.... *Dolch, T., et al.*, LAUREATES poster symposium, Hillsdale College
- **Determining Potential Causes for Micro-components in J1713+0747 Pulsar Data using Machine Learning** (2021) Dulemba, A.... *Dolch, T., et al.*, LAUREATES poster symposium, Hillsdale College
- **NANOGrav Space Public Outreach Team (SPOT)** (2021) *McMann, N., Key, J., Page, J., Dolch, T., Littenberg, T.*, American Astronomical Society Meeting #237 335.11
- **Student Teams of Astrophysics ResearcherS (STARS) in the North American Nanohertz Observatory for Gravitational Waves** (2020) *Dolch, T., Crawford, F., & Nanograv Physics Frontiers Center* 2020, American Astronomical Society Meeting #235 102.07
- **NANOGrav: cyberinfrastructure supporting training and outreach** (2020) *Brazier, A., Chatterjee, S., Cordes, J... Dolch, T., et al.*, American Astronomical Society Meeting Abstracts #235 235 102.02
- **Distinguishing Bright Pulses from RFI via Machine Learning Using Single-Pulse Data from PSR J1713+0747** (2019) Forman, D., Dolch, T., Lewandowska, N., et al., American Astronomical Society Meeting #233, 153.15
- **NANOGrav: Data Accessibility, Analysis and Automation using Python** (2019) *Brazier, A., Lam, M. T., Garver-Daniels, N., ...Dolch, T.... et al.*, American Astronomical Society Meeting #233, 149.18
- **A Second Chromatic Timing Event of Interstellar Origin toward PSR J1713+0747** (2019) *Lazio, T. J. W., Lam, M. T., Ellis, J., ...Dolch, T.... et al.*, American Astronomical Society Meeting #233, 149.04
- **Bow-Shock Pulsar Wind Nebulae Searches Aided by the North American Nanohertz Observatory for Gravitational Waves** (2018) Giannakopoulos, C.... *Dolch, T.... Salo, L., et al.*, American Physical Society Meeting, L01.00015, Columbus, OH
- **Observations of the Guitar Nebula Pulsar with the Green Bank Telescope and the Long-Wavelength Array** (2018) Salo, L.... *Dolch, T., et al.*, American Physical Society Meeting, L01.00014, Columbus, OH
- **Observations of the Guitar Nebula Pulsar with the Green Bank Telescope and the Long-Wavelength Array** (2018) *Salo, L.... Dolch, T., et al.*, LAUREATES poster symposium, Hillsdale College
- **Current Status of The Low Frequency All Sky Monitor** (2018) *Dartez, L. P... Dolch, T., et al.*, American Astronomical Society Meeting #225, #442.01
- **The NANOGrav Observing Program: Automation and Reproducibility** (2018) *Brazier, A... Dolch, T., et al.*, American Astronomical Society Meeting #231, #255.18
- **Characterizing Galactic Scintillations of Fast Radio Bursts using Radio Pulsars** (2017) *Lam, M. T., Cordes, J. M., McLaughlin, M. A., Dolch, T., Jessup, C., Chatterjee, S.*, Fast Radio Bursts: New Probes of Fundamental Physics and Cosmology, Aspen, CO
- **Upper Limits on High-Frequency Single-Source Gravitational Waves** (2017) Halmrast, D.... *Dolch, T., et al.*, American Astronomical Society Meeting #225, #242.18
- **Gravitational Wave Limits From Two Pulsar Datasets** (2017) Halmrast, D.... *Dolch, T., et al.*, LAUREATES poster symposium, Hillsdale College

- **Upper Limits on High-Frequency Single-Source Gravitational Waves** (2016) Halmrast, D.... Dolch, T., et al., 2016 International Pulsar Timing Array Meeting, Stellenbosch, South Africa
- **Measuring Changes in Scattering Parameters of Millisecond Pulsar B1937+21 Over Multiple Epochs** (2016) Jessup, C.... Dolch, T., et al., 2016 International Pulsar Timing Array Meeting, Stellenbosch, South Africa
- **Recent Results on Pulse Jitter and Other Single Pulse Properties of Pulsar J1713+0747** (2014) Rosenblum, J., Chatterjee, S., Cordes, J. M., Crawford, F., Dolch, T., Lam, M. T., McLaughlin, M. A., Paliyaguru, N., Stinebring, D. R., American Astronomical Society Meeting #223, #153.17
- **Measurements of the Fluctuations of the Cosmic Infrared Background Using HST CANDELS and SpUDS Data** (2013) Nelson, C., Smidt, J., Cooray, A. R., Dolch, T., Ferguson, H. C., et al., American Astronomical Society Meeting #221, #341.19
- **Infrared Background Fluctuations on Small Spatial Scales** (2010) Dolch, T., Ferguson, H. C., Koekemoer, A. M., Chary, R. R., Cooray, A. R., American Astronomical Society Meeting #215, #463.15
- **The Maryland Space Grant Observatory: Public Outreach, Collaboration With HST** (2010) Dolch, T., Teays, T., Henry, R. C., American Astronomical Society Meeting #215, #600.03
- **A Comparison of Galaxy Counts from Recent Surveys** (2006) Dolch, T., Ferguson, H. C., American Astronomical Society Meeting #207, #22.04
- **A K-Selected Candidate Galaxy Cluster with  $z \sim 0.9$  in the NOAO Deep Wide Field Survey** (2003) Dolch, T., Eisenhardt, P., Stern, D., Dey, A., Jannuzi, B., Brown, M., Tiede, G., American Astronomical Society Meeting #201, #78.05
- **“The View from 5 AU”** (Workshop at the UC Irvine, 2010), poster presentation
- **“The First Galaxies, Quasars, and Gamma-Ray Bursts”** (Conference at Penn. State University, 2010), poster presentation
- **87 other co-authored or all-collaboration** presentations (posters and talks) at American Astronomical Society Meetings

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#### ACCEPTED TELESCOPE OBSERVING-TIME PROPOSALS (AS PRINCIPAL INVESTIGATOR OR PRIMARY WRITER)

