

Re: Is electromagnetic field theory unified?

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From: Bjoern Feuerbacher (feuerbac_at_thphys.uni-heidelberg.de)

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JM Albuquerque wrote:

> "Bjoern Feuerbacher" <feuerbac@thphys.uni-heidelberg.de> escreveu na
> mensagem news:d0pa27\$07n\$I@news.urz.uni-heidelberg.de...

>

>>JM Albuquerque wrote:

>>

>>>"Bjoern Feuerbacher" <feuerbac@thphys.uni-heidelberg.de> escreveu na
>>>mensagem news:d0kfh\$feb\$I@news.urz.uni-heidelberg.de...

>>>

>>>

>>>>JM Albuquerque wrote:

>>

>>[snip]

>>

>>

>>>>>I'm not 100% sure that I already know the truth.

>>>>

>>>>You sure sound like that.

>>>

>>>

>>>I have to sound like if I know the truth.

>>>I'm playing Devil's Advocate here.

>>>The fact is that I don't know about the truth like everybody else don't.

>>>Questions like:

>>

>>I provide below the answers which are currently accepted in physics.

>>

>>

>>

>>>What is light?

>>

>>Electromagnetic radiation.

>

>

> Since antennas and spinning magnetic dipoles must produce

> electromagnetic radiation, why an antenna drive at visible light

> frequency doesn't emit visible light like a light-house does?

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I know of no antenna which is driven at visible light frequencies. Do you? If not, how do you know that it wouldn't emit visible light?

> *Why we cannot detect visible light by means of an antenna?*

Because we simply don't have antennas driven at such high frequencies, and I sincerely doubt that that would even be possible technically. How do you propose to generate an AC current with a frequency of around 10^{15} Hz, for starters?

>>> *What is the cause for Lorentz force (magnetic and electric)?*

>>

>> *For the magnetic Lorentz force, a charge moving through a magnetic field. There is no electric Lorentz force.*

>

>

> *Or a magnetic dipole on a time changing electric field.*

Sorry, I have no clue what you mean here. The sentence is not even grammatically complete.

> *The Lorentz force occurs between an electric and magnetic field.*

Where did you get that strange idea from?

> *It works both ways.*

And that?

>>> *What is a photon?*

>>

>> *An excitation of the electromagnetic field.*

>

>

> *What causes that excitation?*

Different causes possible. E.g. moving charges.

> *For sure you are not talking about Maxwell's equation.*

I am talking about Quantum Electrodynamics here, i.e. Maxwell's equations combined with Quantum Theory. If you did not notice: photons are a part of Quantum Theory, so you obviously can't address them using *only* Maxwell's equations.

>>> *How does an electron look like?*

>>

>> *It doesn't look like anything.*

>

>

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- > *Right.*
- > *A quanta of energy trapped in a shell.*

You think that an electron is a shell? Why?

- >>> *What is a charge really?*
- >>
- >> *"a" charge is quite meaningless. "charge" is a property of particles.*
- >> *It measures their strength of coupling to the electromagnetic field.*
- >
- >
- > *So you agree with me.*
- > *Charge is quit meaningless, like energy or voltage.*

That's not what I said. I said that the term "*a* charge" is quite meaningless. Notice the emphasis on the word "*a*".

And I don't see why you think that energy or voltage are meaningless.

- > *It's simply a measure of a strength.*

Indeed. Why does this make it meaningless, in your opinion?

- >>> *All I know is that all of them could behave like waves or particles*
- >>> *at the same time (electron and charges are different), depending*
- >>> *on the point of view of the experiment.*
- >>
- >> *And this type of behaviour is described by Quantum Theory.*
- >
- >
- > *So you agree that classic mechanics cannot explain them?*

Classical mechanics can not fully explain the behaviour of electrons.
Did you mean that?

[snip a bit]

- >>> *I know that for all of them the force depends on the sense of rotation*
- >>> *(clockwise or anticlockwise) by means of the application of the*
- >>> *right-hand-rule,*
- >>
- >> *Err, what force ar you talking about? Magnetic forces, or what?*
- >
- >
- > *I'm talking about the sense of rotation and the sense of the forces.*

Which forces? And what do you mean with the "sense" of a force?
Its direction???

- > *Interaction between magnetic and electric field (vectors)*

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Classically, there is no such interaction.

