Lightnings, dark matter, and lepto-pion hypothesis again

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Abstract

The association of gamma rays and high energy electrons and positrons with lightnings is difficult to understand in the framework of standard physics. Also electron-positron pairs with cm energy equal to two times rest mass of electron looks strange. I have proposed a TGD based model based on leptopion hypothesis and the recent findings are consistent with this model.

Lightnings have been found to involve phenomena difficult to understand in the framework of standard physics. Very high energy photons, even gamma rays and electrons and positrons with energies in gamma energy range, have been observed.

I learned recently about even more mysterious looking discovery (see http://tinyurl.com/jucwhod. Physicist Joseph Dwyer from University of New Hampshire and lightning scientists from the University of California at Santa Cruz and Florida Tech describe this discovery in a paper to be published in the Journal of Plasma Physics. In August 2009, Dwyer and colleagues were aboard a National Center for Atmospheric Research Gulfstream V when it inadvertently flew into the extremely violent thunderstormand, it turned out, through a large cloud of positrons, the antimatter opposite of electrons, that should not have been there. One would have expected that positrons would have been produced by annihilation of highly energetic gamma rays with energy aboe .5 MeV but no gamma rays were detected.

This looks rather mysterious from standard physics point of view. There are also earlier strange discoveries

1. Lightning strikes release powerful X-ray bursts [C3] (see "Lightning strikes release powerful X-ray bursts" at tinyurl.com/zqc7r7z).

2. Also high energy gamma rays and electrons accompany lighnings [C2] (see "Earth creates powerful gamma-ray flashes" at http://tinyurl.com/juy8uj8). The problem is that electrons should lose their energy while traversing through the atmosphere so that energies in even X ray range would be impossible.

3. The third strange discovery was made with Fermi telescope [C1] (see "Antimatter from lightning flashes the Fermi space telescope" at http://tinyurl.com/p2z3n9p): gamma rays with energies .511 MeV (electron mass) accompany lightnings as if something with mass of 2 electron masses would decay to gamma pairs.

Could TGD explain these findings.

1. A possible explanation for the finding of Fermi telescope is that in the strong magnetic field of colliding very high energy colliding electrons assignable to the dark magnetic flux tubes of Earth particles that I call electropions suggested by TGD are created [K2] (see http://tinyurl.com/zvk3umn). Also evidence for mu-pions and tau-pions exists. They would have mass rather precisely 2 times the mass of electron and would be bound states of color excited electron and positron. Evidence for this kind of states was found already at seventies in heavy ion collisions around Coulomb wall producing electron positron pairs at total energy of 2 times electron mass but since they do not fit at all to the standard physics picture (too large decay width for weak bosons would be predicted) they have been put under the rug, so to say. The paradox is solved if these particles are dark in TGD sense.

2. If the annihilations of electropions give rise to dark electron-positron pairs and dark gamma rays, which then transform to ordinary particles, one could understand the absence of gamma rays in the situation described by Dwyer et al in terms of too slow transformation to ordinary particles. For instance, the strong electric fields created by a positively charged region of cloud could accelerate electron from both downwards and upwards to this region and lepto-pions would be generated in the strong magnetic fields generating strong electromagnetic instanton density $E \cdot B$ generating lepto-pion coherent state. If only positrons are observed, the absence of electrons could be due to different direction of accelerate motion for electrons. Since electrons are observed at the surface of Earth, this would suggest that electron positron pairs are created below the airplane.

3. But how it is possible to observe gamma rays and ultrahigh energy electrons at the surface of Earth? The problem is that atmosphere is not empty and dissipation would restrict the energies to be much lower than gamma ray energies which are in MeV range. Note that the temperatures in lightning are about 3×10^4 K and correspond to electron energy of 2.6 eV which is by a factor 10^5 smaller than electron mass and gamma ray energy scale! And how the electrons with energies above MeV range are created in thunder cloud? For years ago I proposed a model for high energy gamma rays and electrons associated with lightnings in terms of dark matter identified as $h_{eff} = n \times h$ phases. This model could provide answer to these questions.

