MATTHEW J. DEUTSCH

deutsch.matthewj@gmail.com

EDUCATION

Kent State University *May 2022 - Present*
Ph.D. Candidate in Materials Science *Kent, OH*

Kent State University *August 2020 - May 2022*
M.S. in Materials Science *Kent, OH*

Texas A&M University - Commerce *August 2018 - August 2020*
M.S. in Physics *Commerce, TX*

Allegheny College *August 2014 - May 2018*
B.S. in Physics, Minor in Political Science *Meadville, PA*

RESEARCH & TECHNICAL EXPERIENCE

Graduate Research *May 2021 - Present*
Advanced Materials & Liquid Crystals Institute; Kent State University

- 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 *January 2023 - August 2024*
Computational Physics Division; Los Alamos National Laboratory

- 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 *June 2022 - August 2022*
Computational Physics; Los Alamos National Laboratory

- 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 *November 2018 - August 2020*
Dept. of Physics & Astronomy; Texas A&M University - Commerce

- 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, "Limits of Topological Entropy Production in Confined Active Nematics" *Manuscript in preparation.*

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 Meeting[1]
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*
– 2^{nd} 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

[1] Meeting cancelled, presentation slides available online