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Exploring the Possibility of Surface Change during Emission of Radiation for the Electron

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Abstract

We assume from previous work that the mass of the electron creates a spacetime curvature thus giving a picture of local change of volume and surface. The assumption comes from the relativistic radius of the electron which gives as a first estimate for a spacetime curvature. The volume created seems to be depending on the dielectric susceptibility which alters the speed of light thus creating a new metric. We find a formula for this new volume and the rate of change of the surfaces locally.

Keywords: Electron; Radiation; Spacetime; Volume

Introduction

In previous work in this journal the author has proved that associated with mass is a curvature of spacetime thus creating new volume. In this article we define the way this volume is separated into new surface for absorbing the photon during the change of quantum states. The formula for this volume will be finally given as space dependent related to the dielectric susceptibility and the potential energy. New surface is created towards the gradient of the absolute value of the wave function, that is, perpendicular to the surfaces of constant psi.

Main part

If we generalize the surface to entropy equivalence for a black hole [1] as a valid law describing the quantum phenomena taking in mind that the logarithm of probability is proportional to the entropy we naturally arrive at the following relationship:

$$dP = \frac{d|\psi|^2}{N} = 2\frac{|\psi|^2}{N^2 K} dS \quad (1)$$

In equation (1) K stands for the spacetime curvature found in our paper Koutandos S [2] which if multiplied by the dielectric susceptibility gives:

$$K\chi(\bar{r}) = \frac{dS}{dV} \quad (2)$$

The right part of equation (2) is the surface to volume ratio.

We put forth some of the formulas we had derived in the before mentioned article Koutandos S [2]:

$$\frac{\hbar^2}{2mN}\Delta|\psi|^2 = B = V\frac{dP}{dV} = \frac{|\psi|^2}{\chi}\frac{mc^2}{N} \quad (3)$$

$$P = Pressure = \frac{|\psi|^2}{N}(E-U) \quad (4)$$

Combining formulas (4),(3),(2),(1) we get:

$$B = V\frac{dP}{dV} = 2\frac{|\psi|^2}{N^2}V\chi(E-U) = mc^2\frac{|\psi|^2}{N\chi} \quad (5)$$

The solution of equation (5) is equation (6):

$$2\chi^2 = \frac{mc^2}{(E-U)}\frac{N}{V} \quad (6)$$

A natural consequence of equation (1) is the following result:

$$\nabla|\psi| = 2|\psi|\frac{\nabla S}{NK} \quad (7)$$

Therefore by using equation (7) together with the results of the references Koutandos S [3,4] the velocity of the particle is written as:

$$\vec{v} = \psi\frac{d\vec{r}}{dt} + 2i\psi\frac{\nabla S}{NK} \quad (8)$$

$$\frac{d\vec{r}}{dt} = \frac{\hbar}{m}\nabla\phi + \frac{e}{mc}\vec{A} \quad (9)$$

Next we are going to produce the formula for vorticity by following reference Bershadskii A [5]:

$$\vec{\Omega} = \frac{\nabla S}{NK} \times \frac{d\vec{r}}{dt} \quad (10)$$

The meaning of equation (10) is that vorticity is a vector showing towards the change of volume. However the change of volume and surface is phenomenological only due to the presence of mass from the equivalence principle which creates a curvature in spacetime. Thus we shall have the following restriction:

$$\frac{dS}{dt} = 0 = \nabla S \cdot \frac{d\vec{r}}{dt} + \frac{\partial S}{\partial t} \quad (11)$$

From equations (11),(9) and (7) and by using the law for the continuation of current we derive the following result:

$$\frac{\partial|\psi|^2}{\partial t} = 1/\mathrm{KN}|\psi|^2\frac{\partial S}{\partial t} \quad (12)$$

Therefore during the passage from on quantum state to the other the surfaces change locally. Next we are going to address another issue which is of vital importance to quantum mechanics. We are going to find the formula for the current. We start from the assumption that since we have discovered so far that the volume and the mass are changing the action should be written as following:

$$dS = \frac{\hbar}{mN}dmdV \quad (13)$$

We already know the action from previous work so we are going to reproduce it [6]:

$$\frac{dS}{d\Omega} = \frac{dS}{dVdt} = \frac{\hbar^2}{2mN}|\psi|\Delta|\psi| \quad (14)$$

Combining equations (13) and (14) we derive the following result:

$$I = \frac{dm}{dt} = PQ = \frac{\hbar^2}{2mN}|\psi|\Delta|\psi| = \frac{|\psi|^2}{N}\left[E - U - \frac{m}{2}\left(\frac{d\vec{r}}{dt}\right)^2\right] \quad (15)$$

This formula nearly complies with the formula for the evaporating droplets for which the author had made a study in previous work Koutandos S [7].

$$\Delta P = \frac{dm}{dt} \quad (16)$$

The difference here is being that the surface is changing so we subtract a term from the left hand side of equation (16).

The formula given in reference Koutandos S [6] now takes a simpler form:

$$\psi^*\frac{d\vec{v}}{dt} = i\vec{J}Q + \nabla I \quad (17)$$

In equation (17) Q is the quantum potential.

Results

We would like to correct a formula given in reference Koutandos S [6] and give the right one:

$$B = \chi\frac{\Omega}{N} \quad (18)$$

Other authors have performed the calculations for the action density and have found similar results [8]. There is a slight dispute as to whether the action density should be taken as the one we have put forth or as the Laplacian of the probability.

The law involving the three final letters of the Greek alphabet may be written as:

$$|\psi|^2 = 2\chi^2\Omega \quad (19)$$

The law for the velocity can be found elsewhere as well [9].

Conclusion

The time derivative of the radius combines with a gradient of the surface giving a net local change of volume. During emission or absorption of radiation these surfaces change to absorb or emit the radiation which as we know is proportional to the surface, an example well known from antennas. We refer the reader to some more work proving that in relativity the surface change might be associated with entropy change [10].

We hope we have contributed to the field of research of hidden variables in quantum mechanics.

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