

MATTHEW J. DEUTSCH

EDUCATION

Kent State University Ph.D. Candidate in Materials Science	<i>May 2022 - Present</i> <i>Kent, OH</i>
Kent State University M.S. in Materials Science	<i>August 2020 - May 2022</i> <i>Kent, OH</i>
Texas A&M University - Commerce M.S. in Physics	<i>August 2018 - August 2020</i> <i>Commerce, TX</i>
Allegheny College B.S. in Physics, Minor in Political Science	<i>August 2014 - May 2018</i> <i>Meadville, PA</i>

RESEARCH & TECHNICAL EXPERIENCE

Graduate Research <i>Advanced Materials & Liquid Crystals Institute; Kent State University</i>	<i>May 2021 - Present</i>
<ul style="list-style-type: none">· Developed simulations to investigate the fundamental mechanism of heterogeneous defect nucleation in nematic liquid crystals.· Designed and constructed highly parallel coarse-grained molecular dynamics simulations to study mixing dynamics of confined active matter and extra-cellular matrix ordering.· Built highly-optimized Monte-Carlo simulations to study chirality amplification and deracemization in nematic liquid crystals.· Used high-performance computing resources at the Ohio Supercomputing Center (OSC), as well as co-authored NSF-ACCESS grants for the San Diego Supercomputing Center (SDSC) and the National Center for Supercomputing Applications (NCSA).	
Graduate Student Internship <i>Computational Physics Division; Los Alamos National Laboratory</i>	<i>January 2023 - August 2024</i>
<ul style="list-style-type: none">· Interned in the Continuum Models and Numerical Methods group (XCP-4).· Integrated Lagrangian particle dynamics with Eulerian computational fluid dynamics code for large-scale cloud physics simulations.· Applied OpenACC programming model to Lagrangian particle dynamics modules to leverage GPU resources resulting in a significant performance increase.	
Parallel Computing Summer Research Internship <i>Computational Physics; Los Alamos National Laboratory</i>	<i>June 2022 - August 2022</i>
<ul style="list-style-type: none">· Attended intense 10-week program in foundations of modern high-performance computing.· Improved modules of a computational fluid dynamics code to run on GPUs resulting in a significant computational speed-up using OpenACC programming model.	
Graduate Research <i>Dept. of Physics & Astronomy; Texas A&M University - Commerce</i>	<i>November 2018 - August 2020</i>
<ul style="list-style-type: none">· Characterized novel organic semiconducting polymers for the development of more efficient organic light-emitting diodes and solar cells.· Independently designed and created static light scattering experiment to investigate polymer size effects.	

Undergraduate Research

August 2017 - May 2018

Physics Dept.; Allegheny College

- Investigated hydrophobic surfaces using surface plasmon resonance and scanning electron microscopy as part of a senior thesis project.
- Maintained and repaired lab equipment; wrote and debugged control software.

Collaborative Research Project

Oct. 2016 - March 2017

Physics Dept.; Allegheny College

- Collaborated with Acutec Precision Aerospace on a study of the viability of additive manufacturing of aluminum for the aerospace industry.

LEADERSHIP EXPERIENCE

Graduate Teaching Assistant

August 2020 - December 2022

Dept. of Physics; Kent State University

- Supervised and led undergraduate physics labs via in-person and remote instruction.

Graduate Teaching Assistant

August 2018 - May 2020

Dept. of Physics & Astronomy; Texas A&M University - Commerce

- Graded homework and lab reports for upper and lower-level physics classes for majors and non-majors.
- Assistant instructor for introductory & advanced physics classes; presented brief lectures on selected concepts.

Teaching Assistant

August 2016 - May 2017

Physics Dept.; Allegheny College

- Conducted recitation sessions for introductory physics courses.

PUBLICATIONS

M. Deutsch, R. L. B. Selinger, P. van der Schoot, "Chirality amplification and deracemisation in liquid crystals: Maier-Saupe theory and simulation studies" *Manuscript in preparation*.