- > *must*
- > *obey the right-hand-rule derived from the cross product operation*
- > *between vectors.*

The right-hand-rule has precisely nil to do with an interaction between electric and magnetic fields. It tells you how a *charged particle* reacts to a magnetic field.

- > *For instance, if changes rotate clockwise in a wire the magnetic*
- > *field points in one sense, but if changes rotate counter-clockwise*
- > *the magnetic field vector points in the opposite sense.*

"changes"? That's rather vague. Do you mean currents, or what?

- > *The most important example is the gyroscopic effect.*

Which has nothing to do with electric or magnetic fields!

- > *Please read an old thread called:*
- > *"Gyroscopes – Usenet Physics FAQ – Reference frames"*

Where you present the nonsensical claim "Gyroscopes don't belong to Physics."?

[snip]

- >>>*because I've already verified that, some time ago in this newsgroup.*
- >>>
- >>>*I know about Lasers working mechanism.*
- >>
- >>*Sure?*
- >
- >
- > *The basic working mechanism, yes.*

According to what you write below, you don't.

- > *A flash of light induces electrons stimulation*

What is "electrons stimulation" supposed to mean?

- > *in a resonant cavity (rod),*
- > *between two mirrors, up to the point where all the electrons are excited*
- > *into resonance*

What is "excited into resonance" supposed to mean?

- > *and by means of resonance they run out on the*
- > *half-silvered mirror, like a beam.*

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"they"? Due to grammar, this can only refer to "all the electrons".
So you think that all the electrons run out on the half-silvered mirror? Wow.

Don't you think you somehow forgot to mention photons here?

>>>*I know about the photoelectric effect and photovoltaic cells.*
>>>*I believe that everything in the universe boils down to circular motion*
>>>*or elliptical orbits, including large scales (astronomical) and also*
>>>*small scales (atom) too,*
>>
>>
>>*Where do you see circular motion or elliptical orbits e.g. in*
>>*Rutherford scattering?*
>
>
> *Alfa and Beta particles don't exist free in the universe.*

Why on earth do you think so??? There are plenty of them
e.g. in cosmic radiation!

Also, in Rutherford scattering the particles **are** free!

> *They occur due to collisions or some other catastrophic causes.*

Why on earth do you think so???

> *They are short lived bullets, so what?*

Neither Alpha (note the spelling) nor Beta particles are short lived.
What on earth makes you think so???

> *I want examples of perpetual motion, like planets, galaxies,*
> *pulsars, steady particles, etc.*

So you want to rephrase your claim to "every perpetual motion
in the universe boils down to circular and elliptical orbits"?

BTW, did you notice that the orbits of the planets around our
sun are **not** strictly elliptical? Ever heard of "perihelion shift"?

>>>*but unfortunately the theory of relativity*
>>>*doesn't even deal with rotating frames of reference.*
>>
>>*Do you mean Special or General Relativity here? The latter*
>>*automatically contains rotating frames of references; the former*
>>*can be used to address them, too.*
>
>
> *I mean Special Relativity.*

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<http://www.physics.adelaide.edu.au/~dkoks/Faq/Relativity/SR/acceleration.html>

So SR can handle accelerating reference frames, and therefore also rotating reference frames.

> *General Relativity is about gravity.*

Not only. It is also about general frames of reference, including accelerated ones (and therefore also rotating ones).

> *Since a rotating frame of reference is non-inertial, I've seen
> repeated times people claiming that non-inertial frames of
> reference are not valid.*

I suspect that you simply misunderstood what they were actually saying. Refer them to the web page mentioned above in the future, and let's see what they say then.

>>>*I don't know for what relativity really is necessary (except to make
>>>observations that involve light travel and large distances – astronomy).*
>>
>>*Do you consider the GPS system to be part of astronomy?*
>
>
> *GPS involves light travel (or EM radiation travel) at large distances.*
> *So yes, GPS is like astronomy.*

1) Non sequitur. Astronomy is not defined as "something which involves EM radiation travel at large distances".
2) I did not ask if you think it is "like" astronomy. I asked if you consider it *part* of astronomy.

>>*Did you know that e.g. for explaining the color of gold and the
>>liquidity of quicksilver at room temperature, SR is necessary?*
>
>
> *No, I did not know.*
> *Could you explain please?*

I suppose you know that the energy of electrons in an atom depends on the charge of the nucleus? (if not, look up e.g. Moseley's law)
In heavy atoms (like Hg or Au), this energy of the electrons is so large that it becomes comparable to the rest energy of the electrons, and hence one has to describe these atoms using Special Relativity (using the Dirac equation instead of the usual Schrodinger equation).

