

Ethan Lipson

ethanlipson.com ❖ ethan.lipson@columbia.edu ❖ (607) 279-5751

EDUCATION

Columbia University

Applied Mathematics, Minor in Computer Science - GPA 3.74

Past Coursework - Linear Algebra, ODEs, Real Analysis, Complex Analysis, Topology

Spring 2024 Coursework - Graduate Optimization, Graduate Probability Theory, Measure Theory

New York, New York

August 2022 - May 2026

Stuyvesant High School

GPA 93/100

New York, New York

September 2018 - June 2022

EXPERIENCE

Columbia University Department of Mathematics - *Researcher*

March 2023 - Present

- Conducting research with Professor Konstantin Aleshkin into current models of string theory
- Analysis of polygon subdivision to enumerate quintic threefolds, a specific kind of Calabi-Yau manifold

Xscape Photonics - *Intern*

May 2023 - August 2023

- Automated control, calibration, and synchronization of lab equipment (power supplies, lasers, spectrum analyzers)
- Optical fiber alignment using mathematical optimization in a 12-degree-of-freedom mechanical environment

Heights Labs - *Intern*

June 2022 - September 2022

- Wrote software that scanned the web for cryptocurrency addresses, identifying crime and illicit movement of funds
- Used **AWS**, **PySpark**, **Tesseract OCR**, **Vue**, and **TypeScript**.

TECHNICAL SKILLS

Languages

- Python, C++, JavaScript, TypeScript, Rust, Java

Parallel GPU Programming

- Massively parallel million-body simulations using **CUDA**, and web-based GPU compute using **WebGL/WebGPU**

Physics Simulation

- Fluid simulation, rigidbody/softbody dynamics, parallelized to run on multi-core or GPU

Computer Graphics

- Knowledge of linear algebra and quaternion algebra for use in **OpenGL**, **WebGL**, **WebGPU**, and **Three.js**

Machine Learning and Data Science

- Deep neural networks with **PyTorch**, data processing with **Apache Spark** on remote clusters

PROJECTS - Available at ethanlipson.com

Fluid Simulation - Position-Based Fluids are used to perform a 30,000 particle simulation in real-time

Cloth Simulation - Interactive simulation of cloth draped over a post, implementing collision and shadows

Julia Sets - Interactive visualization of Julia sets, a well-known phenomenon in holomorphic dynamics

Boids - Simulation of approximately 100,000 boids, a model of flocking behavior seen in birds, fish, and other animals

Metaballs - Interaction of the metaballs algorithm to create a lava lamp effect, visualized using marching cubes

Gravity - System of over 200,000 multicolored particles falling towards a center of gravity

Jets - 2D Eulerian fluid simulation, displaying a continuously evolving boundary between opposing flows

Raytracing - Real-time, interactive implementation of Ray Tracing in One Weekend, a well-known static raytracer

