Anne Watson Draelos, PhD

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Assistant Professor, University of Michigan

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Biomedical Engineering

Computational Medicine & Bioinformatics

Education

PhD in Physics, Duke University	2012-2018
MS in Electrical & Computer Engineering, Duke University	2012-2018
BS in Physics, NC State University	2008-2012
BS in Computer Science, NC State University	2008-2012

Research Training

Postdoctoral Associate, Duke University · 2018-2022
Computational methods for real-time analysis (advisor: Dr. John Pearson).

Graduate Research Assistant, Duke University · 2012-2018
Thermal and electronic transport in graphene (advisor: Dr. Gleb Finkelstein).

Undergraduate Research Assistant, NC State University · 2011-2012
Morphology of organic photovoltaics with soft x-rays (advisor: Dr. Harald Ade).

Student Intern, Thomas Jefferson National Accelerator Facility · 2006-2014
Free Electron Laser division (advisor: Dr. Michelle Shinn).

Research Funding

2024 Sloan Research Fellow in Neuroscience, Alfred P. Sloan Foundation · 2024-2026
Amount: $75,000

Research Scout Award, Michigan Medicine · 2023-2024
Amount: $50,000

Career Awards at the Scientific Interface, Burroughs Wellcome Fund · 2023-2028
Amount: $500,000

Swartz Foundation Fellow for Theory in Neuroscience, The Swartz Foundation · 2020-2022
Amount: $200,000

Ruth K. Broad Postdoctoral Fellowship Award, Ruth K. Broad Biomedical Research Foundation · 2019-2020
Amount: $59,594.81

Fellowships & Awards

Leading Edge Fellow, HHMI, Janelia	2020
Best Poster Award, IEEE Brain Workshop on Advanced NeuroTechnologies	2020
Best Poster Award, Duke Research Computing Symposium	2019
Fritz London Graduate Fellowship Prize, Duke University	2017-2018
National Science Foundation Graduate Research Fellowship	2014-2017
National Defense Science and Engineering Graduate Fellowship (declined in order to accept NSF fellowship)	2014
Walter Gordy Fellowship, Duke University	2013
Mary Creason Memorial Award for Undergraduate Teaching in Physics, Duke University	2013
Graduate Program in Nanoscience Fellowship, Duke University	2013
McCormick Award for Undergraduate Research in Physics, NC State University	2012
Undergraduate Research Grant, NC State University	2012
Upsilon Pi Epsilon, Honor Society for the Computing and Information Disciplines	2011
Phi Beta Kappa	2011
Sigma Pi Sigma, Physics Honor Society	2011
Park Enrichment Grant for Research	2009, 2011-12
Park Scholarship, full-ride merit scholarship, NC State University	2008-2012
National Merit Scholar	2008
Intel Science Search Semifinalist	2008

Publications

Draelos, A., Nikitchenko, M., Sriworarat, C., Sprague, D., Loring, M.D., Pnevmatikakis, E., Giovannucci, A., Naumann, E.A., Pearson, J.M. *improv*: A flexible software platform for adaptive neuroscience experiments, *bioRxiv*:2021.02.22.432006v2 (2024).

Gedela, N. S. S., Salim, S., Radawiec, R. D., Richie, J. M., Chestek, C. A., **Draelos, A.**, Pelled, G. Single unit electrophysiology recordings and computational modeling can predict octopus arm movement. *bioRxiv*: 2024.09.13.612676 (2024).

Draelos, A., Gupta, P., Jun, N. Y., Sriworarat, C., Pearson, J. Bubblewrap: Online tiling and real-time flow prediction on neural manifolds, *35th Conference on Neural Information Processing Systems* (2021).

Draelos, A., Pearson, J. M. Online neural connectivity estimation with noisy group testing, *34th Conference on Neural Information Processing Systems* (2020).

Draelos, A., Naumann, E.A., Pearson, J.M. Online neural connectivity estimation with ensemble stimulation, *arXiv*:2007.13911 (2020).

Zhao, L., Arnault, E. G., Bondarev, A., Seredinski, A., Larson, T., **Draelos, A.**, Li, H., Watanabe, K., Taniguchi, T., Amet, F., Baranger, H. U., Finkelstein, G. Interference of chiral Andreev edge states, *Nat. Phys.* 16: 862-867 (2020).