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- **NRAO Very Large Array (2024; PI - Dolch)**: An Unidentified Ultra-Steep Spectrum Source (2 hr)
- **Long-Wavelength Array (2019, 2022; PI - Dolch)**: New Pulsar Detections with the LWA (20+ hr), Crab Giant Pulse Search (Director’s Discretionary time)
- **Green Bank Observatory 18B-321 (2018, PI - Dolch)**: Continuing Monitoring DM Variations of PSR B2224+65, the “Guitar Nebula” Pulsar (12h). Also included simultaneous observations from a separate observatory, the Long Wavelength Array.
- **Kitt Peak National Observatory WIYN Telescope (2018, 2019; PI - Dolch)**: A KPNO H $\alpha$  Search for Radio Pulsar Bow-Shock Nebula. 4 more nights awarded in 7/2018. 6 remote nights in 2019.
- **Palomar Observatory (2018)**: An H $\alpha$  Search for Radio Pulsar Bow-Shock Nebula (2 nights)
- **Arecibo Observatory P3178 (2017; PI - Dolch)**: A Possible Pulsar: VLA J0636+1838. 4 hours awarded in 2017.
- **Kitt Peak National Observatory 4 m Mayall Telescope (2016, 2017; PI - Dolch)**: A KPNO H $\alpha$  Search for Radio Pulsar Bow-Shock Nebula. 24 more nights awarded in 2017.
- **Green Bank Observatory 16B-366 (2016, PI - Dolch)**: Monitoring DM Variations of PSR B2224+65, the “Guitar Nebula” Pulsar (12h). Also includes simultaneous observations from a separate observatory, the Long Wavelength Array.
- **Palomar Observatory (2015)**: An H $\alpha$  Search for Radio Pulsar Bow-Shock Nebula (1 night), public summary: <https://tinyurl.com/ybanewan>
- **Palomar Observatory (2014)**: New and Revisited H $\alpha$  Imaging of Radio Pulsar Bow-Shock Nebula (2 nights)
- **Discovery Channel Telescope, Lowell Observatory (2014)**: The Guitar Nebula After 23 Years (1 night)
- **Arecibo Observatory P2800 (2012, PI - Dolch)**: Redo After Equipment Problem (1hr)
- **Arecibo Observatory P2676 (2011, PI - Dolch)**: NANOGrav Precision Timing: ISM Irregularities Toward Pulsar B1937+21 (10hr)

## ACCEPTED OBSERVING-TIME PROPOSALS (AS CO-INVESTIGATOR)

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- 13 Green Bank Telescope, 2013 – 2024
- 3 Long Wavelength Array, 2013 – 2022
- 1 Five-hundred-meter Aperture Spherical Telescope (FAST), 2021
- 6 NRAO Very Large Array, 2016 – 2021
- 6 Arecibo Observatory, 2011 – 2016
- 1 Hubble Space Telescope, 2009 – 2014: CANDELS collaboration proposal HST-GO-12060 \$6.5M (2009, PI: Faber & Ferguson)

## OBSERVATORY INVOLVEMENT

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- Participated in Construction of Long-Wavelength Array Swarm Mini-Station and Deployable Low-Band Ionosphere and Transient Experiment (radio telescopes) – Socorro, NM: during 2021–2024 visits to UNM, including 2021–2022 sabbatical, helped the LWA team build the first 64-antenna mini-station at the VLA North Arm with students, and to upgrade DLITE
- Observer with the Long-Wavelength Array (radio telescope) – Socorro, NM: 15 hr
- Observer with Kitt Peak National Observatory WIYN Telescope – Kitt Peak, AZ: 4 nights on-site, 6 nights remotely
- Observer with Kitt Peak National Observatory 4 m Mayall Telescope – Kitt Peak, AZ: 4 nights
- Observer with Kitt Peak National Observatory 2.1 m Telescope – Kitt Peak, AZ: 2 nights
- Observer with Palomar Observatory 200-inch Telescope – Palomar Mountain, CA: 5 nights
- Observer with the Green Bank Telescope – Green Bank, WV: 7 hr on-site, 146 hr remotely
- Observer with Arecibo Observatory (radio telescope)– Arecibo, PR: 11 hr on-site, 188.5 hr remotely
- Project Leader for the 24 Hour Global Observational Campaign of Pulsar J1713+0747: scheduled and managed a 24-hr long, nine-telescope observation with the Arecibo, Effelsberg, GBT, GMRT, Lovell, LOFAR, Nançay, Parkes, and WSRT radio telescopes

## Teaching

## HILLSDALE STUDENT BLOG POSTS

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- Physics, Philosophy, and Sci-fi: <https://www.hillsdale.edu/hillsdale-blog/uncategorized/physics-philosophy-and-sci-fi/>
- Pursuing Pulsars: Physics at a Liberal Arts College: <https://www.hillsdale.edu/hillsdale-blog/hillsdale-blog/pursuing-pulsars-physics-at-a-liberal-arts-college/>
- Gravitational Waves and Great Walls: A Summer Abroad in China: <https://www.hillsdale.edu/hillsdale-blog/academics/gravitational-waves-and-great-walls-a-summer-abroad-in-china/>

## HILLSDALE COLLEGE COURSES TAUGHT

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- Physics 202, University Physics II (Spring 2023, 2024): Calculus-based introductory physics course focusing on electricity, magnetism, and thermodynamics using Young and Freedman. For physics, chemistry, and pre-engineering students. Also taught labs and recitation sections. ~20 students.
- Collegiate Scholars Program 252/6/7/8/1, Physics & Philosophy in Cinematic Science Fiction (Fall 2017–Fall 2024): A 1-credit seminar class for students primarily in the Collegiate Scholars Program, focusing on *Interstellar* and reading Kip Thorne's *The Science of Interstellar*. ~13 students.
- Physics 393, Signal Processing in Astrophysics (Fall 2023): At students' request, developed and taught course on radio telescope instrumentation, using the on-campus radio telescope, The Low-Frequency All-Sky Monitor. Exercises to become book chapter of *Radio Telescope Instrumentation for Teaching*. ~7 students.
- Physics 393, General Relativity (Fall 2023, Spring 2021, Spring 2016 as PHY597): At students' request, developed and taught course on relativity. The first half is special relativity and the second half is general relativity. Used Hartle. ~6 students, a mix of juniors and seniors.