There are several different effects there, one of them e.g. that the inner orbitals are smaller than in the non-relativistic domain, which leads to a better shielding of the central charge, and therefore the outer electrons are more weakly bound than in the non-relativistic case. The end result after doing all these long, involved calculations

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is that gold has a yellowish colour, and that quicksilver is liquid at room temperature.

Without using SR, QM can't explain these facts.

>>> *In all universe, do you know any real object with mass that is not rotating? So far no one gave an example of a non-rotating object in the universe, with mass.*

>>

>> *Higgs bosons – but we don't know for sure if they exist or not yet.*

>

>

> *So you agree with me?*

Partly.

>>> *Why Lorentz coordinates transformations are a rotation?*

>>>

>

> <http://groups-beta.google.com/group/sci.physics.relativity/msg/07fbb2e45180a599>.

>

>> *I don't see where that post says that a Lorentz transformation is a rotation. It only shows the close analogy between Lorentz transformations and rotations.*

>

>

> *QUOTE:*

You don't need to quote such a large part. Why don't you simply point out where exactly it is said that Lorentz transformations are rotations?

> *0. Introduction*

> ...

> *Keeping in mind that the Lorentz transformations relate coordinates in two inertial reference frames, we will restrict our attention to such reference frames. At first, we will simply assume that all the reference frames are in uniform relative motion (ie unaccelerating and no rotational motion), and later, when some physics is introduced, we will introduce the inertiality.*

> ...

> *1. Rotations in 3D space*

> ...

> *1.1 Rotations in n-dimensional space*

> ...

> *1.1.1 1D*

> ...

> *1.1.2 2D*

> ...

> *1.1.3 3+D*

> ...

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- > 2. *The Lorentz transformations*
- > *The mathematics of rotations gives us a simple mechanism to derive*
- > *the Lorentz transformations.*
- > ...
- > 3. *Lorentz transformations in physics*
- > *To make use of the above mathemachinery,...*
- > ...
- > *The Lorentz transformations obtained in section 2 are the*
- > *transformations which meet these requirements, and therefore must*
- > *be the correct transformations relating coordinates (ct,r) in*
- > *different reference frames, if the Principle of Relativity is valid,*
- > *and the Maxwell equations are correct.*
- > ...
- > *The parameters (a_4,a_5,a_6) are those required to specify a spatial*
- > *rotation.*
- > ...
- > *END QUOTE*

Nothing in all you quoted above says that Lorentz transformations are rotations. I rest my case.

I suspect that you are confused by the beginning of section 2, and by the last sentence you quoted above,?

- >>>*I do understand the said rotation when one have to transform the*
- >>>*coordinates of the rotating rotor of an electrical machine into the*
- >>>*stator coordinates of the same electrical machine, knowing that*
- >>>*both are round and there is a true rotation involved.*
- >>>*But in open space a rotation?*
- >>
- >>*No one said that this has to be done in "open space".*
- >
- >
- >
- > *QUOTE:*
- > ...
- > 3. *Lorentz transformations in physics*
- > ...
- > *The parameters (a_4,a_5,a_6) are those required to specify a spatial*
- > *rotation.*
- > ...
- > *END QUOTE*

Indeed. Now, where do you see "open space" mentioned in what you quoted above?

[snip]

- >>>*I need a mental picture and I'm always trying to improve the one*
- >>>*I've been building for years.*
- >>

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>>> *I don't think one can understand multipole radiation properly
>>> with "mental pictures" only.*
>
>
> *That proves my point.*

In no way.

> *No mental picture, no reasoning is possible.*
> *Only equations in the wind.*

Non sequiturs.

[snip]

>>> *Your total failure on explaining why spinning magnets do
>>> radiate*
>>
>> *Why do you consider citing a page where the calculation is shown
>> in detail to be a "total failure on explaining"???*
>
>
>
> *Because first it assumes that a spinning magnetic dipole radiates,*

No, it doesn't. Why on earth do you think so?

> *then it does calculations based on that assumption to prove that
> same assumption. Its a circular reasoning.*

Thanks for showing your reading comprehension problems.