Ke, C. T.*, **Draelos, A. W.***, Seredinski, A.*, Wei, M. T., Li, H., Hernandez-Rivera, M., Watanabe, K., Taniguchi, T., Yamamoto, M., Tarucha, S., Bomze, Y., Borzenets, I.V., Amet, F., Finkelstein, G. Anomalous periodicity of magnetic interference patterns in encapsulated graphene Josephson junctions, *Phys. Rev. Research* 1: 033084 (2019). (*equal contribution*)

Draelos, A., Wei, M.-T., Seredinski, A., Li, H., Mehta, Y., Watanabe, K., Taniguchi, T., Borzenets, I.V., Amet, F., Finkelstein, G. Supercurrent Flow in Multi-Terminal Graphene Josephson Junctions, *Nano Lett.* 19 (2): 1039-1043 (2019).

Draelos, A., Silverman, A., Eniwaye, B., Arnault, E.G., Ke, C.-T., Wei, M.-T., Vlassiouk, I., Borzenets, I. V., Amet, F., Finkelstein, G. Sub-Kelvin Lateral Thermal Transport in Diffusive Graphene, *Phys. Rev. B* 99: 125427 (2019).

Wei, M.-T., **Draelos, A.**, Seredinski, A., C.-T., Li, H., Mehta, Y., Watanabe, K., Taniguchi, T., Yamamoto, M., Tarucha, S., Finkelstein, G., Amet, F., Borzenets, I.V. Chiral Quasiparticle Tunneling Between Quantum Hall Edges in Proximity with a Superconductor, *Phys. Rev. B* 100: 121403 (2019).

Seredinski, A., **Draelos, A.**, Arnault, E., Wei, M.-T., Li, H., Fleming, T., Watanabe, K., Taniguchi, T., Amet, F., Finkelstein, G. Quantum Hall-based superconducting interference device, *Science Advances* 5 (9): eaaw8693 (2019).

Draelos, A.*, Wei, M.-T.*, Seredinski, A., Ke, C.-T., Mehta, Y., Chamberlain, R., Watanabe, K., Taniguchi, T., Yamamoto, M., Tarucha, S., Borzenets, I.V., Amet, F., Finkelstein, G. Investigation of Supercurrent in the Quantum Hall Regime in Graphene Josephson Junctions, *J. Low Temp. Phys.* 191 (5): 288-300 (2018). (*equal contribution*)

Seredinski, A., **Draelos, A.**, Wei, M. T., Ke, C. T., Fleming, T., Mehta, Y., Mancil, E., Li, H., Taniguchi, T., Watanabe, K., Tarucha, S., Yamamoto, M., Borzenets, I.V., Amet, F., Finkelstein, G. Supercurrent in Graphene Josephson Junctions with Narrow Trenches in the Quantum Hall Regime, *MRS Advances* 3 (47): 2855-2864 (2018).

Aubert, M., **Draelos, A.**, Draelos, M., Feng, Y., He, H., Keller, B., Li, J., Vincent, B., Wang, F., Wu, S., Zhou, K., Zhu, T., Hauser, K. A Rapid Development Methodology for an Autonomous Warehouse Picking Robot. *ICRA 2017 Warehouse Picking Automation Workshop* (2017).

Borzenets, I., Amet, F., Ke, C.-T., **Draelos, A.**, Wei, M., Seredinski, A., Watanabe, K., Taniguchi, T., Yamamoto, M., Tarucha, S., Finkelstein, G. Ballistic Graphene Josephson Junctions from the Short to the Long Regime, *Phys. Rev. Lett.* 117 (23): 237002 (2016).

Ke, C.-T., Borzenets, I., **Draelos, A.**, Amet, F., Bomze, Y., Jones, G., Craciun, M., Russo, S., Yamamoto, M., Tarucha, S., Finkelstein, G. Critical Current Scaling in Long Diffusive Graphene-Based Josephson Junctions, *Nano Lett.* 16 (8): 4788-4791 (2016).

Zhang, X., Gutiérrez, Y., Li, P., Barreda, A., **Watson, A.**, Alcaraz de la Osa, R., Finkelstein, G., González, F., Ortiz, D., Saiz, J., Sanz, J., Everitt, H., Liu, J., Moreno, F. Plasmonics in the UV Range with Rhodium Nanocubes, *Proc. SPIE Nanophotonics VI* 98441E (2016).

Watson, A., Zhang, X., de la Osa, R., Sanz, J., Gonzalez, G., Moreno, F., Finkelstein, G., Liu, J., Everitt, H. Rhodium Nanoparticles for Ultraviolet Plasmonics, *Nano Lett.* 15: 1095-1100 (2015).