- **Physics 350, Computational Physics (Fall 2023; Spring 2020, 2019):** Physics simulations in Python. ~15 students.
- **Collegiate Scholars Program 101, The Liberal Arts Tradition (Fall 2023):** A 1-credit seminar class for students primarily in the Collegiate Scholars Program, on Boethius' *Consolation of Philosophy*. ~10 students.
- **Physics 597-01, Physics Seminar (Fall 2023, Fall 2018 – Fall 2020):** organized weekly speaker series including faculty, outside speakers, and current students. Geared toward potential physics majors, primarily freshman.
- **Physics 202, University Physics II (Spring 2023):** Calculus-based introductory physics course focusing on electricity, magnetism, and thermodynamics using Young and Freedman. For physics, chemistry, and pre-engineering students. Also taught labs and recitation sections. ~20 students.
- **Physics 410, Electronics (Fall 2022):** Electronics course and lab for upper-level physics majors. 6 students.
- **Physics 460, Electricity and Magnetism (Spring 2017 – Spring 2021):** Course for physics majors using Griffiths. In addition to Griffiths, I used the book *Div, Grad, Curl and All That*. Emphasis is on vector calculus and Maxwell's equations. ~7 students.
- **Physics 100, Great Principles of Physics (Fall 2016 – Spring 2021):** Semester-long update and expansion of half-semester Science 101. Developed WorldWide Telescope lab. Core Curriculum requirement for non-science majors. Taught lectures and labs. Used StarLab inflatable planetarium. ~30 students.
- **Physics 201, University Physics I (Fall 2017 – Fall 2020):** Calculus-based introductory physics course focusing on mechanics, using Young and Freedman. For physics, chemistry, and pre-engineering students. Also taught labs and recitation sections. ~30 students.
- **Physics 575, Senior Thesis (Fall 2016 – Fall 2020):** 8 students.
- **Physics 597-01, Relativity (Spring 2020):** 2 students.
- **Physics 304, Theoretical Physics II (Spring 2019):** optics, special relativity, modern physics for sophomore physics majors. ~6 students.
- **Physics 120, Astronomy (Spring 2018):** Overview of astronomy for non-science majors, focusing on stars, galaxies, and extragalactic astronomy. Used Greenstein. Used StarLab inflatable planetarium. ~10 students.
- **Physics 311, Experimental Physics II (Spring 2017 – Spring 2019):** Advanced physics lab for majors, involving topics such as X-ray diffraction and superconductivity with a focus on error analysis. ~3 students.
- **Physics 101, College Physics (Fall 2016):** Algebra-based introductory physics course, focusing on mechanics, using Serway and Vuille. Targets biology majors and pre-medical students. Also taught labs and recitation sections. Conducted weekly Sunday night review sessions. ~40 students.
- **Science 101 (Fall 2015 – Spring 2016):** Introductory physics class for non-science majors, as part of Core Curriculum, in conjunction with a separate lab class. Used Hobson. Taught lectures and labs. ~30 students per half-semester (taken with a half-semester of chemistry), with ~60 students over the semester. The class involved demonstrations, audio-visual aids, telescope sessions, and real-time clicker responses.
- **Physics 490, Quantum Mechanics (Fall 2015):** First class in quantum mechanics for physics majors. Used Griffiths, Chapters 1–4. Incorporated complementary materials such as applets, other textbooks, and real-time clicker responses. 5 students, a mix of juniors and seniors.

#### *Hillsdale Independent Studies*

- **Physics 597, Radio Astronomy (Fall 2018 – Spring 2024):** 28 students.
- **Physics 597-01, Research in Astrophysics (Fall 2022):** 1 student.
- **Physics 597-01, Machine Learning / Pulsars (Fall 2020):** 2 students.
- **Physics 597-02, Radio Astronomy and Machine Learning (Spring 2020):** 2 students.
- **Physics 597-01, Machine Learning / Astrophysics (Spring 2019):** 1 student.
- **Physics 597-02, Astrophysics (Spring 2019):** 4 students.
- **Physics 597-04, Pulsar Astronomy (Fall 2018):** 4 students.
- **Physics 597, Pulsar Astrophysics (Fall 2015 – Spring 2018):** 21 students.
- **Physics 597-03, Research in Astronomy (Spring 2018):** 1 student.
- **Physics 597-03, Pulsar Observation (Spring 2017):** 1 student.
- **Physics 597-04, Astrophysical Research (Spring 2017):** 1 student.

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#### JOHNS HOPKINS UNIVERSITY COURSES

- **Teaching Assistant (2004 – 2005):** Physics for Biological Science Majors and General Physics Laboratory



## STUDENT RESEARCH SUMMARY

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- Supervised 34 Hillsdale research students, including 11 senior undergraduate physics theses; involved 35 Hillsdale students in Student Teams of Astrophysics ResearcherS (STARS) group

## PHYSICS SENIOR THESIS PROJECTS ADVISED

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- **Nathan Sibert** Senior Thesis: “Investigating a Potential Pulsar Wind Nebula and Candidates for PSR B0904+77” (2024). Based on 2023 summer LAUREATES project at Hillsdale.
- **Whit Lewis** Senior Thesis: “Improving St. George Through Pressure Regulation of the HIPPO Gas Jet Target” (2024). Based on 2023 REU at Notre Dame University.
- **Nicholas West** Senior Thesis: “Short-Timescale Gravitational Waves in the North American Nanohertz Observatory for Gravitational Waves” (2022). Based on 2021 summer LAUREATES project at Hillsdale.
- **Alexander Dulemba** Senior Thesis: “Machine Learning and Transient Astronomy with the Low-Frequency All-Sky Monitor V and the North American Nanohertz Observatory for Gravitational Waves” (2022). Based on 2020 summer LAUREATES project at Hillsdale.
- **Shane Smith** Senior Thesis: “The Breakthrough Listen Search for Intelligent Life: A Wideband Radio Technosignature Search Toward Proxima Centauri” (2021). Based on 2020 summer REU program at Berkeley SETI Institute.
- **Philip Andrews** Senior Thesis: “Investigating the Impact of Data Slicing on Pulsar Timing Model Fit Parameters” (2020). Based on 2020 LAUREATES program, with Prof. Michael Lam (RIT) and me. Writeup published in official NANOGrav memo series: <http://nanograv.org/assets/files/memos/NANOGrav-Memo-004.pdf>
- **Joseph Harvey** Senior Thesis: “Developing a Climatometer: Toward an Objective Metric for Climate Replication with Machine Learning” (2020). Based on 2020 summer REU program.
- **David Forman** Senior Thesis: “A Classification Approach To Identify Seabed Geoacoustic Profiles via Deep Learning” (2020). Based on 2019 summer REU program.
- **Christos Giannakopoulos** Senior Thesis: “Identifying New Possible Bow-Shock Nebulae And Surface Brightness Upper Limit Determination” (2020). Supported from LAUREATES fund. Poster at APS April Meeting in Columbus, OH.
- **Charles (Jay) Rose** Senior Thesis: “Backend Electronics for the Low-Frequency All-Sky Monitor” (2019). Supported from LAUREATES fund.
- **Daniel Halmrast** Senior Thesis: “Detecting High Frequency Gravitational Waves” (2017). While LAUREATES student, presented poster at IPTA meeting in South Africa, and poster at American Astronomical Society meeting (see Selected Posters section).
- **Joseph Kutil** Senior Thesis: “Polarization Phase Shifts and Other Anomalies in Pulsar B1133+21” (2017).
- **Cody Jessup** Senior Thesis: “Measuring Changes in Scattering Parameters of Millisecond Pulsar B1937+21 over Multiple Epochs” (2016). Also a summer research project supported from LAUREATES fund. Presented poster at IPTA meeting in South Africa (see Selected Posters section).