[snip]

>>> *The experiment with magnets is not feasible because one
>>> cannot get enough spin (frequency), even using several pair
>>> of poles (North and South poles are always in pairs) in order
>>> to radiate anything measurable at 10 times the wavelength
>>> distance.*
>>
>> *Probably not. But notice what Franz Heymann kept saying about
>> nuclear magnetic resonance.*
>
>
>
> *I did and below I provide some good links that I've read and
> analysed.*
>
> *On the third line below one reads:
> "MRI uses no radiation."
> You see? "No radiation."*

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- >
- > *Nevertheless the same article says it's radio waves and they*
- > *seem to contradict themselves.*

Yes. Apparently they think that radio waves are not radiation!
Obviously, they are wrong. (perhaps they meant "not x-ray radiation"
or something like that, i.e. they wanted to soothe the public:
"hey, it's not dangerous!")

Well, what do you expect from physicians trying to write about
physics?

[snip long quote]

- > *Also good slides here:*
- > http://www.wellesley.edu/Chemistry/nhk/ppt_cyano/sl_4_nmr.html
- > http://www.wellesley.edu/Chemistry/nhk/ppt_cyano/sl_5_mri.html
- > http://www.wellesley.edu/Chemistry/nhk/ppt_cyano/sl_6_waterprotons.html
- > http://www.wellesley.edu/Chemistry/nhk/ppt_cyano/sl_7_gradientspatial.html
- >
- > *(No radiation mentioned)*

Wrong. On the very first page already, one can clearly read:
"absorb radiofrequency (RF) electromagnetic radiation"

Above I suspected that you have reading comprehension problems.
Now I begin to think that you have problems with your eyes!

- > *More here:*
- > <http://www.nhnh.org/12669.cfm>
- > *Read: "MRI does not use radiation, as do x-rays or CT scans."*

Same comments as for the long quote above – apparently physicians
think that radio waves are not radiation!

- > <http://www.ness-foundation.org.uk/Magnetic-Resonance-Spectroscopy.html>
- >
- > *(No radiation mentioned).*

No wonder, since that is an awful pop science site.

"MRS uses the fact that different chemicals vibrate at different
frequencies (like a tuning fork) when stimulated by a magnet."

Ouch! What a nonsense!

- > *"No radiation" is a fact that I read from Google's first page best results*
- > *on the query "what is magnetic resonance".*

If you

1) conveniently ignore the "absorb radiofrequency (RF) electromagnetic

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radiation" mentioned above and

2) agree with physicians that radio waves are not radiation, then yes.

But surely you aren't **that** dumb?

You could also look here:

http://class.phys.psu.edu/p559/experiments/html/NMR_2004.htm

Quote:

"These transitions may be induced by the absorption of radio frequency (RF) radiation of the correct frequency."

> *So perhaps Franz Heymann could tell us were the radiation is in*
> *the nuclear Magnetic Resonance Imaging – MRI.*

See in one of your own links above. Opening your eyes when reading could be helpful.

> *Franz Heymann must not forget that radiation needs a distance*
> *10 times the wavelength to develop (as you both explained)*

No, we did not say that. What we said is that there is an induction field and a radiation field present **at all distances**, but that the radiation field only becomes **dominant** at large distances (and the "10 times the wavelength" was just a rule-of-thumb!).

> *and that MRI is about "radio waves", which means about 10x10=100*
> *meters distance.*

1) Where did you get the idea from that the wavelength which is used is 10 meters? "Radio waves" can have a lot of different frequencies.

2) Why do you think the source of the radio waves **is** not that long away?

3) Irrelevant, as explained above.

>>>*Also I notice that you claim it starts with a longitudinal wave*
>>>*for induction (that's true) and then you must end up with a*
>>>*transverse wave at about 10 times the wavelength (that's*
>>>*also true for radiation), without any explanation how the*
>>>*wave (photon) could possible change from longitudinal*
>>>*to transversal wave (no clue, no idea, zero, nothing).*

>>

>>*Wrong. This was explained in detail.*

>>

>>*Again: The total fields (electric and magnetic) have different*
>>*components, superimposed on each other. One (the induction field)*
>>*falls off with $1/r^2$, another (the radiation field) falls off with $1/r$*
>>*(there are also other components, but those are not important here).*
>>*So for short distances, you see induction, for long distances, you*

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>>see radiation. Nothing mysterious here at all.

