Alec Lau

aszlau@gmail.com | 2124 N 89 St, Wauwatosa, WI, 53226

Education/Coursework (underline indicates a graduate course)

Stanford University Stanford, CA

B.S. Engineering Physics (Quantum Science) | *Advisor: Benjamin Lev*

Classical Mechanics, Variational Mechanics, Relativity, Organic Chemistry, Electrodynamics, Quantum Mechanics, Computer Systems, Intro to Making (EE), Programming Abstractions, Quantum Algorithms, Topological Quantum Computation, Quantum Information, Complexity, Gravity, & Black Holes, Information Theory, Convolutional Neural Networks, Advanced Topics in Quantum Mechanics, Statistical Mechanics, Many Body Quantum Dynamics, Numerical Methods

B.S. Mathematics (Pure) | *Advisor: Ravi Vakil*

Analysis, Theoretical PDEs, Group/Ring Theory, Differential Topology, Mathematics & Statistics of Gambling, Quantum Field Theory for Mathematicians, Algebraic Topology, Galois Theory, Quantum Groups, Differential Geometry, Symplectic Geometry & Topology, Topics in Topology (4-manifolds), Simplicity & Complexity in Economic Theory

---

Work Experience

Meranti Research Laboratories Aug. 2020 - Present | Remote

Plasma Particle Simulation Programmer

- Writing Python code for plasma simulations for use of data analysis for fusion reactor designs
- (side project) Analyzing quantum chaos in said fusion reactor designs

Advanced Technology Center, Lockheed Martin Space Jun. 2019 - Sep. 2019 | Palo Alto, CA

Research Science Engineer Intern

- Wrote and simulated VHDL code for FPGAs for use in space flight
- Analyzed 3D LIDAR data processing

Wauwatosa School District Aug. 2015 - Jun. 2016 | Wauwatosa, WI

Student Helpdesk Operator

- Set up & distributed school chromebooks, helped to troubleshoot various computer problems

---

Engineering/Research Experience

Mathematics/Theoretical Condensed Matter Physics Remote | Jul. 2020 - Present

Advisor: Kevin Walker, Microsoft Station Q

- Applying algebraic and geometric topology to theoretical condensed matter physics. Namely, computations of S_3-Dijkgraaf-Witten topological quantum field theory on link complements in the 3-sphere.

Mathematics Reading Oct. 2018 - Jun. 2019 | Stanford, CA

Advisor: Daniel Bump, Stanford University

- Research in topological quantum computation; topology, theoretical physics, theoretical computer science, representation theory, quantum groups, category theory

Feldman Group, Dept. of Physics, Stanford University Stanford, CA

Undergraduate Researcher, Full-Time | P.I.: Ben Feldman, Stanford University | Jun. 2018 - Sep. 2018

- Designed and created devices to fabricate custom single electron transistor tips for studying the quantum Hall regime

The Dionne Group, Dept. of Materials Science & Engineering, Stanford University Stanford, CA

Undergraduate Researcher, Full-time | P.I.: Jennifer Dionne, Stanford University | Jun. 2017 - Sep. 2017

- Synthesized gold plasmonic nanoparticles with optimal Raman enhancement, tested different synthesis conditions to alter nanoparticle geometry, & characterized them on the Tecnai TEM electron microscope
- Wrote numerical method simulations of nanophotonics on different nanoparticles

---

Projects (see https://hirako22.github.io/making.html for details and additional projects)

Voice-controlled Dorm Lighting System	Aug. 2016
Mechatronic Iron Man Arm Replica	Jun. 2015
Bare-bones Raspberry Pi LED sound display	Mar. 2018
Retro style Wooden Coffee Table	Aug. 2014
Rubber Band Machine Gun	Mar. 2012
Feature-Focused Photograph Generation	May 2019

- Nominated for project prize in a class of almost 600 students

Mathematics Directed Reading Program at Stanford University

Riemannian Manifolds	Talk: "Riemannian Manifolds & Differential Geometry" | Spring 2018
Algebraic Topology	No talk given | Summer 2018
Mirror Symmetry	"Calabi-Yau Manifolds & String Theory" | Winter 2019

Skills

VHDL | FPGA Design | C | C++ | Java | Javascript | Chemical Safety | Electron Microscopy | Scientific Python | Soldering | Mechatronic Design | Woodworking | Welding | Metalworking | Arduino | Raspberry Pi | Bare Metal Programming | Customer Service | Numerical Methods | Autodesk Inventor | Numpy | Vacuum System Design | Prototyping | Deep Learning for Image Recognition | LaTeX

Languages

German (6 years), Mandarin (1 year)

Miscellaneous

- Leland Stanford Junior University Marching Band (LSJUMB) (Section Leader Sep. 2018 - Dec. 2019)
- Stanford Taekwondo (Competed in Pac-West and Collegiate Nationals tournaments in black belt sparring)
  - Quarter Finalist at 2019 Collegiate Nationals, featherweight division black belt sparring