## OTHER LAUREATES-SUPPORTED SUMMER RESEARCH ADVISED

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- **Paige Lettow**: “Processing Single Pulses from the J1713+0747 24-Hr Global Campaign” (2023).
- **Henry Lenington, Joseph Petullo, Parker Reed, Nathan Sibert**: “A Bow-Shock Pulsar Wind Nebula Search in Deep Images” (2023).
- **Low-Frequency All-Sky Monitor Summer Research Students**: In Summer 2018, 2019, 2021, and 2023, Philip Andrews, Sashabaw Niedbalski, Caleb Ramette, Alex Dulemba, Shane Smith, Nathaniel Birzer, Stephen Mulcahey, Laurie Preston, Evan Anthropolous, Jacob Agresta, Luke Avery and I constructed the on-campus radio telescope and analyzed its data, reaching first light and detecting ionospheric events, Jovian bursts, and solar bursts.
- **Nathaniel Jones and Christopher Scheithauer**: “Epoch-dependent Interstellar Scintillations and Timing Variations for the Millisecond Pulsar B1937+21” (2018).
- **David Forman**: “Processing Single Pulses from the 1713 24-Hr Global Campaign with Machine Learning” (2018). With Prof. Natalia Lewandowska (Haverford) and me. Poster at 2019 AAS Meeting, Seattle, WA.
- **Laura Salo**: “Dual Telescope Observations of the Guitar Nebula Pulsar, PSR B2224+65” (2017). Poster at APS April Meeting in Columbus, OH.

- **Daniel O’Dette:** “First Light for the RadioJove Telescope” (2017).

## OUTCOMES OF RESEARCH STUDENTS

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- **Stephen Mulcahey ‘23** (see **LAUREATES-supported Summer Research Advised**) *currently in Structural Engineering graduate program at South Dakota School of Mines and Technology.*
- **Shane Smith ‘22** (see **Physics Senior Thesis Projects Advised**): *published Nature Astronomy paper on Breakthrough Listen signal BLC1– <http://seti.berkeley.edu/blc1/>. Currently employed by The Aerospace Corporation.*
- **Nicholas West ‘22** (see **LAUREATES-supported Summer Research Advised**) *currently in Applied Mathematics graduate program at Oxford University, UK, on Barry Scholarship.*
- **Sashabaw Niedbalski ‘21** (see **LAUREATES-supported Summer Research Advised**) *currently in Astronomy Ph.D. program at Cornell University, Ithaca, NY*
- **Philip Andrews ‘21** (see **Physics Senior Thesis Projects Advised**) *currently in Aeronautical Engineering Ph.D. program at Notre Dame University, South Bend, IN*
- **David Forman ‘21** (see **Physics Senior Thesis Projects Advised**) *currently in Computer Science Ph.D. program at Massachusetts Institute of Technology, Cambridge, MA*
- **Caleb Ramette ‘21** (see **LAUREATES-supported Summer Research Advised**) *currently in Materials Science and Engineering Ph.D. program at University of Utah, Salt Lake City, UT*
- **Laura Salo ‘19** (see **LAUREATES-supported Summer Research Advised**) *currently in Astrophysics Ph.D. program at University of Minnesota, Minneapolis, MN. DGRAV Student Travel Award also granted for 2018 April APS Meeting.*
- **Christos Giannakopoulos ‘19** (see **Physics Senior Thesis Projects Advised**) *Currently in Physics Ph.D. program at the University of Cincinnati, Cincinnati, OH. DGRAV Student Travel Award also granted for 2018 April APS Meeting.*
- **Charles (Jay) Rose ‘18** (see **Physics Senior Thesis Projects Advised**) *currently employed by the Martinrea International Inc., and in Masters program in Mechanical Engineering at the University of Cincinnati*
- **Madison Brown ‘18 (English major)** *worked as a writer in a NASA Headquarters internship in Washington, DC. Used her experience with the pulsar observing team in interview process.*
- **Daniel Halmrast ‘17** (see **Physics Senior Thesis Projects Advised**) *currently in Mathematics Ph.D. program at University of California, Santa Barbara. Thesis work is physics-based, on string theory.*
- **Joseph Kutil ‘17** (see **Physics Senior Thesis Projects Advised**) *currently employed by Michigan Air Products*
- **Joshua Ramette ‘17** (see **Other Hillsdale College Student Research Activities**) *currently in Physics Ph.D. program at the Massachusetts Institute of Technology*
- **Michael Tripepi ‘17** (see **Other Hillsdale College Student Research Activities**) *Ph.D. in Physics, Ohio State University. Joined Hillsdale College physics faculty in 2022.*
- **Cody Jessup ‘16** (see **Physics Senior Thesis Projects Advised**) *currently in Physics Ph.D. program at Montana State University, Bozeman, MT*
- **Katherine Knecht, Hillsdale Academy ‘20** *currently at Cornell University, Ithaca, NY*

## OTHER STUDENT RESEARCH ACTIVITIES

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- **NANOGrav International Research Experiences for Students (IRES) Summer Travel Programs (2018–2022; 5 students):** through the NANOGrav Collaboration in 2018, I arranged for physics majors Christos Giannakopoulos and Charles (Jay) Rose to spend 8-10 weeks at student internships at two observatories, the Sardinia Radio Telescope in Italy and the Five-Hundred meter Aperture Spherical Telescope (FAST) in China. Both projects contributed to senior theses. In 2019, Phillip Andrews (physics) and Chris Scheithauer (biology) both traveled to FAST as part of the IRES program to work on a machine-learning project. In 2022, Evan Anthopoulos (Applied Mathematics) traveled to CSIRO in Australia to work on a radio astronomy-related web application.
- **NANOGrav International Research Experiences for Students (IRES) Selection Committee (2022):** helped NANOGrav colleagues judge applications to Canadian research exchange program
- **LWA Users Meeting (2020):** remotely attended with LAUREATES student Alexander Dulemba. Gave NANOGrav talk (see Contributed Talks).