>

>

> *There is not much detail above.*

> *Only some statements.*

What, exactly, do you want to see, if the above does not have enough detail for you? Since you don't like equations...

[snip]

>>>*Physics is to be explained with words on a description, examples,*

>>>*also mathematics, predictions and their results.*

>>>*Only mathematics is no physics, there must be some reasoning too.*

>>

>>*The web page I cited *did* contain also words, descriptions,*

>>*reasoning etc.*

>

>

> *Above is my definition of "true physics".*

> *My opinion is that the web page you cited was pure mathematics*

> *only.*

As I already mentioned: then you have no clue what "pure mathematics" actually is. It was theoretical physics. Big difference. Hint: "lots of equations" does in no way imply "pure mathematics".

If you don't believe me, ask any theoretical physicist or mathematician if that web page contains "pure mathematics" or "theoretical physics".

[snip a bit]

>>>*You didn't provide any explanation on the working mechanism*

>>>*that could possibly make a spinning magnet to radiate, other than*

>>>*Maxwell's equations say that a time changing magnetic field*

>>>*induces an electric field in the vacuum.*

>>

>>*Why is that explanation not acceptable as a "working mechanism"?*

>>*Please tell me what exactly you mean with "working mechanism".*

>

>

>

> *The "working mechanism" is an explanation, step by step, starting*

> *at the origin (the magnet at rest, not radiating, with closed magnetic*

> *flux lines between North and South poles), then explain why a*

> *simple rotation makes it start radiating.*

Because if the magnet radiates, its magnet field is time-dependent, periodically, and this induces a time-dependent, periodic electric field, which in turn induces again a time-dependent magnetic field,

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etc.

This **is** step by step. What more do you want???

- > *Next explain how the*
- > *closed magnetic lines of force could expand*

No one says that these lines of force expand. What on earth are you talking about?

- > *(they remain closed or they are open now?),*

The magnetic field lines are always closed. See Maxwell's equations! $\text{div } \mathbf{B} = 0$ always holds!

- > *what is expanding at light speed?*

The **changes** in the fields.

- > *Where is the energy stored,*

In the fields.

- > *how*

In the form of photons.

- > *and why?*

Physics is not about "why". It's a simple fact that this happens. Live with it.

- > *How a longitudinal*
- > *expanding wave later becomes a transverse wave, how and why?*

What "longitudinal expanding wave" are you talking about?

And, again: no one ever said that there are two different waves which somehow transmutate into each other. The electric and magnetic fields simply have different components, which depend differently on distance. What on earth is so hard to understand about that?

- > *Explain how a spherical expanding surface that increases at*
- > *radius squared leads to a radiation decrease at 1/r only,*
- > *instead of the expected 1/r²? etc. etc. etc.*
- > *How could radiation decrease at 1/r and the area of an*
- > *expanding spherical wave increases at r²?*
- > *(since photons density must decrease at 1/r²)*

No one ever said "radiation decreases as 1/r". The **field strengths** decrease at 1/r. The **energy density** (which is proportional to the

photon density) decreases as $1/r^2$.

Since only conserved quantities have to decrease at $1/r^2$, this does in no way contradict what is expected.

[snip a bit]

>>> *What comes first, the egg or the chicken?*

>>

>> *The egg.*

>

>

> *Who laid the egg?*

A bird which was very similar to a chicken, but not exactly like it. Ever heard of mutations?

>>> *Or else, the magnetic field or the electric field?*

>>

>> *Depends on the experimental setup. In the case of the rotating*

>> *magnet, obviously the magnetic field comes first.*

>

>

>

> *Right.*

So why did you say that Maxwell's equations are circular?

> *But a static magnetic field doesn't cause an electric field.*

Indeed. And no one said it does. So why do you keep harping on that?

> *Only a time dependent magnetic field causes an electric field.*

Indeed. And no one ever said otherwise. So why do you keep harping on that?

> *On the contrary, a static electric field where DC current flows*

> *(no time dependent, simply DC current) causes a magnetic field.*

sigh

ONLY WHEN MATTER IS PRESENT. YOU NEED THE CURRENT FOR THE MAGNETIC FIELD. IN A VACUUM, WITHOUT CHARGED PARTICLES AND A CURRENT PRESENT, A STATIC ELECTRIC FIELD CAN NOT CAUSE A MAGNETIC FIELD. SO IN A VACUUM, MAXWELL'S EQUATIONS ARE SYMMETRIC IN THE ELECTRIC AND MAGNETIC FIELDS.

