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**Study of Quantum Dots using the Finite Element Method** ADAM WHITNEY[1], JAY WANG[2], None — A quantum dot is a finely tunable two-dimensional quantum system, bound within the nanometer range. They can occur in natural lattice structures, but for production they are often fabricated into semiconductors. The finite element method is a numerical technique for approximating solutions to partial differential equations with boundary conditions by connecting the solutions for a finite number of element equations over the domain. The finite element method is commonly used in various branches of science and engineering, but is not yet often used in the study of quantum dots. We will use the finite element method to find solutions to the Schrödinger equation for quantum dots with various boundaries. Simple boundaries can be analyzed in a fairly straightforward manner, but more complicated conditions require computation to solve. We will address questions such as the energy levels of quantum dots, their electronic structure, i.e. the shape of the wave functions, and how they depend on the domain of confinement. These results will help lead us to the study of so-called "designer atoms" which are expected to exhibit exotic behavior absent from natural atoms. This will be potentially very useful in nanodevices and other applications of nanoscience.

[1]Student conducting independent research on the topic of Quantum Dots and the finite element method.
[2]Teacher and mentor for this project.

Adam Whitney
None

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