Time remaining:
0:14:45

This is only a preview of the survey. Responses will not be saved. Close

Degenerate States Pretest

University of Colorado

Page **1** of 1

Please type your name in the form: Last, First:

Required.

NOTE!! Please type in your CU userid (that's the username you use to log in to CULearn. We do NOT want your password. It probably looks like your last name, perhaps with a few extra characters. Note that it is definitely NOT your numerical (9 digit) student ID!!
This script cannot "error check", you have to be sure you type it in correctly! Thanks

Please type your CU userid:

Required.

Consider a three-dimensional harmonic oscillator described by the Hamiltonian $\hat{H} = -\frac{\hbar^2}{2M}\nabla^2 + \frac{1}{2}M\omega^2 r^2$. In Cartesian co-ordinates, the energy eigenfunctions are given by $\psi(x,y,z) = N\varphi_{n_x}(x)\varphi_{n_y}(y)\varphi_{n_z}(z)$ with eigenvalues $E_{n_x n_y n_z} = \hbar\omega(\frac{3}{2} + n_x + n_y + n_z)$. For the states below, assume that N is always the proper normalization constant.

Q1: Consider the state,

$$\Psi(\vec{r}, t=0) = N\left(\varphi_1(x)\varphi_0(y)\varphi_0(z) + \varphi_0(x)\varphi_0(y)\varphi_1(z)\right):$$

___a) Is this an allowable state?

Required.

Select one...

___b) Explain.

c) Does the state change as time evolves?

Required.

Select one...

d) Explain.

e) Does the probability density change as time evolves?

Required.

Select one...

f) Explain.

Q2: Consider the state,

$$\Psi(\vec{r}, t = 0) = N(\varphi_1(x)\varphi_0(y)\varphi_0(z) + \varphi_1(x)\varphi_0(y)\varphi_1(z)) :$$

a) Is this an allowable state?

Required.

Select one...

b) Explain.

c) Does the state change as time evolves?

Required.

Select one...

___d) Explain.

___e) Does the probability density change as time evolves?

Required.

Select one...

___f) Explain.

Submit responses

Questions or Comments?

Contact the 123 tutorial pretest coordinator at uwttl123@u.washington.edu