

Re: Particle Visualization

Source: <http://sci.tech--archive.net/Archive/sci.physics.particle/2005-06/msg00091.html>

- *From:* "PD" <TheDraperFamily@xxxxxxxx>
 - *Date:* 22 Jun 2005 05:12:24 -0700
-

Monitek wrote:

> "PD" <TheDraperFamily@xxxxxxxx> wrote in message
> news:1118959156.273773.83420@xx
>>
>>
>> Monitek wrote:
>>> "PD" <TheDraperFamily@xxxxxxxx> wrote in message
>>> news:1118522689.968198.238280@xx
>>>>
>>>> Monitek wrote:
>>>>> "PD" <TheDraperFamily@xxxxxxxx> wrote in message
>>>>> [snip]
>>>>>>
>>>>>> There are several reasons why this cannot be the case.
>>>>>> Let's start with where the supposed vacuum polarization charges go.
>>>>>> Do
>>>>>> they actually make it to the capacitor plates?
>>>>>> If no, then this would result in a dielectric effect, exactly as in
>>>>>> a
>>>>>> real material, with a measurable dielectric constant > 1. I don't
>>>>>> believe that has been measured.
>>>>>> If yes, then some of the charge delivered in the leads would be that
>>>>>> pulled from the vacuum, as well as that pulled from the battery.
>>>>>> That
>>>>>> is, there would be more *excess* charge than accountable from the
>>>>>> source.
>>>>>>
>>>>>>
>>>>>> Vacuum dielectric constant is defined as 1. The polarised vacuum is
>>>>>> polarised by the energy of the charge on the plates of the capacitor.
>>>>>> There
>>>>>> is no net current flow between the plates via the battery. As the
>>>>>> vacuum
>>>>>> polarisation takes place there is an effective current flow due to
>>>>>> charge
>>>>>> separation until the charge reaches equilibrium then the "current

Re: Particle Visualization

> > > > flow "

> > > > stops and the electric field is established and is maintained via the

> > > > vacuum

> > > > polarisation.

> > > >

> > > > You didn't answer the question. Is the charge in the gap delivered to

> > > > the plates or no?

> > > > An electron does not flow from the negatively charged plate to the

> > > > positive

> > > > plate. The dielectric polarises ie lines its charge up in the direction

> > > > of

> > > > the potential gradient. The negative polarisation adjacent to the

> > > > positive

> > > > plate causes the electrons to move from the plate by the fact that like

> > > > charges repel. This leaves a net positive charge on the positive plate.

> > > > Similarly when EMR passes a capacitor the plates are polarised by the

> > > > state

> > > > of vacuum polarisation which is created by the EMR wave.

> > > >

> > > > (If not, WHY NOT?)

> > > >

> > > > Why if an electron crossed the gap between the plates it would be a

> > > > conductor not a capacitor an ideal example of which has infinite

> > > > resistance.

> > > >

> > > > You've defined the displacement as being a *real* current with charge

> > > > flow. I would suggest that any material where there is a current in the

> > > > presence of an electric field is a conductor. The usual algebraic

> > > > formulation of this looks something like this: $J = (\sigma)E$, where J

> > > > is the current density, E is the electric field, and (σ) is the

> > > > conductivity. You say J is nonzero when E is nonzero, which demands

> > > > that (σ) is nonzero. The resistivity is the reciprocal of (σ).

> > > > So if you have infinite resistance, what must the conductivity be? If

> > > > you have nonzero conductivity, how can the resistance be infinite?

> > > >

> > > > But algebra aside, let's look at a region of space immediately adjacent

> > > > to a plate. You say there is charge separation in that region of space

> > > > *right next* to the plate. What on earth keeps the charge from

> > > > depositing on the plate. The vacuum gap is nothing like a material

> > > > dielectric, where there is a surface to the dielectric material beyond

> > > > which the dielectric's charges cannot move.

