Stern-Gerlach Simulation

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**Code is available at https://github.com/ASU-CompMethodsPhysics-PHY494/final-stern-gerlach-simulation.git**

Abstract

In 1922 Stern and Gerlach confirmed that microscopic particles have a quantized intrinsic degree of freedom called *spin* angular momentum when they sent a beam of sliver atoms through an inhomogeneous magnetic field. Since silver atoms have an extra electron in the 5s orbital, the result showed that the spin of the electron is , where is plank’s constant divided by 2π. Thus, for this project we sought out to simulate the Stern-Gerlach experiment by using the finite difference method with a Gaussian wavepacket implemented in Python 3 software. We also wished to reconstruct the results of the experiment in the classical limit where the states of the electron were assumed to be a continuous band symmetric about the axis where the beam splits. The major hurtle that was encountered was trying to get the states to split and discretize in a manner that made sense for both the classical limit and the quantum limit. The results that was obtained in the classical limit showed that when electrons exit the magnetic field they can populate any state that is symmetric about their initial axis of motion between . RESULTS FOR QUANTUM LIMIT, WHAT DOES IT MEAN. FUTURE WORK SENTENCE.