Re: PHOTON MASS −− A FACT. MASSLESS PARTICLES −− NOT FACT.

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- *From*: "Vert" <avergon@xxxxxxxxxxx>
- *Date*: 1 Jul 2006 16:23:42 −0700

Randy Poe wrote:

> Vert wrote:
>
>> So I repeat (for the 40th time)
>
> Yes you do, but there is no N such that N repetitions will convert
> a false statement into a true one.
>
>> Since p = mv,
>
> False premise. p is not mv.
>
>> explain momentum without mass.Let's
>> see how you dodge that.

I don't know what the deeper definition of momentum is that includes
both gamma*m*v for particles with mass and h/lambda for photons.
Probably something in terms of wavenumber k, which is the natural
conjugate variable to position. "Momentum wave function" in QM
is the wavefunction in terms of k, IIRC.
Without the deeper mathematical connection, you could think
of it as an operational definition: p is *defined* as gamma*m*v
for particles which don't move at c, and hbar*k for particles
which do.
VERGON
First of all I would like to thank you for an intelligent and
informative post −− Not like that idiot Puddlejumper. If I understand
you correctly, k is a wavenumber −− which I have called frequency
number or oscillation number, the latter being unambiguous.
As to h/lambda, that's just another way of writing hf/c.

In all cases, when you have h in an expression, you have mass. Observe:
h = E*t. −−−− hf = E*t * n/t. −−−− The t's cancel and we have hf = nE .
Next , we have nE/c^2 = m. Recall Einstein wrote (for radiation) m = E/c^2.

When you use h for momentum, you are using mass.

The definition would be motivated by conservation of momentum: what momentum does a particle get in a collision with a photon? If you use hbar*k as the momentum of the photon and assume conservation of momentum, you get the right behavior of the massive particle.

> (And we see here who's ignorant.)

VERGON
Don't worry, we like you anyway and believe there is hope for you.

> Interesting comment, since you are making your answers up in the absence of education on the related definitions.
>
> Unlike you, I will admit ignorance: I'm pretty sure there is a definition that encompasses all particles,

VERGON
Let this poor ignorant slob educate the great master.
You want a definition that encompasses all radiation particles? Here it is.

The smallest unit of mommentum in the universe is m_q x c = 7.3720385 x 10^−48gr * c = 2.210082 x 10^−37 gr cm.

Call that p_0. p_0 x k (the frequency number) = momentum of the photon.

Naturally this cannot apply to ponderous particles because they cannot travel at c.

However, m_q * f of the particles (electron, proton, and neutron) will yield the masses of these particles. And that times their velocity equals their momentum.

but offhand I don't know
that I've ever seen it. hbar*k seems the most likely candidate
based on conjugate variable grounds.

You on the other hand, are also ignorant in the same sense of having never seen the unified definition, but choose to make up your own, or pretend that there never has been such a definition, rather than actually investigate.

> As for p =hk, don't explain k.

I've actually heard k referred to as momentum (in Solid State physics, in connection with phonons), though more commonly it is called the wavenumber. It's the Fourier Transform of position, in the same way that frequency is the FT of time.

− Randy

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