Alec Lau

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Education/Coursework (<u>underline</u> indicates a graduate course)

Stanford University   Stanford, CA

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

Classical Mechanics, <u>Variational Mechanics</u>, Relativity, Organic Chemistry, Electrodynamics, Quantum Mechanics, Computer Systems, Programming Abstractions, <u>Quantum Algorithms & Quantum Cognition</u>, <u>Topological Quantum Computation</u>, <u>Quantum Information, Complexity, Gravity, & Black Holes</u>, <u>Information Theory</u>, <u>Convolutional Neural Networks</u>

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

Analysis, Theoretical PDEs, Group Theory, Ring Theory, Differential Topology, <u>Mathematic & Statistics of Gambling</u>, <u>Quantum Field Theory for Mathematicians</u>, <u>Algebraic Topology</u>, Galois Theory, <u>Quantum Groups</u>, <u>Differential Geometry</u>

Work Experience

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

Research Science Engineer Intern

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

AMC Theatres   Jul. 2015 - Sep. 2016 | Wauwatosa, WI

Theatre Crew

- Worked the Box Office, concession stand, usher, trainer
- Employee of the Month, February 2016

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

Student Helpdesk Operator

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

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Engineering/Research Experience

Mathematics Research   Stanford, CA | Oct. 2018 - Present

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

Voice-controlled Dorm Lighting System   Aug. 2016
Coded & soldered an Arduino-based analog LED control system with a voice recognition platform
Mechatronic Iron Man Arm Replica   Jun. 2015
Designed, built, coded, & soldered an arduino-based mechatronic Iron Man arm with custom-wired lights, a custom sound trigger, & a moving rocket chamber
Bare-bones Raspberry Pi LED sound display Mar. 2018
Retro style Wooden Coffee Table   Aug. 2014
Built a pine & birch coffee table, made custom jigs for attaching parts & safely cutting double bevels
Rubber Band Machine Gun   Mar. 2012
Built a motorized mechanism that releases 150 rubber bands in ~3 seconds, based on Ogg Craft's design
Feature-Focused Photograph Generation   May 2019
Designed novel architecture for a semantic image GAN designed to produce photorealistic images
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

Skills

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

Languages

German (6 years), Mandarin (1 year)

Miscellaneous

Leland Stanford Junior University Marching Band (LSJUMB) (Section Leader since Sep. 2018), Stanford Taekwondo (Competed in Pac-West and Collegiate Nationals tournaments, 2019), Stanford Robotics