Alex Short

alex.abe.short@gmail.com | ashort04@calpoly.edu | shorale21.github.io

Education

California Polytechnic State University, San Luis Obispo (Since Fall 2021**)**   Estimated Completion:

Major:	Bachelor of Science in Physics	June 2025
2nd Major:	Bachelor of Science in Computer Engineering	June 2025
Minor:	Mathematics	Completed June 2023
Minor:	Astronomy	Sept 2024

Research and Projects

Loop Quantum Gravity | Present

➔ Exploring the canonical quantization of general relativity via the loop representation in order to produce a detailed textbook style publication on the subject

Diffusion in Microhydrodynamical Systems | Present

➔ Determination the effects of fluid flow on microscopic diffusion present in quasi two dimensional systems

➔ Use of fluorescence microscopy to observe lipid monolayers in a Langmuir trough setup in order to quantify diffusion

➔ Exploration of the aggregative properties of quantum dots embedded in a thin smectic liquid crystal film

University of Colorado Boulder REU | July – August 2023

➔ Observation of the diffusive properties of smectic C islands in liquid crystals

➔ Use of polarized microscopy to observe topological vortices in liquid crystal films

➔ Use of artificial intelligence to track and quantify the diffusion of features in liquid crystal films, as well as image processing and statistical analysis of the results

Shape Dynamics & Gravitational Physics | February – August 2022

➔ Use of simulations to understand classical gravitational systems

➔ Modeling and understanding of 'shape space' in the classical sense in order to find quantum properties of gravitation

Relevant Skills & Knowledge

- C, C++, Python, Java, Ruby, C#, HTML, Verilog, Assembly
- Mathematica, Matlab, Julia, Labview, Arduino
- Microscopy & related equipment (lasers, cameras, etc.), handling chemicals
- Abstract algebra, tensor calculus, linear algebra, differential geometry

- Machine learning & image processing techniques
- Electric circuitry & digital logic
- Computer design and architecture
- Algorithms and computational methods of physics
- Project organization with notion & obsidian