Pilo-Pais, M., **Watson, A.**, Demers, S., LaBean, T.H., Finkelstein, G. Surface-enhanced Raman scattering plasmonic enhancement using DNA origami-based complex metallic nanostructures, *Nano Lett.*. 14 (4): 2099-2104 (2014).

Gann, E., **Watson, A.**, Tumbleston, J.R., Cochran, J., Yan, H., Wang, C., Seok, J., Chabinyc, M., Ade, H. Topographic Measurement of Buried Thin-Film Interfaces using a Grazing Resonant Soft X-Ray Scattering Technique, *Phys. Rev. B* 90: 245421 (2014).

Watson, A., Shinn, M.D. JLIFE: The Jefferson Lab Interactive Front End for the Optical Propagation Code. *35th International Free Electron Laser Conference* MOPSO82 (2013).

Shinn, M.D., Benson, S.V., **Watson, A.**, van der Slot, P.J.M., Freund, H.P., Nguyen, D.C. A New Approach to Improving the Efficiency of FEL Oscillator Simulations. *34th International Free Electron Laser Conference* (2012).

Invited and Conference Talks

Draelos, A. Real-time machine learning for optimizing neural stimulation, *Center for Visual Science Symposium*, *University of Rochester* (2024).

Draelos, A. Machine Learning for Adaptive Experimental Designs, *Cognitive Aging Summit IV, NIA/FNIH* (2024).

Draelos, A. Real-time machine learning for adaptive neuroscience applications, *Michigan Institute for Data Science Faculty Research Pitch* (2023).

Draelos, A. Real-time modeling with adaptive interventions, *Department of Computational Medicine & Bioinformatics Annual Retreat, University of Michigan* (2023).

Draelos, A. Real-time Modeling with Adaptive Interventions, *Biomedical Engineering Seminar Series, University of Michigan* (2023).

Draelos, A. Real-time Modeling with Adaptive Interventions, *Zebrafish Neural Circuits & Behavior Seminar Series* (2023).

Draelos, A. Real-time modeling with active interventions, *Neural Networks Workshop, University of Michigan* (2023).

Draelos, A. Real-time modeling with adaptive interventions, *Neural Engineering Symposium, University of Michigan* (2023).

Draelos, A. Real-time modeling with active interventions, *Accelerating AI Algorithms for Data-Driven Discovery Seminar Series* (2023).

Draelos, A. Real-time modeling with active interventions for high-dimensional data, *Janelia Conference on Computational & Theoretical Zebrafish Neuroscience* (2023).

Draelos, A. Real-time modeling with active interventions for high-dimensional data, *Michigan Neuroscience Institute Data Blitz, University of Michigan* (2023).

Draelos, A. Scalable online modeling and stimulations for adaptive experiments, *Cosyne Workshops* (2022).

Draelos, A., Gupta, P., Jun, N. Y., Sriworarat, C., Loring, M.D., Nikitchenko, M., Naumann, E., Pearson, J. Online neural modeling and Bayesian optimization for closed-loop adaptive experiments, *Computational and Systems Neuroscience (Cosyne)* (2022).

Draelos, A., Gupta, P., Jun, N. Y., Sriworarat, C., Loring, M.D., Nikitchenko, M., Pnevmatikakis, E., Giovannucci, A., Naumann, E., Pearson, J. Online neural modeling for adaptive neuroscience experiments, *Neuroscience 2021*, P958.03 (2021).

Draelos, A. Online neural modeling and stimulation for adaptive neuroscience experiments, *Swartz Foundation Meeting* (2021).

Draelos, A., Nikitchenko, M., Sriworarat, C., Sprague, D., Loring,. M., Pnevmatikakis, E., Giovannucci, A., Naumann, E., Pearson, J. Real-time analysis of neural activity and functional connectivity, *Trainee Highlight Award, BRAIN Initiative Investigators Meeting* (2021).

Draelos, A. Real-time neural modeling for adaptive neuroscience experiments, *Tech4Health Seminar*, *NYU Langone Tech4Health Institute* (2021).

Draelos, A. Mapping the dynamic brain, *Duke Research Week, Duke University* (selected talk) (2021).

