Answer on Question #45432, Physics, Quantum Mechanics

Question:

1) Now that we know the god particle really exist, how does it means electron have a mass when it circle around the orbit? Can we use this to explain Planck's constant in a more pictorial way, than just e=hv?

2) I read the graphs of the black body radiation on frequency and temperature. And how Planck just comes up with the equation because frequency doesn't change much with increase of temperature in the experiment am i understanding it correctly?

3) And the noble price of the atom equation, which In 1913 Niels Bohr published the Bohr model L=n(h/2pi) how is momentum define in quantum mechanics, can it also be see as mass times angular velocity? Or how is it defined? And how come there is a pi in the equation?

Any good book that gives the insight of these equation i could have a look?

Answer:

1) Discovering of the Higgs boson was very important for Standard Model, but it has nothing common with quantum mechanics. It is explained in very simple words for example

http://vimeo.com/41038445

or more complicated

http://en.wikipedia.org/wiki/Higgs_boson

2) Not exactly. First of all there were two experimental equations for different frequencies: Wien's displacement law and Rayleigh–Jeans law. And Planck had to assume that the energy of oscillators in the cavity was quantized, i.e., it existed in integer multiples of some quantity. You can find derivation:

http://en.wikipedia.org/wiki/Planck%27s_law#Derivation

3) In quantum mechanics, momentum (like all other physical variables) is defined as an operator, which "acts on" or pre-multiplies the wave function ψ(r, t):

$$\hat{p} = -i\hbar\,\nabla$$

where ∇ is the gradient operator, ħ is the reduced Planck constant, and i is the imaginary unit.

Reduced Planck constant equals:

$$\hbar = \frac{h}{2\pi}$$

And it is the reason of 2π in angular momentum.

Literature:

http://en.wikipedia.org/wiki/Bohr_model

http://en.wikipedia.org/wiki/Introduction_to_quantum_mechanics