- **NanoSTART talk (2020):** gave remote talk on the history of NANOGrav to summer research groups, including Hillsdale STARS team.
- **APS Conference for Undergraduate Women in Physics (CUWiP; 2020):** arranged for physics students Khadija Hamisi and Lily Van Wingerden to attend at Carnegie Mellon University in Pittsburgh, PA.
- **APS Midwest Relativity Meeting (2019):** at Grand Valley State University, Grand Rapids, MI, with Hillsdale student attendance. Gave NANOGrav talk (see Contributed Talks).
- **Hillsdale Academy Capstone Projects (2016, 2019):** Worked with high school seniors Gregory Whalen and Katherine Knecht on pulsar and bow-shock nebula searching projects
- **LWA Users Meeting (2019):** at the University of New Mexico, Albuquerque, NM. Attended with LAUREATES students Alexander Dulemba, Sashabaw Niedbalski, and Shane Smith. Gave Monitor talk presenting our research results (see Contributed Talks). Travelled to LWA telescope site at Sevietta National Wildlife Preserve.
- **STARS talks (2019 – 2020):** gave talks on NANOGrav Student Teams of Astrophysics ResearcherS telecons, which our student group joined regularly. Also arranged for our students to give presentations.
- **David Forman Summer Research (2019):** did additional remote work together on David's LAUREATES-funded project from previous summer
- **NSF Student Advisory Panel (2018):** students were remotely interviewed to evaluate the quality of their NANOGrav-related research experiences
- **Low-Frequency All-Sky Monitor Team Leader Meeting (2018):** in Washington, DC for 3 days. Gave introductory pulsar timing talk. Attended with Hillsdale student Joseph Harvey.
- **Remote Observer Training Session (2018):** from campus, conducted Arecibo and Green Bank Telescope observing training for Hillsdale and Cornell students (graduate and undergraduate) jointly.
- **American Physical Society Meeting (2018):** in Columbus, OH with students Christos Giannakopoulos and Laura Salo for five days. The students presented posters and I gave a talk.
- **Society of Physics Students trip to Green Bank Observatory (2018):** at Green Bank Observatory in WV with six students. Climbed the Green Bank Telescope, used 40-ft telescope for galactic hydrogen observations.
- **Student Pulsar Observing Team (2015 – present):** involved Hillsdale students in remotely controlled radio-telescope observing with the Arecibo and Green Bank observatories, including nationwide Saturday-morning telecons with other undergraduates doing similar work. 9 students operated the radio telescopes with me for Independent Study credit or student employment, recording observation notes on the official NANOGrav observing logs. 2 students (Cody Jessup, Daniel Halmrast) became second-authors on the NANOGrav 11-year data paper in the Astrophysical Journal and 4 students (Joshua Ramette, Michael Tripepi plus the original 2) became authors on the two 12.5-year data release papers. Throughout the semesters, other interested students watched the observing sessions. Recruitment was accomplished by sign-up lists at the student activities fair, presentations I gave to the Society of Physics Students, and email announcements to all physics majors. In addition to standard NANOGrav timing observations for gravitational wave detection, students also participated in a number of other projects. These included radio observations of the pulsar in the optical Guitar Nebula (see Accepted Telescope Observing-time Proposals), pulsar searching with the PSCSEARCH software, and observing contributions to Arecibo project P3077 in support of the cutting-edge topic of extragalactic fast radio bursts.
- **Observing Trips to Kitt Peak National Observatory (Tucson, AZ, 7/2017, 10/2017):** travelled with 3 students to the Mayall 4-m Telescope for 2 nights of observing on 2 separate trips.
- **APS Midwest Relativity Meeting (2017):** at U. of Michigan in Ann Arbor, MI for 3 days with 12 students. Gave NANOGrav intro talk (see Contributed Talks) to serve as introduction to more specific working group-focused talks.
- **Solar Eclipse Trip (2017):** travelled to KY for solar eclipse viewing with 2 students. Brought optical telescope and RadioJove radio telescope, part of a summer research project.
- **Low-Frequency All-Sky Monitor Team Leader Meeting (2017):** at Franklin & Marshall College in Lancaster, PA for 3 days. Gave NANOGrav timing demonstration. Attended with Hillsdale student Christos Giannakopoulos.
- **American Astronomical Society Winter Meeting (2017):** in Grapevine, TX for 4 days with physics student Daniel Halmrast, who presented a poster (see Posters). I gave a talk (see Contributed Talks). Daniel also attended a programming workshop for research-oriented software skills.
- **Joshua Ramette Independent Study (2016):** analyzed data from Green Bank Telescope "Guitar Nebula" project with me. Second author on my contributed AAS talk abstract (see Contributed Talks).
- **Founding of Radio Telescope Remote Command Center (2016):** using a lab space in the physics department, I created the RTRCC, which is a dedicated room for remote observing with the Green Bank Telescope and the Arecibo Observatory. Telecons, research group meetings, and logging into telescope command interfaces

on large monitors are all conducted in this room. Posters, both educational and relating to student research, communicate the Department's activities to anyone walking by.

