MATH 395 QUANTUM COMPUTING

SEPTEMBER PROJECT ABSTRACTS

Title: Multi-slit experiment
Speaker(s): Hui Jiang and Alexa Becker
Abstract: In this talk, we will first learn probabilistic double-slit experiment by showing students the exact example from book, including pictures and matrix. Then we will introduce a multi-slit experiment we designed for the project. Next we will run the program to let them understand the concept better.

Title: System Marble Experiment Program
Speakers: Jon Alvarado, Teng Hu, Rubin Trailor
Abstract: The Marble Experiment can be represented using three unique systems: classical, probabilistic, and quantum. We've programmed a classical machine to represent these systems. We can represent these different systems using matrices and compute these states using matrix multiplication.
What We'll Talk About: Show the programming problems in the book, demonstrate our program's ability to compute the experiment using three different systems, walkthrough through the source code and algorithms, and give our conclusion.

Title: How to Make a Qubit
Speaker(s): Ahmana Tarin, Amanda Cieslak, India Buckley
Abstract: Qubits are similar to bits in that they both have the two possible outcomes of 0 or 1, however a qubit also can be those AND a superposition of both 0 and 1. This is superposition is significant because these qubits in a quantum computer allows computations to be performed faster than computations in classical computers. In this talk we will learn about the different methods to create a qubit, ion traps, nmr systems, linear optics through polarization, and superconductors. Then we will discuss how each of these methods work in detail with examples.

Title: Function Spaces
Speakers: Ben Garcia and Gustavo Guzman
Abstract: Function spaces are, for our purposes, vector spaces in which the elements of the space represent functions. We will begin by going over a basic history of work on function spaces, followed by a more rigorous definition applied in relations to concepts of basic linear spaces learned in a linear algebra class. We will do example work with a norm, inner product, and distance on a finite dimensional polynomial space for simplicity, and attempt to interpret their "meaning" in regards to sets of functions. We will then brush over a laundry list of function spaces, and possibly attempt to compare and contrast Hilbert, Lebesgue, and Banach spaces.

Title: Quantum Billiards
Writer(s): Derek Dang, DK Lee
Abstract: The new game is called quantum billiards, not similar to classical billiards, with electrons as the balls and an electron gas as the table; and in this paper, we will talk about the creation of this system, interference as a phenomenon in the game, and chaos versus order in terms of quantum systems and classical systems.

Title: An Introduction to the Double Slit Experiment and the Quantum World
Speaker(s): Harold Frank, Chris Goode, Carlos Andina
Abstract: The double slit experiment gives us an interesting insight into the Quantum world. In our discussion, we will dive into the results of the experiment when performed in both a classical and quantum setting. The classical portion will explain the behavior of particles (ie. marbles) and waves moving through single and double slits. The quantum portion will include the behavior of an electron beam in the same experiment. We will also demonstrate the interference pattern of waves with a laser pointer.