> > > >

> > > >

> > > > First of all I have not said there is charge flow in between the plates of a

> > > > capacitor I have said there is charge movement. The charge movement I

> > > > envisage is that of electron positron pairs in the vacuum separating, but

> > > > not separating as far as would be required for pair creation. Partially

> > > > separated pairs will have partial charge and partial mass. Imagine a

> > > > capacitor with the plates horizontal, the upper plate being negative and the

> > > > lower plate being positive. The partially separated electron positron pairs

> > > > whilst they are moving are equivalent to a current flow. In this case the

Re: Particle Visualization

- > partially separated electron moving upwards would be regarded as a
- > conventional current flow downwards, this would produce a clockwise magnetic
- > field around the axis of movement. Similarly, the positron moving
- > downwards, creates a clockwise magnetic field round the positron axis of
- > movement. The magnetic fields from both particles are additive. A magnetic
- > field associated with the charging of a capacitor has been measured by
- > Röntgen I am suggesting that this field is a result of movement of charge in
- > the dielectric medium.
- >
- > Capacitors only function due to the dielectric properties of the space
- > between the plates.

That is incorrect. Capacitance is *defined* as the constant, which depends on structure and material only, that is the ratio of the charge to potential difference, mathematically defined as $Q = C \cdot V$. A single conductor can have a capacitance (where in this case, the potential at infinitely far away is set to some constant value). The point is, capacitance between two conductors is too narrow a definition.

- >When there is no ponderable matter between the plates of
- > a capacitor and the capacitor still functions then the inevitable conclusion
- > is that the apparently empty space in between the plates is a dielectric
- > medium capable of polarisation. I suggest that the magnetic field is due to
- > the charge movement during vacuum polarisation and further say that as the
- > magnetic field associated with such movement is real then the particles
- > being moved are real.
- >
- > The reason why the charge does not jump onto the plates is two fold.
- > Firstly, the e-p pairs are only partially separated, have only partial
- > charge and can not therefore substitute for an electron in the conducting
- > plate surface.

You're going to have to quantitatively define "partial separation" and "partial charge" for me. That is, take a charge dipole pair, and in terms of their raw charges and their raw spatial separation, define a parameter that indicates the partiality of the effective separation or the effective charge. It should be clear from your definition at what point the "partial" becomes "complete".

- > Secondly, the charged particles are paired in the same way as
- > an insulated dielectric material made from ponderable matter would be.

The difference is that in ponderable media, there is a "surface tension" effect that keeps charges from leaving the surface of the medium. In vacuum, of course, there would be no such effect.

- > Interestingly pair separation does not occur if a capacitor with a vacuum as
- > a dielectric because when the plate voltage exceeds a critical value a
- > "vacuum arc" breaks out when the Work Function of the metal electrode
- > surfaces is exceeded.
- >

Re: Particle Visualization

>
>
>>
>>>
>>>> Secondly, there would be simple tests to determine whether charge
>>>> moves
>>>> in the gap. A phosphorescent screen placed near one plate would
>>>> register hits from passing charges. I'm pretty sure this has NOT
>>>> been
>>>> observed.
>>>>>
>>>>>
>>>>>
>>>>>
>>>>> I have some zinc sulphide powder handy will that do? I will have to
>>>>> get
>>>>> the
>>>>> van der graph out though.
>>>>
>>>> You can do the research on what's required for a phosphorescent screen.
>>>> Got an old computer monitor? (Legal notice: you could kill yourself
>>>> here if you don't know what you're doing.)
>>>>
>>>
>>> I think the material used for video screens only fluoresces as having a
>>> sustained afterglow would be a nuisance.
>>
>> Yes, either a fluorescent or a phosphorescent screen will work.
>>
>>>
>>>>> Is that a fact that only charged particles cause materials to
>>>>> phosphoresce?
>>>>>
>>>>> Well, pretty much so, but it's irrelevant. If you don't see anything on
>>>>> the screen, then you know for sure you don't have charge flowing
>>>>> through the phosphorescent screen, because moving charges will cause
>>>>> phosphorescence.
>>>>>
>>>>
>>>> Pretty much so is too vague, I really would like a yes/no on this one,
>>>> because other than using such screens I have never had occasion to
>>>> condider
>>>> what they do and why they do it. So is it a fact that only charged
>>>> particles
>>>> can cause a phosphorescent material to glow?
>>>>
>>>> Photons, if they are high enough energy, can kick out electrons from
>>>> the surface of the screen and cause the electron to leave a spot on the
>>>> screen, but that's a 2nd-order effect. The point here is that moving
>>>> electrons WOULD be detected. I'm not expecting you to see spots and
>>>> then having to worry that they are due to something else. I don't

Re: Particle Visualization

>> expect you to see spots from ANYTHING in the gap, let alone moving
>> charges.
>>
>
> Well, I see afterglow from my phosphorescent screen when the screen is
> exposed to infrared radiation, I think you will agree that at those
> frequencies the effect is not due to a photoelectric effect.