First some background is needed.

1. I ended up to $h_{eff} = n \times h$ hypothesis [K1, K3] from the observations of Blackman and other pioneers of bio-electromagnetism [J1] about quantal effects of ELF em fields to vertebrate brain, which he explained in terms of cyclotron frequencies of Ca^+ ion in endoneous magnetic field $B_{end} = 0.2$ Gauss (2/5:th of the nominal value $B_E = .5$ Gauss of the Earth's magnetic field). Cyclotron energy $E = h \times f$ is however extremely low, much below the thermal energy in physiological temperature so that no quantal effects should be possible. This inspited the hypothesis $h_{eff} = n \times h$ scaling up the energy.

2. Nottale [E1] introduced originally the notion of gravitational Planck constant $\hbar_{gr} = GMm/v_0$ to explain the orbital radii of planets in solar system as Bohr orbits. The velocity parameter v_0 is different for inner and outer planets and Quite recently I proposed v_0 is in constant ratio to the rotation velocity of the large mass M. The interpretation in TGD framework is that the magnetic flux tubes mediate gravitational interaction between M and m and the value of Planck constant is h_{gr} at them. The proposal $h_{eff} = h_{gr}$ at flux tubes is very natural sharpening of the original hypothesis [K3, K4]. The predictions of the model do not depend on whether m is taken to be the mass of the planet or any elementary particle associated with it and the gravitational Compton length $\lambda_{gr} = GMc/v_0$ does not depend on the mass of the particle as is proportional to the Schwartschild radius $2GM$ of Sun.

3. This hypothesis can be generalized to apply also to Earth (see `http://tinyurl.com/ht4pwy7`). For the strength $B_{gal} \sim 1$ nT for galactic magnetic field assumed to mediate Earth's gravitational interaction cyclotron frequency 10 Hz in alpha band is mapped to cyclotron frequency scale of 72 minutes. Scaled EEG range corresponds to cyclotron periods varying up to 12 hours for B_{gal}. For $M = M_E$ and B_{gal} the cyclotron energy corresponds to about 1 eV at the lower end of visible photon energies.

4. What about the interpretation of ordinary EEG in terms of cyclotron frequencies assuming that the corresponding energies are in visible and UV range corresponding to the variation of B_{end}? M_E is certainly too large to give a spectrum of cyclotron energies in this range suggested by Blackman to explain the findings about quantal effects of ELF radiation on brain not possible in standard quantum theory because the energy is much below the thermal threshold. $M_D = .5 \times 10^{-4} M_E$ would be needed. I have proposed that M_D corresponds to a mass assignable to a spherical layer at distance of Moon's orbital radius and there are independent pieces of evidence for the existence of this layer. B_{end} would represent the lower bound for the value range of the magnetic field varying at least by 7 octaves would give the highest UV energies around 124 eV. The transformation of dark photons to ordinary photons

would yield biophotons with energies in visible and UV range. Also B_{gal} would have some variation range.

5. This has a connection to quantum biology and neuroscience. The proposal is that dark cyclotron photons with energies in visible and UV range associated with flux tubes of magnetic field of appropriate strength serve as a communication tool making biological body (BB) to communicate sensory data to magnetic body (MB) and allow BB to control BB. The recent model involves

Consider now the model for how electrons and gamma rays accompanying lightnings can travel to the surface of Earth without dissipating their energies and how the collisions of electrons with gamma ray energies generating electropions are possible.

1. What happens if one replaces M_D with M_E meaning that also Earth's gravitons would reside at the flux tubes of B_{end}? The energies get scale up by a factor $M_E/M_1 = 2 \times 10^4$ and this scales up the 1-100 eV range .02-2 MeV so that also gamma ray energies would be obtained.

2. The earlier proposal was that electrons and gamma rays associated with lightning arrive to the surface of Earth along dark magnetic flux tubes so that by macroscopic quantum coherence in scale of λ_{gr} they do not dissipate their energy.

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