Re: an electron question

Source: http://sci.tech−archive.net/Archive/sci.physics/2006−01/msg01554.html

- *From*: "FrediFizzx" <fredifizzx@xxxxxxxxxxx>
- *Date*: Sun, 15 Jan 2006 23:17:24 −0800

"srp" <srp2@xxxxxxxxxxxxxxxx> wrote in message
news:43CAC452.4060701@xxxxxxxxxxxxxxxxxxx
|
|
| FrediFizzx a écrit :
| > "srp" <srp2@xxxxxxxxxxxxxxxx> wrote in message
| > news:43CA7998.6070905@xxxxxxxxxxxxxxxxxxx
| > | FrediFizzx a écrit :
| > | > "srp" <srp2@xxxxxxxxxxxxxxxx> wrote in message
| > | > news:43C99997.9040608@xxxxxxxxxxxxxxxxxxx
| > | >|
| > | >|
| > | >|FrediFizzx a écrit :
| > | >|>"srp" <srp2@xxxxxxxxxxxxxxxx> wrote in message
| > | >|>news:43C7EA49.8000602@xxxxxxxxxxxxxxxxxxx
| > | >|>| FrediFizzx a écrit :
| > | >|>| > "srp" <srp2@xxxxxxxxxxxxxxxx> wrote in message
| > | >|>| > news:43C5D0BE.9020604@xxxxxxxxxxxxxxxxxxx
| > |
| > | [snip]
| > |
| > | > | > |
| > | > | > | Indeed! Wish I had that option on my hand calculator.
| > | > | > |
| > | > | > | Hey, maybe you'd be curious about my latest baby:
| > | > | > |
| > | > | > |
| > | >
| >
http://pages.globetrotter.net/srp/discrete_electromagnetic_fields.pdf
| > | > | > |
| > | > | > | Totally mks however :−]
| > | > | > |
| > | > | > | André Michaud
| > | > | >
| > | > | > Hi André,
| > | > | >
| > | > | > Read your paper above. Your equation (34) seems to be 6
orders

| > | > | > of magnitude too big for the absolute value of the B_0
magnetic
| > field
| > | > | > of a photon. This is easy to see in your conversion to the
| > |E_0|
| > | > | > field in equation (38). Plugging in a 10 centimeter
wavelength
| > gives
| > | > | > a value of
| > | > | > about 14.6 volts/meter. This certainly has to be way too
big
| > for a
| > | > | > photon with a 10 cm wavelength. I am getting deja vous
here.
| > ;−) I
| > | > | > think we were discussing this before a few months ago. My
| > | > | > calculations give me about 1.06E−5 volts/meter for a 10 cm
| > photon.
| > | > | > Which seems much more reasonable. In SI units my equations
for
| > a
| > | > | > free space photon are,
| > | > | >
| > | > | > |E_0| = e/(2*eps0*sqrt(alpha)*lambda^2)
| > | > | >
| > | > | > |B_0| = mu0*e*c/(2*sqrt(alpha)*lambda^2)
| > | > | >
| > | > | > So I think you made a mistake somewhere leading up to
equation
| > (34)
| > | > | > but I have not pin−pointed it yet. I am sure it has
something
| > to
| > | > | > do with the 1/alpha^3 factor. I don't know exactly what you
| > mean
| > | > | > by "absolute" wavelength either.
| > | > |
| > | > | OK, I'll definitely look again (thanks for caring to have a
look
| > | > | yourself). I remember the conversation we had but I couldn't
| > pinpoint
| > | > | either any error in my sequence of derivation from Marmet's
| > equations
| > | > | at the time, and I trippled checked that Marmet's derivation
were
| > | > | clean to start with.
| > | > |
| > | > | What comforts me that there may be no mistake, despite
| > appearences,
| > | > | is that the actual relativistic velocities of the electron can
be

| > | > | calculated with precision for any carrying energy from these
| > | > | derivations.
| > | > |
| > | > | But I will recheck your point.
| > | >
| > | > Well, we can do some simple dimensional analysis also. The
energy
| > of a
| > | > photon is E = hbar*w; it should also be of the order of E =
| > | > eps0*E_0^2*volume. Equating we get,
| > | >
| > | > |E_0| = sqrt(hbar*w/(eps0*vol))
| > | >
| > | > We can sub 2pi*c/lambda for w,
| > | >
| > | > |E_0| = sqrt(2pi*hbar*c/(eps0*vol*lambda))
| > | >
| > | > Assuming the volume is of order of the photon wavelength we sub
| > lambda^3
| > | > (IOW, a *whole* photon of a certain wavelength can't really fit
in a
| > | > volume much smaller than this−−it maybe comes out to
lambda^3/2pi in
| > | > actuality),
| > | >
| > | > |E_0| = sqrt(2pi*hbar*c/eps0)(1/lambda^2),
| > | >
| > | > and we note that sqrt(2pi*hbar*c) = e/sqrt(2*eps0*alpha),
| > | >
| > | > |E_0| = e/(eps0*sqrt(2*alpha)*lambda^2)
| > | >
| > | > So we can see that this is only different from my original |E_0|
by
| > a
| > | > factor of 1/sqrt(2). For your equation (40), I think you would
have
| > to
| > | > have a volume that a whole photon wouldn't fit into. It would
be
| > much
| > | > too small wrt its wavelength. Some time ago, I ran across a
Cavity
| > QED
| > | > experiment that was using an expression close to mine in value
for
| > E_0
| > | > of a photon and getting sensible answers, but I can't find the
| > | > experiment now. I think they were simply using,
| > | >
| > | > |E_0| = sqrt(hbar*c)/lambda^2 in cgs units. Mine is,
| > | >

