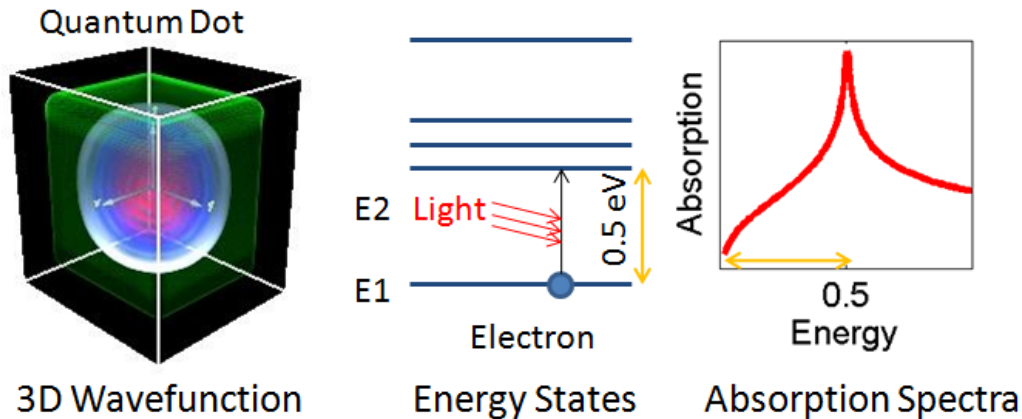


Quantum Dot Lab Learning Materials



By completing the [Quantum Dot Lab](#), users will be able to a) understand the 3D confinement of carriers in a quantum dot, b) describe effects of geometry of a quantum dot on the energy states of carriers, and c) study light absorption of a quantum dot.

The specific objectives of the Quantum Dot Lab are:

Physical Model	Mathematical Model	Computational Model
<p>a) Introduce the concept of:</p> <ul style="list-style-type: none"> - 3D confinement of carriers - Light absorption in a quantum dot 		
<p>b) Apply numerical techniques for calculating:</p> <ul style="list-style-type: none"> - 3D wave-function in a quantum dot - Energy states in a quantum dot - Optical absorption strength in a quantum dot 		
<p>c) Design and simulate your own quantum dot structures.</p>		

Recommended Reading

Users who are new to quantum mechanics should consult the following materials:

1. David K. Ferry. (2001). *Quantum Mechanics: An Introduction for Device Physicists and Electrical Engineers*. 2nd ed. New York: Taylor & Francis.
2. P. Harrison. (2010). *Quantum Wells, Wires and Dots: Theoretical and Computational Physics of Semiconductor Nanostructures*. New York: Wiley.
3. Anon. "Quantum Dot". *Wikipedia* – http://en.wikipedia.org/wiki/Quantum_dot.

Demo

- [First time user guide for quantum dot lab](#)
- [Introduction to quantum dot lab](#)
- [Quantum dot lab tool demonstration](#)

Theoretical Description

- [Quantum dots](#)
- [Introduction to Quantum Dots and Modeling Needs/Requirements](#)
- [Introduction to the NEMO3D Tool](#)

Tool Verification

Examples

- [Introduction to quantum dot lab slide 19-30](#)

Exercises and Homework Assignments

- [Exercise](#)

Solutions to Exercises

- Solutions are provided only to Instructors!

Evaluation

- [Test for Quantum Dot Lab tool](#)

Challenge

- [Quantum dot – Design a laser](#)