

Nicholas Jacob Lauersdorf

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Education

Ph.D. in Materials Science, Jun. 2019-Current
University of North Carolina-Chapel Hill
Doctoral advisor: Dr. Daphne Klotsa
Graduate Certificates: Business Fundamentals

B.S. in Physics and Mathematics, August 2014-May 2018
University of Wisconsin-Madison

Research

NDSEG Research Fellow, Feb. 2020-Current
Department of Applied Physical Sciences, University of North Carolina-Chapel Hill
Principal Investigator: Dr. Daphne Klotsa

- Computationally (Python, C++) characterized the steady-state properties in phase-separated, non-equilibrium systems of self-propelled particles (active matter)
- Settled an ongoing debate in the field by demonstrating how pressure and surface tension must be treated as spatially-varying in active matter systems [Lauersdorf, *et al.* (2021)]
- Enabled scientists to predict the steady-state's properties in active matter systems by deriving and verifying an analytical theory based on the pressure balance at the gas-dense interface [Lauersdorf, *et al.* (2021)]

Graduate Research Assistant, Jun. 2019-Feb. 2020
Department of Applied Physical Sciences, University of North Carolina-Chapel Hill
Principal Investigator: Dr. Jinsong Huang

- Experimentally researched and designed perovskite light detectors
- Developed and optimized the first narrow-band perovskite photodetector to differentiate photoluminescent dyes [Wolanyk, *et al.* (2020)]
- Enabled more accurate photodetector characterization by designing a novel measurement system of the noise equivalent power
- Formed and managed a collaboration network for our lab with Brookhaven, Lawrence Livermore, and Savannah River National Laboratory personnel
- Made perovskite photodetectors more accessible to other scientists and students by writing a textbook chapter broadly reviewing the field [Lauersdorf, Huang (2021)]

Assistant Scientist, Oct. 2018-May 2019

PPD, Inhalation Department

- Quantified the effectiveness and stability of inhaled pharmaceuticals using high-performance liquid chromatography (HPLC)
- Increased customer satisfaction by organizing formal, written reports for and corresponding with clients
- Maintained and documented experiments in laboratory notebooks and client reports following GMP and FDA regulatory requirements

Research Intern, May 2018 – Sept. 2018

Department of Physics, University of Wisconsin-Madison

Research Advisor: Dr. Lisa Reusch

- Increased measurement capabilities of scientists by applying my computational model to design a x-ray detector to remove undesirable noise/signal from spectroscopic measurements [Lauersdorf (2018)]
- Experimentally verified the simulated predictions of my line radiation detector's performance
- Taught scientific topics to both those familiar and unfamiliar with the subject by presenting at public, undergraduate, and professional conferences

Undergraduate Researcher and Senior Thesis, May 2016 – May 2018

Department of Physics, University of Wisconsin-Madison

Research Advisor: Dr. Lisa Reusch

- Enabled the accurate prediction of energy emissions from fusion plasma generators by developing a deterministic model (Python and IDL)
- Increased efficiency of the energy emission model by 40% through converting calculations from using 2D lists (IDL) to 3+ dimensional arrays (Python), minimizing the need for iterating calculations over a loop
- Developed multi-variable optimization routines to maximize the accuracy and desired signal for x-ray detectors
- Implemented the capability of calculating the concentration of elemental impurities in a plasma based on measured energy emissions

Outreach

Graduate Teaching Assistant (Data Science and Analytics), Feb. 2020-Sep. 2021

Be A Maker (BeAM) Makerspaces, University of North Carolina-Chapel Hill

- Enabled more cost-efficient worker scheduling and targeted marketing by developing Tableau workbooks for statistical analysis and visualization of trends in big data sets (SQL) of user demographics
- Organized and led beta testing of BeAM user analytics software that improved end-user experience of administrative staff
- Designed visualizations for advertising the impact of BeAM on UNC's websites, in interdepartmental reports, and within every UNC makerspace
- Led team of five undergraduates that created and implemented a campus-wide BeAM inventory system and database
- Managed project that created a database for 3D printer and laser cutter user demographics by writing and overseeing the completion of a work breakdown structure

Senator of Graduate and Professional Student Federation (GPSF), Aug. 2020-Sep. 2021

