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**
  - Introduce the concept of:
    - 3D confinement of carriers
    - Light absorption in a quantum dot

- **Mathematical Model**
  - Apply numerical techniques for calculating:
    - 3D wave-function in a quantum dot
    - Energy states in a quantum dot
    - Optical absorption strength in a quantum dot

- **Computational Model**
  - Design and simulate your own quantum dot structures.

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


**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](#)