| > | > |E_0| = 2pi*sqrt(hbar*c)/lambda^2 in cgs units.
| > | >
| > | > So I am pretty sure it is close to being correct. At least of
the
| > same
| > | > magnitude.
| > |
| > | Ok, I'll analyze what you are saying here. But from the
calculations
| > | I just made, I can tell you that I agree with your equations (I'll
| > | explain further next), so what you just wrote will most probably
| > | also make sense to me upon analysis.
| > |
| > | When I say I agree with your equations for E_0 and B_0. Upon
| > | resolving vor U, we obviously obtain the total amont of energy
| > | in joules for one .1 meter wavelength photon if it were alone
| > | in one cubic meter of space, but on the other hand, this doesn't
| > | localize the energy of the photon anywhere into that volume as
| > | a local lump of energy, an energy that if it were concentrated
| > | in a local lump, would locally have a density way higher (per
| > | cubic meter) than if it were evenly spread out over the whole
| > | unit volume of 1 m^3.
| >
| > Why 1 m^3? The normalization "box" for the heuristic example
| > above for a .1 meter photon would be 0.001 m^3.
|
| Simply because the unit volume of U is J/m^3 (joules per cubic meter).
|
| This the arbitrarily set unit volume in MKS, I suppose in cgs it
| would be the cm^3, but even that small a volume seems orders of
| magnitude larger than the size any individual photon may have
| at the fundamental level (in normal space of my model anyway).

Sure but the normalization box follows the size of the photon
wavelength. IOW, for a 1 millimeter wavelength photon, the "box"
becomes 1mm^3. The quantum wave pattern and the classical wave pattern
are basically the same with the quantum one being a probability for
finding the photon.

| > | IF you analyze Marmet's paper, you will see that he integrates
| > | the magnetic energy of the electron from infinity to r_c
| > | precisely to localize it (concentrate it in a local lump of
| > | energy that more closely corresponds to the electron being
| > | a localized particle.
| > |
| > | Upon close analysis, that r_c (the electron classical radius)
| > | simply is the absolute amplitude of the wavelength of the
| > | electron divided by alpha.
| > |
| > | alpha has this value simply because integrating any nearer
| > | to r=0 would accumulate too much energy and any further from

| > | r=0 would not accumulate enough energy to account for the
| > | verified complement of energy making up the mass of the
| > | electron.
| > |
| > | I found that this inferior limit of integration
| > | (lamda/2pi)/alpha turns out to corresponds a universal lower limit
| > | of integration for any such spherical integration from infinity.
| > |
| > | The 3 alpha you find in my equation (alpha^3) corresponds to
| > | the spherical integration of the three aspects of EM energy in
| > | the 3 spaces model electric, magnetic, and "energy sustaining the
| > | velocity of the particle"
| > |
| > | The result is to give the mean "local" energy density within
| > | the mean volumes that the cycling energy of the particle will
| > | occupy, which, being way smaller than the reference 1 cubic
| > | meter volume, you will certainly relate to the fact that that
| > | local density will be higher, and most probably by many orders
| > | of magnitude than if the photons energy was spread out over
| > | the total reference volume.
| > |
| > | These local densities are what my E and B give.
| > |
| > | As for the associated volumes, I simply don't know how to assess
| > | them precisely since the energy probably is constantly pulsating
| > | (cycling between E and B states) as it moves. They may even have
| > | little to do with the actual wavelength, which, if you think about
| > | it, is simply the physical distance covered by a photon during
| > | one cycle of its frequency. The varying volume aspect remains
| > | to be addressed.
| > |
| > | There probably is a yet to be found way to brige the gap between
| > | your E and B equations for "uniformly spread energy into the
| > | reference volume" and my E and B equations for "localized lump
| > | of energy within the reference volume"
| >
| > OK. I guess the real question here is my supposition that there
| > is a minimum volume that a whole photon could fit into based on its
| > wavelength.
|
| Possibly. I personally do not assume any volume in normal space
| for a travelling photon. If you recall the geometry of my model,
| the presence of energy in "normal space" always boils down to
| point event, physical transverse amplitude belongs to both
| electrostatic space and magnetostatic space, which are the
| spaces where the particles electro−magnetically interact.

