Midterm #2: Phys 122, Study Guide (Test on Wed. 3/18)

One sheet of equations allowed. I won't make you do any integrals on the test, but you may have to set them up (with appropriate limits, etc.!) Know your metric prefixes, and bring your calculator.

Here are the topics you're responsible for:

Chapter 3; Spectral Lines! Understand how spectral lines naturally result from any particular set of discrete energies, and how to calculate the wavelengths. Know photon number is quantized. 3.6; Photoelectric effect, in detail (esp. Einstein's explanation) 3.8; Compton Effect/Scattering, in detail (ties into 2.11,2.12). You will also need to know the relationships between h,c,f,E,p, and λ (for light).

Chapter 4 (4.4); Bohr Model. Know this in detail, including how to derive it from basic principles (specifically the deBroglie hypothesis, 5.2). Be sure to have the energies of each state on your page of notes.

Chapter 5

5.2; De Broglie hypothesis (both momentum and energy) for massless and massive particles

5.4; Be able to interpret a wave formula, and convert between f, ω, k, λ, E, p.

5.5,5.6; Use of Heisenberg Uncertainty Principles (both energy-time and x-p).

5.7; Copenhagen Interpretation; probability concept, normalization of probability.

5.8; Particle in a box: allowed energies (see Ch. 6.3)

Chapter 6;

6.1. Schrodinger Equation (full, and time-independent version); write it on your sheet, know how to use it. (Know how to time-evolve solutions, know that wavefunctions add to form new solutions, but probabilities are not additive.)

6.2 Know how to normalize the wavefunction. Also know how to find the probability that the particle is between any two points. Don't worry about expectation values.

6.3, Particle in an infinite square well -- VERY IMPORTANT: THIS WILL PROBABLY BE ON THE TEST. Know allowed energies, associated wavefunctions, physical picture of wavefunctions, etc. You may have to make a sketch on the test.

OTHER: Know how to calculate the probability of **energy measurements**, like in the last problem of the most recent homework. (Take the magnitude squared of the corresponding coefficients.) Know how to use the fact that these probabilities must add to one, in order to easily normalize such a wavefunction.