Department of Applied Physical Sciences, University of North Carolina-Chapel Hill

- Elected by my graduate student peers in APS to advocate for graduate student rights
- Improve graduate student laboratory and transportation safety during COVID-19 by voting and supporting bills on the senate floor
- Elected by the GPSG senate to serve on the finance committee, where I wrote, proposed, and passed bills to provide financial support to minority-serving outreach organizations and international students requiring assistance with work-from-home costs
- Organized APS town hall meetings that updated and addressed the concerns of my graduate student constituents

Graduate Teaching Assistant (Teaching APPL-101), Aug. 2020-May. 2021

Department of Applied Physical Sciences, University of North Carolina-Chapel Hill

- Helped introduce and teach scientific computation (MATLAB) to students of diverse academic backgrounds
- Oversaw undergraduate research projects that modeled the effect of social distancing on spreading diseases like COVID-19, the motion of dolphins via sonar, and the growth of mold colonies

Awards

National Defense Science and Engineering Graduate (NDSEG) Fellowship

3-year award based on academic excellence in Science, Technology, Engineering and Math (STEM) achievements that fully covers graduate school costs for up to 36 months, including tuition (\$11,000/yr), an annual stipend (\$42,000/yr), healthcare (\$1,500/yr), and travel allowance (\$5,000). I was selected to receive this award from over 8,000 applicants.

First place poster presentation in Modeling, Computation, and Theoretical Simulations

I was awarded this award at the Triangle Student Research Competition 2021 out of over 100 presenters.

Theodore Herfurth Scholarship

4-year award (\$8,000/yr) to students excelling in both academics and outreach with financial need pursuing a degree from UW-Madison's College of Letters & Science

Technical Skills

Languages: Python (7 years), Bash (7 years), Mathematica (4 years), IDL (3 years), LaTeX (3 years), MATLAB (3 years), C++ (2 years), SQL (1 year), JavaScript (1 year)

Tools: Microsoft Word (14 years), Powerpoint (14 years), and Excel (6 years), HOOMD-Blue (3 years), Jupyter Notebooks (3 years), Ovito (3 years), GIMP (3 years), Tableau (2 years), SolidWorks (2 years), Chimera (1 year)

Operating Systems: macOS (9 years), Windows (7 years), Linux (3 years)

Wet Lab: Spin coating, blade coating, dip coating, physical layer deposition, atomic layer deposition, laser ablation, high performance liquid chromatography, gas chromatography, UV-Vis-nIR Absorbance, external quantum efficiency measurement, J-V measurement, capacitance-voltage measurement, transient response measurements, atomic force microscopy, X-ray diffraction

Publications

Lauersdorf N, Huang J. "Perovskites Enabled Highly Sensitive and Fast Photodetectors" book chapter published in "Perovskite Photovoltaics and Optoelectronics: From Fundamentals to Advanced Applications", edited by Tsutomu Miyasaka, Wiley (2021).

Lauersdorf N, Kolb T, Moradi M, Nazockdast E, Klotsa D. "Phase behavior and surface tension of soft active Brownian particles," *Soft Matter*. **17**, 6337-6351 (2021)

Wolanyk J, Xiao X, Fralaide M, **Lauersdorf N**, et al. "Tunable perovskite-based photodetectors in optical sensing," *Sensors Actuators, B Chem*. 2020. doi:10.1016/j.snb.2020.128462

Lauersdorf N, "Development of a Ross Filter Based Aluminum Line Radiation (NickAl2) Detector in Madison Symmetric Torus," Internally published by UW-Madison, March 2018.
http://plasma.physics.wisc.edu/uploadedfiles/theses/thesisLauersdorf136_2018.pdf

Presentations

Lauersdorf N, Nazockdast E, Klotsa D. "Surface Tension of Soft Active Brownian Particles" oral presentation at the Applied Physical Sciences March Meeting, March 2022, Chicago, IL

Lauersdorf N, Nazockdast E, Klotsa D. "Predicting the Mechanical Stability of Phase-separated, Binary Active Mixtures" oral presentation at the Physics and Applied Math seminar at the UNC-Chapel Hill, March 2022, Chapel Hill, NC