Yes, but do you assume that maybe part of the energy density *volume* is
in the non−normal spaces? EMR does have a volume associated with its
energy density. Does this volume disappear when we get down to the
quanta of EMR? I am assuming that it doesn't. Even though it may be

partially hidden from us in the "non−normal" space.

| > I find that minimum volume to be lambda^3/2pi. Of course
| > this is a volume that travels with the photon at c and there should
be a
| > probability of 1 to always find the photon in that volume.
|
| In my model, there is a probability of 1 of always finding the
| photon as a point event (no volume involved in normal space)
| located in normal space at the junction point of both other
| orthogonal spaces, between which half the energy of the photon
| is cycling.
|
| > From a detection perspective, this reduced to an area that is
observer
| > dependent. But this volume situation goes to Casimir effect that
| > wavelengths longer than the distance between the plates are excluded
| > from being inbetween the plates.
|
| In my model, such interaction occurs in transverse electrostatic space
| and transverse magnetostatic space, and it is the transverse amplitude
| that is determinant (lamba/pi), so volume in normal space is
irrelevant
| (in my model, of course)
|
| > However in the traveling volume
| > scenario, I guess there might be a non−zero probability of finding a
| > photon of a longer wavelength in a volume smaller than lambda^3/2pi.
| > Perhaps this is not a good example to show why your "generalized"
| > equations (34) and (40) for B_0 and E_0 of a photon would give the
wrong
| > answers if plugged into the wave equations.
|
| Well, I have not tried to fit my localized field equations into
| the wave equations, because I don't see how they could be compatible.
| Apples and oranges in my view, since they describe motion of particles
| moving without underlying fields. This is a totally different global
| approach, not meant to invalidate wave approach at all.
|
| > What happens with your values is that you will get a photon count
that
| > is about 6 orders of magnitude smaller if we could count photons in
a
| > EMR field. IOW, since your E_0 and B_0 values are higher, it takes
less
| > photons to make up a certain EMR field.
|
| Not really. Remember that they give the mean density of local energy
| within the moving photon (energy concentrated in one lump with zero
| energy in the rest of the reference volume), not the actual total
| energy of the photon.

|
| The actual energy of the photon is given by equation (11). If you
| look at equations (41) and (42), you will see how that energy
| equation relates to equations (40) for E_0 and (34) for B_0

I don't follow the relation there. Maybe you need to explain more fully?

| > This is way off from what I have seen quoted in the literature.
|
| Of course, if you consider the concentrated density of energy within
| a localized photon to be uniform all over the reference volume. But
| this is not the intent of this equation.

I was assuming that the "intent" of eq. (34) and (40) were the "static" E_0 and B_0 field values for a photon. IOW, if you plug these into the wave equation, these are what would be the maximum measured values.

| > For example, in Jackson's
| > "Classical Electrodynamics, 3rd Ed.", he quotes that one meter from
a
| > 100−watt light bulb the rms electric field is of order 50
volts/meter
| > and there are about 10^15 visible photons per cm^2*second.
|
| This would be right in my model also, since standard treatment remains
| valid.
|
| > I suppose
| > this one might be tough to calculate. But another example he gives
is
| > 100 watt FM isotropic transmission of 10^8 Hz is rms .5 milliVolts/m
at
| > 100 kilometers and has a flux of about 10^12 photons/(cm^2*s). This
one
| > should be easier to calculate. Plug in your value from equation
(40)
| > and see if you agree.
|
| See above, there is no contradiction if you relate to the fact that
| the values given by equations (40) for E (and 34 for B) refer to the
| local density of energy within the localized moving photon, not to the
| density per MKS or CGS unit volumes, for which your equations seem
| absolutely fine.

OK, this is where I am having some trouble with what you are saying. Your eq. (34) and (40) only have one variable, lambda, the wavelength of the photon. If you are specifying a certain volume for the energy density volume of a photon, then there should be another variable for that. Don't you think? Even the statement you are making before eq. (34) doesn't make sense from what you are telling me now. I think what you are saying now, is that if you could measure the "static" B field of a photon upon detection, eq. (34) is what would be measured. Is that correct? Your statement is "Which gives us a generalized equation capable of calculating the magnetic field of any isolated photon from its absolute wavelength, all other parameters being constants." I guess what is bothering me here is "relative to what?". At the point that a photon would be found or detected?

