PHUM SIRIVIBOON

EDUCATION

MIT   2022 - 2023 (Ongoing)
Ph.D. in Physics

Brown University   2018 - 2022
B.S. Computer Science and Physics

Kent School   2017 - 2018
Post-Graduate Degree

Mahidol Wittayanusorn School   2013 - 2017
High School

PUBLICATION LIST

1. Mandal, M., Drucker, N. C., Siriviboon, P., Nguyen, T., Boonkird, T., Lamichhane, T. N., ... & Li, M. (2023). Topological superconductors from a materials perspective. arXiv preprint arXiv:2303.15581

2. Jiang-Xiazi Lin, Phum Siriviboon, Harley D. Scammell, Song Liu, Daniel Rhodes, K. Watanabe, T. Taniguchi, James Hone, Mathias S. Scheurer, and J. I. A. Li. Zero-field superconducting diode effect in twisted trilayer graphene, 2021. arXiv:2112.07841

3. Phum Siriviboon, Jiang-Xiazi Lin, Harley D. Scammell, Song Liu, Daniel Rhodes, K. Watanabe, T. Taniguchi, James Hone, Mathias S. Scheurer, and J. I. A. Li. Abundance of density wave phases in twisted trilayer graphene on WSe_2. 2021. arXiv:2112.07127

4. Phum Siriviboon, Chawalit Tungkaburee, Naruepon Weerawongphrom, and Chadin Kulsing. Direct equations to retention time calculation and fast simulation approach for simultaneous material selection and experimental design in comprehensive two dimensional gas chromatography. Journal of Chromatography A, 1602:425-431, 2019

TECHNICAL SKILL

Computer Languages	C++, Python, Java, Scala, Racket, Ocaml, ReasonML, MATLAB, VBA, Mathematica
Library	numpy, scipy, openCV, matplotlib, kwant, sympy, pytorch, tensorflow
Language	Thai, English

RESEARCH EXPERIENCE

Twisted-trilayer Graphene with WSe_2   Mar 2021 - Mar 2022
Undergraduate Researcher   *Li's lab, Brown University*

· Exfoliated graphite gate, graphene, hBN, and WSe_2.
· Inspected the flakes using Atomic Force Microscope (AFM).
· Stacked and fabricated the device.
· Measured and analyzed the electrical transport of the device at different temperatures, electric fields, and magnetic fields.

Evolution of Neural Network with Partially-randomized Label Mar 2021 - Present Undergraduate Researcher   Mar 2021 - Jan 2022
Undergraduate Researcher   *Gromov's group, Brown University*

· Implemented a general framework in PyTorch to calculate the Neural Tangent Kernel (NTK) of neural networks.
· Calculated the Kernel function of the neural network when a subset of the labels is randomly permuted.

Reconstruction of Subsampled Landau Fan Measurement using Compressed Sensing and Deep Learning. June 2020 - Aug 2020
Undergraduate Researcher *Li's lab, Brown University*

· Worked on approaches to reconstruct the high-resolution landau fan from the randomly sub-sampled.
· Implemented compressed sensing as a baseline method for the fan's reconstruction using Python.
· Implemented Noise2Noise model and trained the model on the real Landau fan data using Tensorflow.
· Attended APS March Meeting 2021 for the oral presentation.

Skyrmion in Frustrated Liquid Crystal System June 2020 - Aug 2020
Undergraduate Researcher *Pelcovis' lab, Brown University*

· Implemented relaxation method for liquid crystal in frustrated boundary condition based on Liquid crystal Skyrmions can swim (Ackerman, 2017) in Python.

Scattering Matrix in Tilted Dirac Cone Junction May 2019 - July 2019
Research Assistance *KMUTT Theoretical and Computational Physics, Thailand*

· Derived a model to explain the electronic properties of the NPN Graphene transistor with tilted Dirac cone.
· Numerically calculated the density of state and the scattering amplitude of electron in the noninteracting limit using Python.

Motion of Paramecium Under the gradient flow Dec 2018 - May 2019
Undergraduate Researcher *Valles' Lab, Brown University*

· Tracked the motion of single Paramecium in a circular chamber to determine chirality of its motion using Tracker program.
· Designed the experiment to observe how the motion of Paramecium responses under flow with gradient.

PROJECT

Ferrofluids Simulation Using SPH Group Project
CSCI2240: Interactive Computer Graphics *Brown University*

· Implemented the key features of On the Accurate Large-scale Simulation of Ferrofluids using C++ (Huang, 2019).
· Created a MagneticSolver class which calculate the magnetic force acting on each ferrofluid element given the external field.

Simulating Chaos in the Astrojax Pendulum with Automatic Differentiation
Phys 2030: Classical Theoretical Physics I *Brown University*

· Applied automatic differentiation in Python to simulate Astrojax pendulum which has complex coordinate representation and constraints.
· Studied the Lyapunov exponent, Poincare section, and flip time diagram of the Astrojax pendulum.

Flat Self Assembly
Project *Bangkok, Thailand*

· Studied the phase transition of granular material under vertical oscillation.
· Detected the granular material's position by OpenCV (Python) and extracted the statistical distribution of each particle in phase space.

·

· Calculated the Shannon entropy of the system and quantified the critical parameters and the nature of the transition.

Surface Tension as a Function of Temperature in Lennard-Jones Fluid
Phys 1600: Computational Physics   *Brown University*

· Implemented molecular dynamics algorithm from a scratch using Python.
· Implemented a thermostat for the system using extra layers of the molecule to ensure that heating conforms to statistical mechanics.
· Calculate the surface tension of the fluid from Virial theorem as a function of temperature.

WORK EXPERIENCE

Interactive Computer Graphics (CSCI 2240)   Oct 2021 - Dec 2021
Teaching Assistance   *Brown University*

· Take part in TA interview process and course development.
· Work on the solution to newly developed project about as-rigid-as-possible transformation.

Deep Learning (CSCI 1470)   Oct 2021 - Dec 2021
Teaching Assistance   *Brown University*

· Served as a conceptual TA which help the student specifically on the conceptual questions.
· Graded homework assignments.

Computer Science: Integrated Introduction (CSCI 0170)   Aug 2019 - Dec 2019
Teaching Assistance   *Brown University*

· Wrote an autograder for the class assignment using Python for functionality testing of the assignment.
· Held TA hour and lab hour.
· Graded homework assignments.

International Youth Physicists Tournament (IYPT), Team Thailand   July 2019
Team Leader   *Warzaw, Poland*

· Conducted a debate practice for the team members.
· Planned strategy for the team during the competition.
· Counseled team member regarding the theoretical, experimental, and computational aspects of the problems.
· Received the bronze medal for the competition.