New Concept of Magnetic Monopoles

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Abstract

All attempts to find Dirac magnetic monopoles have remained unsuccessful until now. Only quasi particles with characteristics similar to magnetic monopoles are created experimentally. This article formulates a new concept of intrinsic magnetic monopoles. Magnetic monopoles are elementary particles with magnetic charges and electric spins. They can be generated by splitting a photon in a strong magnetic field. According to the concept at least a magnetic lepton, magnetic baryon, magnetically neutral monopole and its antiparticles exist.

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Introduction

The Maxwell equations (1) for vacuum are symmetric according to an electric and magnetic field:

$$rot\, \boldsymbol{E} = -\, 1/c\ \partial \boldsymbol{B}/\partial t, \qquad (1)$$
$$rot\, \boldsymbol{B} = 1/c\ \partial \boldsymbol{E}/\partial t, \qquad (2)$$
$$div\, \boldsymbol{E} = 0 \qquad (3)$$
$$div\, \boldsymbol{B} = 0 \qquad (4)$$

where: $\boldsymbol{E}$ – vector of electric field,
$\boldsymbol{B}$ – vector of magnetic field,
t – time,
c – speed of light.

The electric and magnetic fields in the photon are mutually shifted orthogonally (fig. 1.) according to the equations (1….4) both in space and time.

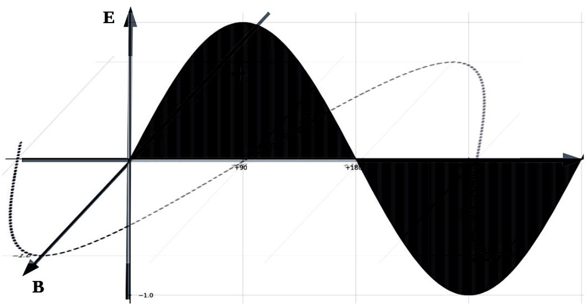

Fig. 1. Electric field (solid) and magnetic field (dashed) of photon.

It is well known that photons are split to particle-antiparticle pairs in strong electric fields (fig. 2.).

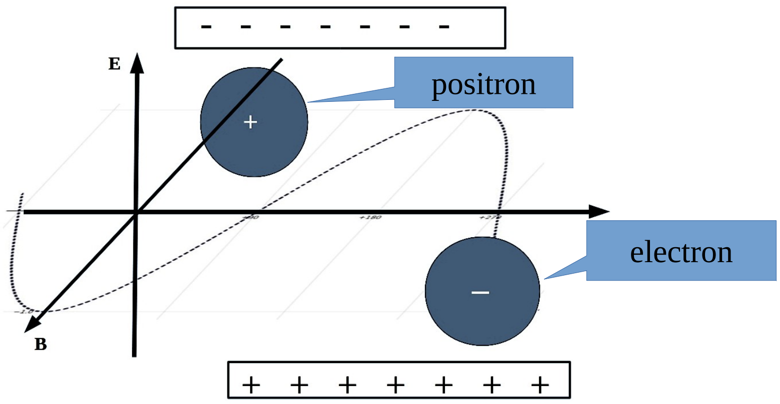

Fig. 2. Splitting the electric field of photon to electron and positron in the strong external electric field.

The nucleus of a heavy atom, for example, gold, is used as the source of an electric field. Practically it means that the beam of laser lights through a thin plate of gold. The energy of a photon converts to electron-positron pairs according to Dirac equation in SI system:

$$E^2 = m^2 c^4 + p^2 c^2, \tag{1}$$

where: E - energy,
m - mass,
p - momentum,
c - speed of light.

In Gauss unit system $c = 1$ and Dirac (2) equation can be written as:

$$E^2 = m^2 + p^2 \quad \text{or} \quad E = \pm(m^2 + p^2)^{1/2} \tag{2}$$

Therefore mass is: $$m = \pm(E^2 - p^2)^{1/2} \tag{3}$$

From the equation (3) it follows that each event of photon splitting creates 2 masses with an opposite sign. This is confirmed by experiments: the particles are generated in pairs [3] and *vice versa.* The mass disappears when a particle collides with an antiparticle.

The magnetic field of a photon is similar to an electric field with only one difference, i.e., it is orthogonal [4] to the electric field (fig. 3.).

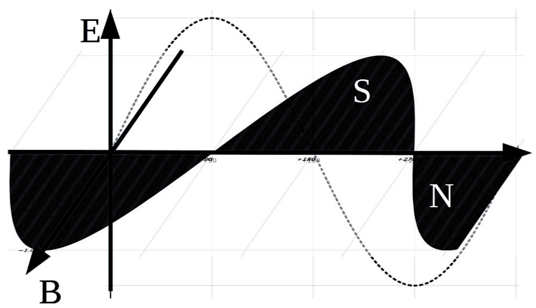

Fig. 3. Magnetic and electric (dashed) field of photon.

Therefore, it is reasonably to think that in a strong magnetic field, photons will split into magnetic monopoles (fig.4.). It would be better to call them magnetic charges.

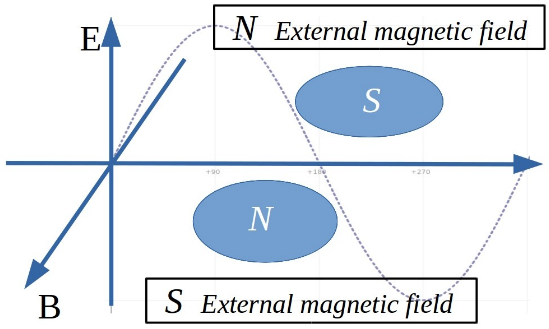

Fig. 4. Splitting the magnetic field of photon to the N and S charges (monopoles) in the strong external magnetic field. Electric field dashed.

Magnetic charges have a potential magnetic field and an electric spin. N and S charges are mutual antiparticles which annihilate if they collide and convert back to a pair of photons. It is expected that the production of magnetic monopoles will be of great importance for further scientific and technical development.

The main problem of magnetic monopoles generation is how to get a sufficiently strong magnetic field. Magnetic monopoles are likely to be found in cosmic regions with very strong magnetic fields. If there are sources of gamma ray bursts, pairs of magnetic monopoles can emerge, which shortly annihilate.

Conclusions

There is no reason to think that photons in an magnetic field split differently than in an electric field. Therefore there must be magnetic leptons with a mass 0.511 MeV, magnetic barions with a mass 938 MeV, magnetically neutral composite monopoles with a mass 939.5 MeV and their antiparticles.

References

1. Feynman, R. Solutions of Maxwell's Equations in Free Space. http://www.feynmanlectures.caltech.edu/II_20.html.

2. Dirac, P. A. M. *Quantised singularities in the electromagnetic field*. *Proc. R. Soc. Lond. A* **133**, 60–72 (1931)

3. Carsten Kallesø Agger. The Theory of Photon-Impact Bound-Free Pair Production and Applications to Relativistic Heavy-Ion Collisions. 1996. Agger.

4. Prūsis I. and P. https://ia601507.us.archive.org/21/items/AboutEnergyOfPhoton/About%20Energy%20of%20Photon.pdf

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