Final exam notes

April 19, 2015

We have covered three principal topics since the midterm:

1. Dirac notation

    (a) Quantum states
    (b) Bases
    (c) Symmetries
    (d) Quantum dynamics: time evolution
        i. Neutrino oscillations
        ii. Simple harmonic oscillator

2. Irreducible representations of angular momentum

    (a) Understand the $\hat{J}_\pm, \hat{J}_z, \hat{\mathbf{J}}^2$ operators: their relationship to $\hat{J}_x, \hat{J}_y$ and their effect on $\hat{J}_z, \hat{\mathbf{J}}^2$ eigenstates ($|j, m\rangle$)
    (b) Addition of angular momenta

3. Hydrogen

    (a) Solution of the Schrödinger equation by separation of variables
    (b) Inclusion of spin
    (c) Perturbation theory
        i. Spin-orbit coupling
        ii. Relativistic corrections
        iii. Zeeman and Stark effects