- **Fall NANOGrav Meeting (2016):** attended two-day portion of collaboration meeting with students Joshua Ramette, Daniel Halmrast, and Michael Tripepi. Students presented posters, I gave a talk, and we toured a supercomputer at the National Center for Supercomputing Applications.
- **International Pulsar Timing Array Meeting (2016):** attended two-week student workshop and science meeting at Stellenbosch University in South Africa with students Cody Jessup and Daniel Halmrast. These Hillsdale College students presented posters, and we gave talks about our research. Travel supported by NANOGrav Collaboration.
- **Green Bank Student Workshop (2016):** Travelled to Green Bank Observatory in WV for four-day student training workshop with students Cody Jessup and Daniel Halmrast. Part of a LAUREATES summer research program. Resulted in official student certification as registered observers.
- **Gravitational Wave Detection Workshop at NANOGrav Spring Meeting (2016):** attended two-day student workshop at Caltech with students Cody Jessup and Daniel Halmrast. Also explored astronomical sites of historical importance, such as the Mount Wilson Observatory where Hubble's discoveries were made.
- **CIERA APS Midwest Relativity Meeting (2015):** took 4 physics majors to high-level relativistic astrophysics meeting at Northwestern University.
- **Pulsar Timing Demonstration, Low-Frequency All-Sky Monitor Team Leader Meeting (2015):** gave videoconference presentation to student team leaders, teaching undergraduates to use the Arecibo telescope remotely, in order to plan a Hillsdale undergrad. observing program. This collaboration led to a joint student pulsar observing manual I developed with Prof. Fronefield Crawford at Franklin & Marshall College.
- **Cornell University (2014):** co-conducted the pulsar searching activity, a mentored student workshop, as part of the Department of Astronomy's Research Experiences for Undergraduates (REU) program.
- **IPTA Student Week (2014):** see **Invited Talks** section below; explained the subsequent Science Week talks to undergraduate students at training workshop in Banff, Alberta, Canada.
- **Oberlin College (2013):** mentored 1 undergraduate summer research student (Jason Rosenblum) on pulsar observing and data analysis, resulting in an American Astronomical Society poster and student travel to Washington, DC.
- **Oberlin College (2012):** mentored 2 undergraduate summer research students (Greg Stevens, Sam Berney) on pulsar observing and data analysis, including trips to tour the CSIRO Parkes Radio Telescope in Australia and to observe at Arecibo Observatory in Puerto Rico. Greg went on to obtain an REU the following summer. Both students presented posters at the Oberlin Celebration of Undergraduate Research.
- **Oberlin College (2011):** mentored 1 graduate student (Nipuni Palliyaguru, now postdoc at Texas Tech) on observing trip to Arecibo Observatory.
- **Space Telescope Science Institute (2010):** mentored 1 Space Astronomy Summer Program undergraduate student (Tuguldur Sukhbold, later Hubble Fellow at the Ohio State University).

## Service

### Education and Public Outreach Service

#### SCIENCE OUTREACH: INTERVIEWS

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- **Radio Free Hillsdale Hour Interviews (2020–2023):** Invited to WRFH (the Hillsdale College radio station) program "The Radio Free Hillsdale Hour" for 11 interviews on various physics and astronomy topics with host Scot Bertram.
- **Collegian Articles (2015 – 2022):** Interviewed or featured 37 times in the Hillsdale Collegian, the student newspaper (<http://hillsdalecollegian.com/?s=dolch>)
- **Hillsdale Daily News Articles (2017 – 2018):** 3 times interviewed by or featured in the local newspaper on various astronomy topics: the solar eclipse, the 2018 Michigan fireball meteor, and StarLab presentations.

## PUBLIC OUTREACH (HILLSDALE UNLESS OTHERWISE NOTED)

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- **Society of Amateur Radio Astronomers (SARA) outreach (2019 – 2022):** worked with local SARA members to recruit data analysis group of amateur astronomers, with student help, on data from the Low-Frequency All-Sky Monitor Telescope
- **MSU Science Festival (2021):** gave virtual Space Public Outreach Team (SPOT) presentation and presented NANOGrav booth at Michigan State University
- **Science Olympiad (2016 – 2021):** Ran and wrote exams for “Astronomy” and “Reach for the Stars.” The second involved StarLab. Created online competition materials for 2021 competition.
- **Interview, St. Mary’s Catholic School (Cortland, NY, 2014):** Gave an interview on pulsar astronomy shown to K-8 science classes. ~40 students reached.
- **Undergraduate Outreach Lectures (Oberlin College, 2012 – 2013):** Gave supplementary lectures to undergrad. physics classes, at request of professors who wanted me to present on pulsar astronomy. ~50 people reached.
- **MD Space Grant Observatory (Johns Hopkins, Summer 2009 – Winter 2010):** Ran weekly public open houses + training sessions for JHU’s Morris Offit Telescope, totaling ~40 nights. Gave special tours to school groups and Cub Scout packs, including solar observations. ~500 people reached.

## *Service to the Scientific Community*

### JOURNAL/PROPOSAL REFEREEING

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- Proposal Reviewer for NSF panels (2023, 2024)
- Book Proposal Reviewer for IOP Publishing (2023)
- Journal Referee for **Astrophysical Journal**, **Monthly Notices of the Royal Astronomical Society**, **American Journal of Physics**, **The Physics Teacher**, **Advances in Space Research**, **Journal of Applied Physics**
- Observing Proposal Reviewer for **Long-Wavelength Array** radio telescope, **Giant Metrewave Radio Telescope**
- Proposal Reviewer for **German Research Foundation (DFG)**, **The Swiss National Science Foundation**, **Netherlands Organisation for Scientific Research (NWO)**, **the Dutch Research Council**

### SCIENTIFIC COMMUNITY INVOLVEMENT

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- **Session Chair, American Astronomical Society Meeting, “Binary Black Hole Formation Channels” (1/2024):** New Orleans, LA
- **NANOGrav Advisory Board Meetings (2018 – 2019):** attended meeting of NANOGrav senior personnel with NSF advisory board at the Adler Planetarium, Chicago, IL. Also attended Fall Advisory Board Meeting in Green Bank, WV, spring and fall Advisory Board Meetings in 2019, 2020, 2023 Advisory Board Meeting by videoconference, and 2022 Advisory Board Meeting at the Flatiron Institute, New York, NY.
- **APS-IDEA (Inclusion, Diversity, Equity, and Accessibility) Online Learning Community (2022–2023):** attending on behalf of NANOGrav Collaboration
- **Scientific Organizing Committee, Fall 2022 NANOGrav Meeting (2022)**
- **International Pulsar Timing Array Catch-up Meetings (2021–2022):** attended
- **International Gravity Outreach Group (iGrav) virtual meetings (2020, 2022):** attended
- **American Physical Society Meeting (2022):** attended
- **Faculty/Postdoc Recommendation Letters (2021):** Wrote five recommendation letters for external colleagues applying for faculty jobs and postdoctoral positions
- **Graduate Student Mentoring (2021):** Mentored two RIT graduate students, Olivia Young and Jackson Hebel, as part of the PISMA project
- **Session Chair, LWA Users Meeting (8/2021):** University of New Mexico
- **Thesis Defense Participation (12/2020):** Brent Cole, University of Texas–Rio Grande Valley (virtual)
- **Physics Today Open Letter (12/2020):** signed open letter in Physics Today about the future of Arecibo