That has been explained to you several times now. Did you finally get it this time?

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>>> *We do know that electric fields always induce magnetic fields
>>> and also radiation if the frequency is high enough.*
>>
>> *No, this does not depend on the magnitude of the frequency.*
>
>
> *Well, a frequency of 10^5 Hz is 10 times less than the radio AM
> frequency (10^6 Hz) and it means 100.000 RPS that is 6 million
> rotations per minute and so far we cannot have spins that large
> in the real world.*
>
> *10^5 Hz is a very high frequency according to my mechanical
> standards.*

Yes. So what? What has that to do with your claim enough that radiation only occurs if the frequency is high enough???

If you spin a magnet with 1 RPS, you will get radiation with a frequency of 1 Hz. No problem at all there.

[snip]

>>> *If the vacuum is nothing, how can nothing contain anything?*
>>
>> *But vacuum is not nothing. It has obvious properties like
>> volume.*
>
>
> *Good.*
> *I was afraid that vacuum was not a volume.*

Reading comprehension problems again? I did not say that vacuum **is** a volume. I said it **has** a volume. Don't you understand the difference?

>>> *Radiation must have a propagating mechanism,*
>>
>> *Classically, the propagating mechanism is that the electric and
>> magnetic fields constantly induce each other.*
>
>
> *My point is that if both fields (E and B) are in phase, like you've
> said some time ago, there is no induction,*

Wrong.

> *because the induction mechanism (has I've explained)*

I see that you still have not understood the difference between "asserted" and "explained"

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> *requires first a storage of energy*

The fields can store energy.

> *and then a deliver of the same energy,*

Energy can be delivered to the fields.

> *which means out of phase.*

No. Why do you think so?

> *Traditional induction is an out-of-phase mechanism between
> magnetic (first) and electric (later) fields.*

Maybe in engineering. Not always in physics.

>>*Quantum mechanically, the propagating mechanism is that photons
>>fly through space.*

>

>

> *Like bullets I presume?*

No. See directly below.

>>>*other than photons like bullets*

>>

>>*Well, no one ever said that photons are like bullets.*

>

>

> *Not you, but "bz" in another thread that I've been following.*

> *"Is TomGee the God of Physics?"*

That's strange. Doing a Google search for the words "bullet" or "bullets" in posts by the author "bz" in the thread you mentioned above, I get no hits.

Searching without the words "bullet" and "bullets", I get several hits. So there was obviously no misspelling involved.

>>>*(expanding spherically at the speed of light,*

>>

>>*Huh? Photons do not expand spherically. Do you mean the*

>>*electromagnetic radiation expanding spherically?*

>

>

> *Yes. It's simple geometry.*

Wrong in general. Read up on "dipole radiation characteristic".

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- > *QUOTE from "bz":*
- > *'Light waves' are small and travel in a straight line. It is only when you*
- > *have a lot of 'light waves' emitted by an omnidirectional source that you*
- > *see something that looks like spherical expansion,*

Note the **omnidirectional source** mentioned here. You **do** know that in general, sources are **not** omnidirectional, don't you?

- > *and THOSE 'light waves'*
- > *fall off in intensity as the square of the distance from the source, unlike*
- > *those in a beam which do NOT fall off with distance traveled(in a vacuum),*
- > *if the beam has no divergence.*
- >
- > *"A" wave of light is actually a single photon.*
- >
- > *Single photons do not decrease in energy as they travel.*
- >
- > *The wave IS the photon. What you are calling a wave is actually a lot of*
- > *photons.*
- >
- > *A photon can be looked at as orthogonal electric and magnetic fields that*
- > *travel together in a tightly bound packet of energy.*
- > *END QUOTE.*

I see no bullets mentioned here...

- >>>*without losing energy, whose "density" drops with the*
- >>>*square of the distance) because light also behaves like a*
- >>>*wave.*
- >>
- >>*As said above: that behaviour is described by Quantum Theory.*
- >
- >
- > *You and Frank said that Classic Theory is enough.*

Neither of us ever said that classical physics is enough for explaining the behaviour of photons. Yet another misunderstanding by you.

Bye,
Bjoern