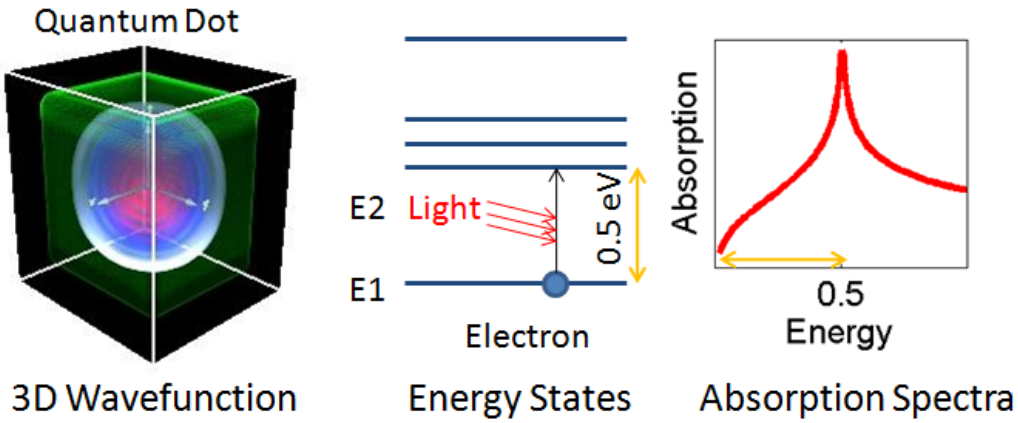
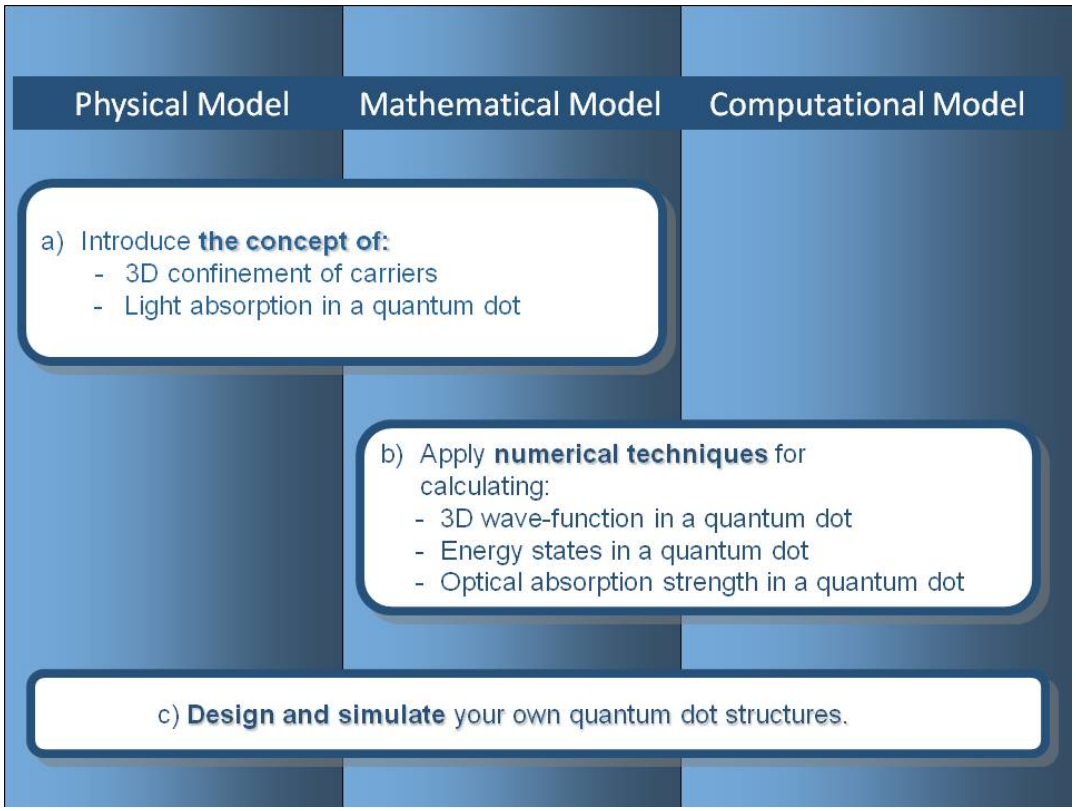
Quantum Dot Lab Learning Materials



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:



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