- **Session Chair, AAS Summer Meeting (6/2020):** University of Wisconsin–Madison (virtual)
- **NANOGrav International Research Experiences for Students (IRES) management (2018 – 2019):** organized weekly telecons for student groups in China and Italy, including Hillsdale students Jay Rose, Christos Giannakopoulos, Philip Andrews, and Chris Scheithauer. Prepared students in research meetings in semesters before departure.
- **NANOGrav Advisory Board Meetings (2018 – 2019):** attended meeting of NANOGrav senior personnel with NSF advisory board at the Adler Planetarium, Chicago, IL. Also attended Fall Advisory Board Meeting in Green Bank, WV, spring and fall Advisory Board Meetings in 2019, 2020 Advisory Board Meeting by videoconference, and 2022 Advisory Board Meeting at the Flatiron Institute, New York, NY.
- **Session Chair, APS Midwest Relativity Meeting (10/2019):** Grand Valley State University, MI
- **NANOGrav Site Visit (5/2019):** University of Wisconsin–Milwaukee, attended for NSF evaluation of collaboration. Re-presented 4 Hillsdale student LAUREATES and AAS posters.
- **Education and Public Outreach Working Group Chair duties, NANOGrav (2019 – present):** ran biweekly telecons, wrote biannual milestone and working group reports, managed conference booths, presented to NSF panels, ran summer NanoSTART colloquium series (NANOGrav Summer-Term Astrophysics Research Teams)
- **Letters in response to NSF request for comments (2016, 2018):** commented on Environmental Impact Statements for the futures of Arecibo and Green Bank Observatories, in order to avoid facility closure; detailed observatory benefits to Hillsdale students and their future careers
- **Recorded Lecture for Student Workshop (2017):** recorded a talk introducing NANOGrav undergraduates to the Noise Budget and Interstellar Medium Mitigation working group science for the Student Workshop at the Fall 2017 NANOGrav Meeting at Lafayette College, PA, and posted for future use: [https://www.youtube.com/playlist?list=PLlS7LdREOHD3YYT\\_yW9Wn01jXt01XYec1](https://www.youtube.com/playlist?list=PLlS7LdREOHD3YYT_yW9Wn01jXt01XYec1)
- **Poster Judge, Chambliss Student Poster Award (2017)** judged undergraduate posters at American Astronomical Society Meeting in Grapevine, TX
- **American Association of Physics Teachers FOLC (2015 – 2016):** Faculty Online Learning Community; biweekly telecon with other new faculty nationwide discussing ongoing experiences of active learning.
- **Senior Personnel, NANOGrav (2015 – present):** periodically meet on Management Team telecons to make decisions about membership and other all-collaboration policies and conduct postdoc interviews
- **Poster Contest Judge, Cornell University (2015):** Cornell Astronomy Undergraduate Research Forum
- **Chair, Committee for Paper Proposal Review, IPTA++ Collaboration (2014 – 2017)**
- **Scientific Organizing Committee, Fall 2014 NANOGrav Meeting, Milwaukee, WI (2014)**
- **Local Organizing Committee, Summer 2014 IPTA Science Workshop (2014)**
- **Group Leader, Extragalactic Background Light Working Group, CANDELS Collaboration (2012 – 2015)**
- **Organizer for NANOGrav Science Seminar Colloquium Series (2012 – 2014)**
- **Scientific Organizing Committee, NANOGrav Meeting, Oberlin, OH (2012)**
- **American Astronomical Society Meeting (2012):** attended
- **Panel Support Data Aide, HST Cycle 17 Time Allocation Committee (2008)**
- **Student Rapporteur, Space Studies Board, “Forging the Future of Space Science” (2007)**

## ***Institutional Service***

### **COMMITTEES**

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- **External Faculty Search Committees (Appointed 2017, 2020, 2024)**
- **Educational Policies Committee (Elected 2022 – 2023)**
- **Nominating Committee (Appointed 2022 – 2023)**
- **Honors Committee (Elected 2020 – 2021)**
- **Academic Honesty Review Board (Elected 2016 – 2017, 2019 – 2020, alternate 2020 – 2021)**
- **Science Olympiad Committee (Appointed 2020 – 2021)**
- **Learning Management System (LMS) Task Force (Appointed 2019 – 2020)**
- **Physics Faculty Search Committees (2015 – 2016, 2019 – 2020, 2021 – 2022)**
- **Other Faculty Search Committees (Appointed 2017, 2020)**

- **Thomistic Institute Science Representative (2018 – present)**
- **Technology Committee (Elected 2017 – 2019)**, Chair 2018 – 2019

## ADVISING

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- **Academic Advising (2016 – present)**: 34 students total, including 8 physics majors total. Wrote 182 reference letters for graduate school, internship, and summer research applications.
- **Core Academic Advising (2016 – present)**: 10 current students
- **Major Academic Advising (2019 – present)**: 6 current students.
- **Phi Kappa Phi (2020 – 2024)** faculty treasurer
- **Society of Physics Students (SPS; 2019 – 2022)**: faculty advisor. For 2020 – 2021, the Hillsdale College SPS Chapter received a 2021 Notable Chapter Award.
- **Sigma Pi Sigma / Astronomy Club (2016 – present)**: faculty advisor