There simply can't be anything arbitrary about the values of a photon's "static" E_0 and B_0 fields other than quantum uncertainty. In free space there is only a photon's wavelength or frequency as the only variable. I have asked this question a few times and no one has ever been able to come up with another variable. So for sure the "static" E_0 and B_0 fields have to be directly proportional to wavelength.

| Think that both approaches are simply attempts at mathematical
| "descriptions" of this or that aspect of what really occurs
| physically at the fundamental level. None of them, nor any other
| method could actually be the physical reality that we are trying
| to describe.

Sure, but a mathematical description should be supported by experimental evidence.

| > | > | By "absolute wavelength", I mean the wavelength that the
energy
| > | > | making up the rest mass of a particle would have it if were
free
| > | > | energy,
| > | > |
| > | > | Lambda_A = h / m c
| > | > |
| > | > | For the carrying energy, it is the wavelength that this energy
| > | > | would have if it was free (not carrying a massive particle)
| > | > |
| > | > | Lambda_A = hc / E
| > | > |
| > | > | For example, the absolute wavelength of the energy making up
| > | > | the rest mass of the electron would be Compton wavelength,
| > | > | of course
| > | > |
| > | > | André Michaud
| > | >
| > | > OK, I guess you mean an invariant type of wavelength.
| > |
| > | Yes. The wavelength that any amount of energy would have it
| > | was moving at the speed of light.
| >
| > Unfortunately the wavelength of a photon is observer dependent so I
take
| > this to mean the wavelength upon detection.

|
| Well, if you wish. You'll get results anyway, but in reality I am
| talking about the wavelength of the photon in its own reference
| frame, not from an observer's point of view. Of course, all aspects
| of relativity and observer related variations can be saddled on
| at will.

If you could be in the frame of a photon, what do you suppose you would see? And how would you be able to measure any wavelength? A photon only has a wavelength wrt emission or detection as far as I know. What might have been radio photons wrt the emission frame could be gamma photons wrt the detection frame if the detector and/or the emittor are moving rapidly towards each other. I think for this discussion we need to limit ourselves to photons that are emitted and detected in the same frame. IOW, the emitter and detector are at rest relative to each other.

| > | If you dig into the second part, regarding relativistic velocities
| > | of moving electron, you will see how my E and B equations
| > | combine to allow calculating relativistic velocities strictly
| > | from EM considerations. To me, this is the confirmation that
| > | my approach by localizing the photon's energy is a promising
| > | avenue.
| >
| > Well, you are simply carrying the same 6 order of magnitude error in
| > both E and B so you still get the right answer at the end in
equation
| > (61). ;−) But I will try to take a closer look at what you are
doing in
| > the second part.
|
| Super. If you can explain why equations (49) and (58) can give the
| right relativistic velocities while being made up of equations (34)
| and (40) that you see as wrong, I am willing to listen and analyze
| further ;−), especially if you can point to a blunder (always a
| possibility) in deriving equations (34) and (40) from Marmet's
| equation, or in deriving (49) and (58) from Biot−Savart and (34)
| and (40).

Hmm... I think you lost me here. How do you get relativistic velocities from (49) and (58)? They are simply "static" B and E fields.

| I think you assume that my E and B densities are 6 orders of magnitude
| off probably because you assume these densities not to be localized
| (which they are, and even reduce to point events in normal space in
| my model), but to pervade whichever reference volume you care to
| refer to, which is not the case. In whichever volume you associate,
| your equation (not mine) gives the right value.

Well, when you say "localized", what does that mean exactly? As far as I can figure, a photon could only be "localized" to a volume no smaller

than lambda^3/2pi if we cheat and could be in the frame of a photon.
For detection, it could only be "localized" on the order of a circular
area with a radius of lambda/2pi. This is actually an experiment that I
would like to see done some day.

| André Michaud

FrediFizzx

http://www.vacuum−physics.com/QVC/quantum_vacuum_charge.pdf
or postscript
http://www.vacuum−physics.com/QVC/quantum_vacuum_charge.ps

http://www.vacuum−physics.com

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- ***Follow−Ups***:
    - ***Re: an electron question***
        - *From:* srp
- ***References***:
    - ***an electron question***
        - *From:* chantal
    - ***Re: an electron question***
        - *From:* Jim Black
    - ***Re: an electron question***
        - *From:* chantal
    - ***Re: an electron question***
        - *From:* srp
    - ***Re: an electron question***
        - *From:* FrediFizzx
    - ***Re: an electron question***
        - *From:* srp
    - ***Re: an electron question***
        - *From:* srp
    - ***Re: an electron question***
        - *From:* srp
    - ***Re: an electron question***
        - *From:* FrediFizzx
    - ***Re: an electron question***
        - *From:* srp
- Prev by Date: ***Re: Unification of Directions in Big Bang***
- Next by Date: ***Re: NIST and MIT Confirm that E= mc2***
- Previous by thread: ***Re: an electron question***
- Next by thread: ***Re: an electron question***
- Index(es):
    - ***Date***

- ***Thread***