Modern Physics
Problem Set 12

JC-54) **Probability Density of the 1D Coulomb Potential**
(10 points) Show that the probability density for the ground-state solution of the 1D Coulomb potential energy has its maximum at $x=a_0$.

JC-55) **Probability to Find an Electron**
(10 points) An electron in its ground state is trapped in the 1D Coulomb potential energy. What is the probability to find it in the region between $x = 0.99a_0$ and $x = 1.01a_0$?

JC-56) **Hydrogen Absorption**
A hydrogen atom in an n=2 state absorbs a photon.

a) (10 points) What should be the photon wavelength to cause the electron to jump to an n = 4 state?
b) (10 points) Make a table of the possible transitions, the possible energy released and the wavelength of the resulting photons that might be emitted following this absorption.

JC -57) **Probability of Finding Electron in Hydrogen Atom**
(20 points) Find the probabilities for the $n = 2, l = 0$ and the $n = 2, l = 1$ electron states in hydrogen to be further than $r = 5a_0$ from the nucleus. Which has greater probability to be far from the nucleus?

Talk) **Practice Talk**
(10 points) Give a practice talk in front of another person. Have that person fill out the questionnaire on the second page of your problem set.

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I, _____ (name of observer) observed the presentation of _____

(your name) on _____ (date).

Presentation Title: _____

Length of presentation: _____

Comments (optional):

By signing this form, I swear the above is true. I understand that I am held to the SMU Honor Code (http://smu.edu/catalogs/). Any violation will be reported through the Vice President for Student Affairs Office.

Signature of Observer:_____

Signature of Student:_____