## OTHER INSTITUTIONAL CONTRIBUTIONS

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- **Astronomy Presentations for K-12 Teachers (2017–2024)**: gave presentations to teachers on campus about how to teach astronomy. Utilized StarLab inflatable planetarium.
- **Periodic Telescope Nights (2015 – present)**: restarted the Astronomy Club's monthly telescope viewing nights, open to the public, under the umbrella of the Society of Physics Students. ~200 people reached. Maintained telescopes and performed periodic equipment tests.
- **Admissions Reception (2022 – present)**: met prospective students
- **How to Apply to Summer Research Programs (2022)**: organized this session for physics students
- **Admissions Webinar (2022)**: presented the physics major to interested pre-engineering students
- **Faculty Colloquium (2020)**: Deferred from Spring to Fall 2020 due to COVID. "The Hunt for Supermassive Black Holes"
- **Our Faculty's Ongoing Research talk (2019)**: at Mossey Library. "The Surprising Beauty of Pulsar Wind Nebulae in Astronomy"
- **Silent Sky presentation (2019)**: gave astronomy history background to the play *Silent Sky* by Lauren Gunderson shown on campus and conducted telescope after-party
- **Public Talk (2019)**: "The First Black Hole Image from the Event Horizon Telescope"
- **Applied Math Club Talk (2019)**: "Why Astrophysics Is Really Computer Science"
- **Center for Constructive Alternatives (CCA) on Artificial Intelligence (2019)**: spoke on faculty panel and participated in broadcasted discussion after several days of invited speakers
- through videoconferences, helped Career Services arrange **IDS 393-06: Visualization and Analysis of Data** (1-Credit course in Python Programming), taught by Dr. George Forman from Amazon Web Services during 2018 Fall Break
- **StarLab Presentations (2016 – 2018)**: set up and provided hour-long presentations on the night sky using the inflatable StarLab for elementary classes at Hillsdale Academy, along with presentations about the Moon and eclipses.
- **Special Telescope Events (2015 – 2017)**: conducted and executed public viewing sessions for campus events and special sky phenomena, with physics students' help: Venus occultation, Mercury Transit, Parents' Weekends, the "Supermoon" and a solar observation during student activities fair ("The Source"). ~300 people reached.
- **Pulsar Search Collaboratory (2017)**: helped arrange for Hillsdale Academy student Nathaniel Birzer to attend week-long pulsar astrophysics camp at Green Bank, WV, after training him in the field.
- **"Cosmic Resonances" Pulsar Astronomy Choreography Presentation (2017)**: Consultant for Prof. Holly Hobbs' choreography to Prof. Dawn Erb's (UW-Milwaukee) musical composition "Lighthouses II" made from pulsar tones. Performed in April 2017, before which Hobbs and I gave a public presentation in which I talked about pulsar astrophysics. I also created a slideshow of pulsar-related images and movies that was shown in the background during the performance. (<https://vimeo.com/212824071>)
- **"What is Beauty?" Panel for Alpha Rho Tau, Hillsdale's Art Honor Society (2016)**: spoke on physics, astronomy, and aesthetics on panel with Profs. Holly Hobbs (dance) and Benedict Whalen (English).
- **Parents' Weekend Telescope Night (2015)**: conducted and executed a public viewing session during Parents' Weekend, with physics students' help. ~30 people reached.

- **Lunar Eclipse Observation (2015):** conducted and executed a public viewing session for total lunar eclipse, with physics students' help. ~300 people reached, mostly students. Resulted in donations to the department, including a telescope.

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## HILLSDALE PHYSICS DEPARTMENTAL SERVICE

- **Facility Tours (2018 – 2024):** of Monitor radio telescope in Hayden Park, Radio Telescope Remote Command Center, and Tesla coil to prospective students, alumni reunion, elementary school, and Scout groups
- **Course Development: Radio Astronomy Instrumentation Lab (2021 – 2022):** developed new upper level course for majors as part of 2021–2022 sabbatical
- **Freshman Physics Seminars (2018 – 2020):** gave talks to freshman and sophomore students about the Low-Frequency All-Sky Monitor and NANOGrav
- **Banquet with Graduate Speaker (2019):** organized banquet with MSU graduate student Sam Swihart for prospective physics majors
- **How To Apply to Graduate School and to REUs (2017, 2019):** organized these events for physics majors
- **Mentorship Assistance, Society of Physics Students (2015 – present):** helped with meetings and took students on trips, such as U. of Michigan's Saturday Morning Physics lectures (3 times), all-day tour of Fermilab National Accelerator Laboratory, IL (2016), the McMath-Hulbert Observatory, MI (2017), and a 3-day trip to the Green Bank Observatory in WV (2018).
- **Course Development: General Relativity (2015 – 2016), Astronomy (2017 – 2018), Computational Physics (2018 – 2019):** see "Course Instruction" section
- **Department Project to Revise Science Core Requirements (2015 – 2016):** met with dept. colleagues frequently during 2015-16 school year and summer 2016 to develop PHY100, "Great Principles of Physics." Developed new astronomy-focused lab using Microsoft's WorldWide Telescope software.

## Local Community Service

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## SCIENCE-RELATED SERVICE

- **SPOT Presentations (2016 – 2024):** gave regular talks for K-12 audiences about gravitational wave astrophysics utilizing NANOGrav's Space Public Outreach Team format. Gave 3 talks in 2023.
- **StarLab Presentations (2016 – 2023):** Gave StarLab program and Low-Frequency All-Sky Monitor telescope tour in Hayden Park for local Scout troops, Cub Scout packs, and local public schools. With assistance of physics majors.
- **Regional Girl Scout Astronomy Day (2016, 2023):** Ran an afternoon astronomy event assisted by an undergraduate physics major in Pioneer, OH. Featured 7 stations: StarLab presentation (inflatable planetarium), solar sunspot observation, make-a-telescope, solar system distance model, spectral lines, constellation coloring, and NANOGrav SPOT (Space Public Outreach Team) presentation on pulsars. ~80 people reached.
- **Jonesville High School Capstone Project (2019 – 2020):** Worked with high school senior Georgia McDowell (Jonesville, MI) on bow-shock nebula searching project. Attending U. of Michigan, cited project in application.
- **Assistance to Physics Class (2018):** helped develop physics demos for the Camden-Frontier High School physics class of Mrs. Alexis Zeiler
- **Aktion Club Astronomy Night (2017):** with physics students' help, conducted telescope night for the handicapped at a Hillsdale Kiwanis Club-associated event.
- **Astronomy Merit Badge Counselor (2015 – 2020):** certified to become the Astronomy merit badge counselor for Scout Troop 274 in Jonesville, MI. 2020 meetings planned but canceled due to COVID.

## Miscellaneous Skills and Training

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## PROGRAMMING LANGUAGES AND SOFTWARE PACKAGES

Python, C, C++, IDL, Matlab, Mathematica, SQL, Simulink



## CONTINUING COURSEWORK

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**Physics 520: Solid State Physics** (Hillsdale College, Spring 2023, audited)

**Astronomy 6523: Signal Modeling, Statistical Inference & Data Mining in Astrophysics**  
(Cornell University, Spring 2015, audited)