Phys 402: Applications of Quantum Mechanics

Lecture 0

1) Plot the first three levels for a particle in a one-dimensional box of size L.

2) In many atomic labs, physicists are now able to confine atoms in a variety of configurations including “one-dimensional boxes” or “two-dimensional boxes”. First, consider an atom confined in a two dimensional box with confinement radius “a” (along the z-direction) and “box size” Lx, Ly (Lx, Ly >> a; this can be achieved via applying a pair of counter propagating laser beams along the z-direction). What are your choices of proper Hamiltonian and/or boundary conditions i.e. a MODEL for the motion of atoms in this limit?

3) Repeat it for a 1D box or tube. Schematically show the whole spectrum, i.e. all the eigen values.