Brandon Adam Loptman

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Background

Recent physics graduate with a strong interest in experimental and computational physics, applied mathematics, and programming.

Education

University of California, Los Angeles (UCLA) **September 2015 – June 2020**
Bachelor of Science in Physics, minor in Mathematics **GPA: 3.56**

Relevant Academic Coursework

Physics: Analytical Mechanics, Electricity and Magnetism, Quantum Mechanics, Thermodynamics, Mathematical Methods for Physics, Nuclear Physics, Computational Physics and Astronomy Laboratory, Elementary Particles Laboratory
Mathematics: Linear Algebra, Ordinary Differential Equations, Applied Numerical Methods, Real Analysis, Complex Analysis, Optimization, Introduction to Probability

Technical Skills

Languages: C/C++, Python, HTML, CSS, JavaScript, PHP, SQL
High-level numerical languages: Mathematica, MATLAB, Numerical Python
Applications: LaTex, Git, Microsoft Office suite, Apple Office suite
Operating Systems: Unix/Linux, Windows, macOS

Projects

Muon Lifetime and Parity Violation in the Weak Force **January 2020 – March 2020**

- Led a group of 4 undergraduate students on project to verify parity violation in the weak force by examining muon decays in the presence of a magnetic field. Our data was also used to determine the average muon lifetime.
- Determined the average muon lifetime to within less than .01% of its currently accepted value.
- Clearly demonstrated parity violation by showing a distinct asymmetry in the direction of emitted positrons.

Feynman Path Integral Simulation **December 2019**

- Wrote a Python program that performs the Feynman Path Integral for the quantum harmonic oscillator.

2D Ising Model Simulation **November 2019**

- Simulated the 2D Ising Model on a square periodic lattice of arbitrary size using Markov Chain Monte Carlo in Python.
- Used the simulated system to numerically approximate the mean internal energy and magnetization of the system.
- Visually demonstrated that as the size of the simulated system increases its total magnetization approaches the analytical solution for the total magnetization.

Numerical Linear Algebra and Quantum Mechanics **October 2019**

- Wrote a Python program to find the eigenvalues and eigenvectors associated a quantum mechanical system given the matrix representation of its Hamiltonian.
- Implemented the Jacobi Eigenvalue Algorithm to diagonalize Hermitian matrices of arbitrary size to within a specified tolerance.

Two Body Orbital Dynamics Simulation **September 2019**

- Wrote a Python program that uses Hamiltonian Mechanics to accurately simulate the dynamics of a two-body system.
- Implemented numerical algorithms such as Euler's method, RK4, and the Stormer-Verlet method to solve ordinary differential equations of arbitrary order.
- Showed that the results of the simulation predict Kepler's laws of planetary motion.

The Backlog **January 2019 – March 2019**

- Built a website that allows video game enthusiasts to keep track of games
- Front end of the website is written in HTML, CSS, and JavaScript while the back end is written in PHP.

Caravan **February 2018 – March 2018**

- Developed a single player GUI card game where the user draws cards to achieve the highest value total per round without going over a specified value.
- Game was written in C++ and utilized the Qt framework for the graphics.

Work Experience

UCLA Program in Computing Lab – Lab Consultant **September 2016 – June 2019**

- Provided general and C++/Python specific computing assistance to undergraduate students.
- Provided both in-person and online computing support.