Draelos, A., Nikitchenko, M., Sriworarat, C., Sprague, D., Loring,. M., Pnevmatikakis, E., Giovannucci, A., Naumann, E., Pearson, J. A Flexible Real-Time Platform for Adaptive Neuroscience Experiments, *IEEE Brain Workshop on Advanced NeuroTechnologies* (2020).

Draelos, A. Online neural connectivity estimation with noisy group testing, *Computational and Theoretical Neuroscience Seminar, Duke University* (2020).

Draelos, A. Real-time analysis and stimulation of neuronal populations, *Leading Edge Symposium* (2020).

Draelos, A. Adaptive causal inference: identifying and manipulating neural function in real time, *Center for Cognitive Neuroscience Colloquium, Duke University* (2020).

Draelos, A. Adaptive platform for online characterization of neural data, *Janelia Women in Computational Biology Conference* (selected talk) (2019).

Draelos, A. Adaptive platform for online characterization of neural data, *Janelia Junior Scientist Workshop on Mechanistic Cognitive Neuroscience* (2019).

Draelos, A., Nikitchenko, M., Thomson, E. E., Pnevmatikakis, E., Giovannucci, A., Naumann, E., Pearson, J. Adaptive platform for online characterization of neural data, *Neuroscience 2019*, 432.21/DP14/DD43 (selected for Dynamic Poster presentation) (2019).

Draelos, A., Adaptive Functional Characterization of Neural Circuits, *Neurobiology Student Seminar, Duke University* (2019).

Draelos, A., Wei, M.-T., Seredinski, A., Ke, C.-T., Li, H., Mehta, Y., Mancil, E., Fleming, T., Watanabe, K., Taniguchi, T., Yamamoto, M., Tarucha, S., Borzenets, I., Amet, F., Finkelstein,

G. Supercurrent in Multi-Terminal Ballistic Graphene Josephson Junctions, *APS March Meeting 2018,* 63 (2018).

Draelos, A., Ke, C.-T., Borzenets, I., Wei, M.-T., Seredinski, A., Watanabe, K., Taniguchi, T., Deacon, R., Yamamoto, M., Bomze, Y., Tarucha, S., Amet, F., Finkelstein, G. Robust 4π Periodicity in Ballistic Graphene Josephson Junctions, *APS March Meeting 2017*, 62 (2017).

Draelos, A., Silverman, A., Wang, J., Ke, C.-T., Wei, M.-T., Vlassiouk, I., Amet, F., Finkelstein, G. Sub-Kelvin Lateral Thermal Transport in Graphene with Superconducting Contacts, *APS March Meeting 2016*, 61 (2016).

Watson, A., Zhang, X., de la Osa, R. A., Sanz, J., Fernandez, F., Moreno, F., Finkelstein, G., Liu, J., Everitt, H. Rhodium Nanoparticles for Ultraviolet Plasmonics, *APS March Meeting 2015,* 60 (2015).

Shinn, M., Benson, S.V., Neil, G. **Watson, A.**, Lalezari, R., van der Slot, P.J.M. Modeling and Operation of an Edge-Outcoupled Free Electron Laser. *32nd International Free Electron Laser Conference*, TUOC3 (2010).

Watson, A., Morphology and Performance of Spin-Cast Organic Thin-Film Transistors, *McCormick Symposium, North Carolina State University* (award talk) (2012).

Benson, S.V. *et al*. Demonstration of 3D Effects with High Gain and Efficiency in a UV FEL Oscillator. *2011 Particle Accelerator Conference*, THP171 (2011).

Software

Draelos, A., et al. *improv* (version 1.0). DOI: 10.5281/zenodo.4422012 (2019).

Professional Associations

Society for Neuroscience	2019 -
Triangle Women in STEM	2019-2022
American Physical Society	2013-2019

Peer Review Service

Neural Information Processing Systems (NeurIPS)

International Conference on Machine Learning (ICML)

Computational & Systems Neuroscience (Cosyne)

International Conference on Learning Representations (ICLR)

Neural Computation

Patterns, Cell Press

STAR Protocols, Cell Press

Teaching Experience

Biomede 241: Statistics, Computation, & Data Analysis for Biomedical Engineers	2024
Instructor	
Neurosci 530: Neuroanalytics	2024
Co-Instructor	
Neurobiology Special Topics: Methods for Imaging and Analyzing Large-Scale Neural Population Data	2022
Co-Instructor	
Physics 363: Thermal Physics	2014
Teaching Assistant	
Physics 264L: Optics and Modern Physics	2012
Lab Teaching Assistant	