Ethan Berk

Physics, Computer Science, Applied Math Undergrad

Email	Ethan.Berk@colorado.edu
Phone	720-737-8280
Git Hub	https://github.com/EthanBerk

Education

University of Colorado Boulder **2023–**

Expected Graduation 2027

Triple major in Physics Grad Track, Applied Math, Computer Science
GPA: 3.85 – Dean's List: Fall 2023, Spring 2024

Key Course Work:

- Classical Mechanics & Mathematical Methods I (PHYS 2210)
- Experimental Physics I & II (PHYS 1140, PHYS 2150)
- Numerical Methods and Scientific Computing (APPM 4600)
- Quantum Mechanics for Engineers (PHYS 2130)
- Matrix Methods, Advanced Linear Algebra (APPM 3310)
- Data Structures, Computer Systems, Algorithms (CSCI 2275, CSCI 2400, CSCI 3104)
- Calc III, Diffeq w/ Lin alg, Applied Prob (APPM 2350, APPM 2360, APPM 3570)

Technical skills

Programming languages	Python, Matlab, C++, Java, JS
Software Tools	*Git, Mathematica, LaTeX, Jupiter Notebooks*

Projects

Matrix methods (APPM 4600) Final project

Applications of Linear Algebra to Chemical Exchange Nuclear Magnetic Resonance (*Link to Write Up*)

- **Goals:** Explored key linear algebra tools for understanding the impact of chemical exchange on spin dynamics in nuclear magnetic resonance (NMR).
- **Techniques:** Derived matrix representations of the Hamiltonian, relaxation, and chemical exchange super-operators in Liouville space and applied to simulate NMR spectra of NH_3 and NH_3^+ equilibrium system.

Numerical Methods (APPM 4600) Final Project

Regularization Of Least Square Regression (*Link To Recent Draft*)

- **Goals:** Explored Ridge, Tikhonov, and Lasso Regularization Methods.
- **Techniques:** Derived minimizer equations for Regularization Methods, and optimization using QR decomposition. Performed numerical experiments comparing and graphing performance in Python.

Experience

Summer research assistant **2021**

Dr Wang and Graduate Student Zenana Shi's Machine Learning lab at Colorado School of Mines

- Helped edit their paper, *Learning Dyadic Associations of Diagnoses of Alzheimer's Disease and Longitudinal Imaging-Genetic Biomarkers*.
- Studied Machine Learning topics in julia and R.

CS@mines Summer Internship **2022**

Computing for Good forest data group project

- Created Jupiter Notebooks to analyze/predict geospacial data of forest growth.
- Created a Postgres, postGIS database to serve geospacial data to a website built to illustrate forest decline.

High School Robotics Captain **2019-2023**

Major contributor to elite competitive robotics team

- Designing and building electric control systems, using Ecad to design PCBs.
- Extensive control theory programming for vision and movement systems.
- General problem solving across all aspects of robotic system design.