Lauersdorf N, Kolb T, Moradi, M, Nazockdast E, Klotsa D. "Phase Behavior and Surface Tension of Soft Active Brownian Particles" poster presented at the Triangle Student Research Competition, March 2022 Chapel Hill, NC

Lauersdorf N, Klotsa D. "Predicting the Dense Phase Properties for Mixtures of Active Forces" oral presentation at the Department of Applied Physical Sciences Colloquium at the UNC-Chapel Hill, March 2022 Chapel Hill, NC

Lauersdorf N, Nazockdast E, Klotsa D. "Surface Tension of Soft Active Brownian Particles" oral presentation at the Physics and Applied Math seminar at the UNC-Chapel Hill, December 2021, Chapel Hill, NC

Lauersdorf N, Kolb T, Moradi, M, Nazockdast E, Klotsa D. "Phase Behavior and Surface Tension of Soft Active Brownian Particles" poster presented at the Triangle Student Research Competition, October 2021, Chapel Hill, NC

Lauersdorf N, Kolb T, Moradi, M, Nazockdast E, Klotsa D. "Phase Behavior and Surface Tension of Soft Active Brownian Particles" oral and poster presentation at the UNC-Chapel Hill APS Open House, October 2021, Chapel Hill, NC

Lauersdorf N, Klotsa D. “Role of Surface Tension in Active-Brownian Particle Systems” oral presentation at the Department of Applied Physical Sciences Colloquium at the UNC-Chapel Hill, September 2021 Chapel Hill, NC

Lauersdorf N, Klotsa D. “Active Matter Mixtures,” oral presentation at the UNC-Chapel Hill APS Open House, October 2020, Chapel Hill, NC

Lauersdorf N, Kolb T, Moradi, M, Nazockdast E, Klotsa D. “Dependence of Phase Behavior and Surface Tension on Particle Stiffness for Variably Soft Active Brownian Particles” poster presented at the Triangle Student Research Competition, October 2020, Chapel Hill, NC

Lauersdorf N, Chen Z, Bao C, Fang Y, Shen L, Liu M, Saidaminov M, Huang J. “Thin Single Crystal Perovskites for Unprecedented Low Noise and Large Linear Dynamic Range Photodetectors,” poster presented at the ETI Workshop, November 2019, Atlanta, GA

Lauersdorf N, Chen Z, Bao C, Fang Y, Shen L, Liu M, Saidaminov M, Huang J. “Thin Single Crystal Perovskites for Unprecedented Low Noise and Large Linear Dynamic Range Photodetectors,” poster presented at the UNC-Chapel Hill APS Open House, November 2019, Chapel Hill, NC

Lauersdorf N, Reusch L.M, Almagri A.F, Franz P, Goetz J, Vanmeter P, Den Hartog D, “Development of a Ross Filter-based Aluminum Line Radiation Detector (NickAl2) for MST,” poster presented at the Annual Meeting of the American Physical Society Division of Plasma Physics, November 2018, Portland, OR

Lauersdorf N, Reusch L.M, Almagri A.F, Den Hartog D, Franz P, Goetz J, Vanmeter P, “Development of NickAl2 Detector for Absolute Measurement of Al Line Radiation on MST,” oral presentation at the Department of Physics at the UW-Madison, March 2018, Madison, WI

Lauersdorf N, Reusch L.M, Almagri A.F, Den Hartog D, Franz P, Goetz J, Vanmeter P, “Development of NickAl2 Detector for Absolute Measurement of Al Line Radiation on MST,” poster presented at the Undergraduate Research Symposium, April 2018, Madison, WI

Lauersdorf N, Reusch L.M, Den Hartog D, Goetz J, Franz P, Vanmeter P, “ROSS Filter Development for Absolute Measurement of Al Line Radiation in MST,” poster presented at the Annual Meeting of the American Physical Society Division of Plasma Physics, October 2017, Milwaukee, WI

Memberships

Graduate Business and Consulting Club (08/2019-Current), Senator for Graduate and Professional Student Government (08/2020-09/2021) and serving on Finance Committee, Materials Research Society (08/2019-Current), Graduate Student Association (08/2019-Current), American Physical Society (08/2016-08/2018, 06/2021-Current)