Kyle Onghai

Education

Princeton University — **Princeton, NJ**
Ph.D. Operations Research & Financial Engineering — *August 2024 – Present*

University of California, Los Angeles — **Los Angeles, CA**
B.S. Mathematics, Specialization in Computing — *September 2020 – June 2024*

- Highest Honors, Honors College, Dean's List, Alumni Scholar's Club Member
- Top 500 on 81st William Lowell Putnam Mathematical Competition
- Cumulative GPA: 3.85, Major GPA: 3.87

Earl L. Vandermeulen High School — **Port Jefferson, NY**
Salutatorian — *September 2016 – June 2020*

- New York Regents Scholarship recipient, National AP scholar.

Research Experience

Massachusetts Institute of Technology — **Cambridge, MA**
Summer Geometry Initiative 2023 — *July 2023 – August 2023*

- Modeled clogging within three-dimensional stochastic Poisson-Voronoi foams by analyzing the distribution of edge lengths and simulating using Voro++.
- Adapted a method that generates helix-free stripes in knit graph designs to handle more than two boundaries and compute the relevant harmonic interpolations in Geometry Central.
- Devised a mesh decimation algorithm based on iterated local operations that adheres to preferred edge alignment directions in libigl.

Centre de Researches Mathématiques — **Montreal, QC**
12th Montreal Industrial Problem Solving Workshop — *August 2022*

- Built a prototype for the International Air Transport Association to map air turbulence using real-time eddy dissipation rate data.
- Allows pilots to avoid patches of high air turbulence in order to reduce wasteful fuel consumption and number of injuries.

Moravian University — **Bethlehem, PA**
REU: Research Challenges of Computational Methods in Discrete Mathematics — *June 2022 – August 2022*

- Established the theory of distribution graphs in the study of chip-firing games on simple graphs.
- Described the contractions of 2-edge-connected graphs with maximum matching number at most 4.

Collaborative Mathematical Research Program — **Online**
Undergraduate Researcher — *June 2021 – August 2021*

- Showed that there are infinitely many k-Diophantine m-tuples over a finite field with a sufficiently large, odd prime cardinality.
- Proved a closed-form formula for the number of 3-Diophantine triples in a finite field with an odd prime cardinality.
- Developed an asymptotic formula for the number of k-Diophantine m-tuples in a finite field with an odd prime cardinality.

Stony Brook University — **Stony Brook, NY**
Simons Summer Research Fellow — *June 2019 – August 2019*

- Added photoacoustic tomography functionality to Orthopaedic Bioengineering Lab's proprietary quantitative ultrasound machine.
- Devised analytic method in MATLAB to reconstruct images of phantoms using Fourier transforms.

Skills

Software: C/C++, Python, LaTeX, MATLAB, Lua, Bash, GNU/Linux, Rust, nTopology
Libraries: Geometry Central, libigl, Eigen, Gurobi, Voro++, SageMath
Languages: English (Native), Mandarin (Intermediate), Latin

Community Involvement

Massachusetts Institute of Technology — **Cambridge, MA**
Summer Geometry Initiative 2024 — *July 2024 – August 2024*

- Served as a volunteer mentor for the 2024 SGI fellows.

Stony Brook University Medical Center — **Stony Brook, NY**
Patient Education Volunteer — *November 2018 – February 2020*

- Taught patients how to access and use the Patient Portal, and received the Presidential Award for Volunteer Service.

Publications and Presentations

Sanjana Adapala, Sara Ansari, Shalom Abebaw Bekele, Kyle Onghai, and Andrew Spielberg. Probabilistic Design and Analysis of Lattice Structures, October 2023. URL: https://summergeometry.org/sgi2023/probabilistic-design-and-analysis-of-lattice-structures/.

Gizem Altintas, Emi Neuwalder, Kyle Onghai, and Hossam Saeed. Simplifying meshes along frame fields. *In preparation.*

Eugene Fiorini, Max Folger, Kyle Onghai, Jacob Porter, Danae Rupp, and Andrew Woldar. Properties of chip-firing distribution graphs. *Presented at JMM 2023.*

Alberto Fornaci, Adrian Ganea, Brent King, Katsiaryna Vashchankova, Javier Almonacid, Sean Bohun, Douglas Bowen, Thomas Gkelsinis, Slim Ibrahim, Michael R Lindstrom, Joy Liu, and Kyle Onghai. Creating a heat map and building a seasonal diagram. *12th Montreal Industrial Problem Solving Workshop*.

Trajan Hammonds, Seoyoung Kim, Steven J. Miller, Arjun Nigam, Kyle Onghai, Dishant Saikia, and Lalit M. Sharma. k-diophantine m-tuples in finite fields. *International Journal of Number Theory*, 19(04):891–912, 2023. doi:10.1142/S1793042123500458.

Sahana Kargi, Kyle Onghai, and Anthony Ramos. Knitting foliations. *In preparation.*

Benjamin Keitly, Samuel Murray, Kyle Onghai, Tony W. H. Wong, and Taoye Zhang. Non-supereulerian, 2-edge-connected graphs with matching number at most 4. *Presented at JMM 2023*.