I'm not sure I'm getting your point. If you put a fluorescent or phosphorescent screen in your capacitor gap and see nothing, what does that tell you?

>
>>>
>>>> Might have to wait until the rotating magnet investigation is
>>>> completed.
>>>> I
>>>> have the holder made to fix the magnet in a drill. Would you be happy
>>>> with a
>>>> ceramic disc capacitor as a probe to save me making one?
>>>>
>>>> Recall that you needed to change the gap so that you can get more than
>>>> one data point and fit the results to eliminate the pickup in the
>>>> twisted pair.
>>>>
>>>>>
>>>>>
>>>>> As far as the effect has not been seen all that means is the charge
>>>>> separation is below the minimum for the effect.
>>>>>
>>>>> And your model should predict what that is. After all, you claim you
>>>>> have a measurable and *real* displacement current, and so you can say
>>>>> that you know exactly how much charge has been moved from one side of
>>>>> the gap to the other. Therefore you know how many vacuum electron and
>>>>> positrons have moved that distance and then you can determine whether
>>>>> that is above or below threshold for seeing it.
>>>>>
>>>>>
>>> First of all I do not know if the effect of phosphorescence has been
>>> observed between capacitor plates or not. I don't know whether it can be
>>> seen
>>
>> Why wouldn't it be seen? Do the test. Better yet, choose an electron
>> detector of your choice and put that in the gap.
>>
>>> even if I am right about pair separation being responsible for carrying
>>> the
>>> electric field. I am looking into it. From the size of the displacement
>>> current one can determine the equivalent electron flow and that's about
>>> it.
>>>

Re: Particle Visualization

>>> Secondly, that's not quite what I said. I said that the displacement
>>> current
>>> can be measured and has been measured by measuring the magnetic field
>>> associated with it – they are synonymous. If you are measuring a real
>>> current then real charges are moving to create it. A galvo does not
>>> respond
>>> to an imaginary current.
>>
>> And a galvo is not measuring the magnetic field.
>>
>>> I personally have not measured the displacement
>>> current.
>>
>> Then I suggest you should!
>
>>>
>>> As for e-p separation, I wish it was as easy as that. I have determined
>>> an
>>> approximate figure for the separation distance v charge value of e-p
>>> pairs.
>>> However, as you know from Maxwells equations that the potential is the
>>> sum
>>> of all the individual charges and is so in this case. The difference
>>> being
>>> the value of the charge is a variable and the number of pairs
>>> contributing
>>> to the charge is unknown. One can make a guess and say that pair
>>> separation
>>> would be the limit of charge carrying capability after that the vacuum
>>> creates pairs and the capacitor becomes a conductor.
>>
>> Then your model is stuck. At least you could have a free parameter for
>> one and calculate the other in terms of it.
>>
> Hmm. The model is not stuck, the maths are on hold until I can figure out a
> reliable way round the impass. Maybe one could start with Avogadros number
> but I can see no logical reason why that would be related.

Neither can I, as that would apply to ponderable media only, where
there is a known, finite supply of charge.

>
>>>
>>>>
>>>>>
>>>>>>
>>>>>>> Summarizing, if you'll look again at Maxwell's equations, you'll
>>>>>>> see
>>>>>>> that there is a possible source of an electric field that is NOT
>>>>>>> due
>>>>>>> to

- **Follow-Ups:**
 - ◆ **Re: Particle Visualization**
 - ◇ *From: Monitek*

- **References:**
 - ◆ **Re: Particle Visualization**
 - ◇ *From: Monitek*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: PD*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: Monitek*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: PD*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: Monitek*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: PD*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: Monitek*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: PD*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: Monitek*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: PD*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: Monitek*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: PD*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: Monitek*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: PD*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: Monitek*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: PD*
 - ◆ **Re: Particle Visualization**
 - ◇ *From: Monitek*

- Prev by Date: **Re: Particle Visualization**
- Next by Date: **QM oscillator – experimental verification?**
- Previous by thread: **Re: Particle Visualization**
- Next by thread: **Re: Particle Visualization**
- Index(es):
 - ◆ **Date**
 - ◆ **Thread**