B. Klein, A. S. Franco, Md M. H. Sabbir, M. Deutsch, R. L. B. Selinger, K. A. Mitchell, D. A. Beller, "Spontaneous Optimal Mixing via Defect-Vortex Coupling in Confined Active Nematics" *arXiv*; doi:10.48550/arXiv.2503.10880

C. Long, M. Deutsch, J. Angelo, C. Culbreath, H. Yokoyama, J. Selinger, R. Selinger, "Frank-Read Mechanism in Nematic Liquid Crystals" *Physical Review X*; 14 (1) doi:10.1103/PhysRevX.14.011044

M. Deutsch, H. Park, "Internal and external quantum yields enhancement in BDMO-PPV by intense illumination" *Synthetic Metals*; 269 (116548) doi:10.1016/j.synthmet.2020.116548

SELECTED PRESENTATIONS

December 2024, SKCM2-I2CNER Joint Symposium

Agent-based simulation studies of confined active nematic filaments

M. Deutsch, M. Varga, R. B. Selinger

Kyushu University, Fukuoka, Japan

March 2023, American Physical Society March Meeting

Agent-based simulation study of confined active nematic filaments

M. Deutsch, M. Varga, R. B. Selinger

Minneapolis, MN

June 2023, Liquid Crystals - Gordon Research Conference

Frank-Read Sources in Nematic Liquid Crystals: Temperature & Strain-Rate Effects

C. Long, M. Deutsch, J. Angelo, C. Culbreath, H. Yokoyama, J. Selinger, R. Selinger

Manchester, NH

March 2023, American Physical Society Virtual March Meeting

Frank-Read Sources in Nematic Liquid Crystals: Temperature and Strain-Rate Effects

M. Deutsch, C. Long, J.V. Selinger, R. L. B. Selinger

Las Vegas, NV

August 2022, Los Alamos National Laboratory Student Symposium

Speeding Up Lagrangian Particle Modules in HIGRAD with OpenACC

M. Deutsch, E. Koo, R. Robey

Los Alamos, NM

April 2022, 36th Annual Graduate Research Symposium

Heterogeneous Defect Nucleation via Frank-Read Sources in Nematic Liquid Crystals

M. Deutsch, C. Long, Dr. J. Selinger, Dr. R. Selinger

Kent, OH

– Outstanding Presenter Award in Liquid Crystals & Math Section

March 2022, American Physical Society March Meeting

Twist And Snap: Heterogeneous Defect Nucleation via Frank-Read Sources in Nematic Liquid Crystals

M. Deutsch, Dr. Robin Selinger

Chicago, IL

March 2020, American Physical Society March Meeting¹

Quantum Yield Enhancement of BDMO-PPV During Photo-Degradation

M. Deutsch, Dr. H. Park

Denver, CO

Nov. 2019, Texas A&M System Pathways Student Research Symposium - Poster

Quantum Efficiency Study of BDMO-PPV Photo-Degradation Processes in Different Solutions

M. Deutsch, Dr. H. Park

Texas A&M International University, Laredo TX

– 2nd Place Award in Math & Physical Sciences Category

March 2017, American Physical Society March Meeting - Poster

Discussion of Physical Limitations of Additive Manufacturing in Aerospace Engineering

C.Castillo, M. Deutsch, S. McClain, Dr. A. Poynor

New Orleans, LA

SKILLS

Programming Languages

Julia, Python, Chapel, Fortran, C/C++

Lab Techniques

UV-Vis, FTIR, NMR, Surface Plasmon Resonance, SEM, AFM

AWARDS

Outstanding Presenter Award in Liquid Crystal & Math

April 2022, 36th Annual Graduate Research Symposium, Kent State University

Outstanding Graduate Researcher Award

May 2020, Department of Physics & Astronomy, Texas A&M University - Commerce

2nd Place Graduate Research Award in Math & Physical Sciences

November 2019, Texas A&M University System Pathways Student Research Symposium

Presidential Research Funding Award

June 2019 - August 2019, Department of Physics & Astronomy, Texas A&M University - Commerce

– Graduate research assistantship sponsored by the President of Texas A&M University - Commerce

¹Meeting cancelled, presentation slides available online