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Original Research Paper

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ABOUT THE DEPENDENCE OF VOLUME CREATED BY THE EQUIVALENCE PRINCIPLE ON THE KINETIC ENERGY AND THE SOLID ANGLES OF THE OBSERVER

Spiros Koutandos

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. Finally the kinetic energy is found to be proportional to the third power of the volume.

KEYWORDS : Relativity;quantum mechanics;hidden variables

Main part

If we generalize the surface to area 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:

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

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

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

The right part of equation (2) is the surface to volume ratio.
We put forth some of the formulas we had derived in the afore mentioned article [2]:

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

In equation (13) sigma is the surface tension which equals c ^ 2 times the surface density of mass and K is a constant curvature of spacetime.

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

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[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 [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 phenom enological only due to the presence of mass from the equivalence principle which creates a curvature in spacetime. Thus we shall have the following restriction:

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

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

Therefore during the passage from on quantum state to the other the surfaces change locally.

The formula for the force density can be found if we use the law of Marangoni flow in liquids

$$\nabla\sigma = \frac{d\vec{F}}{dV} = \frac{\hbar^2}{2mNK}\nabla\Delta P \quad (13)$$

$$\langle\nabla\sigma\cdot\frac{dr}{dt}\rangle = <\frac{dB}{dt}> = <|\psi|^2\chi\frac{dU}{dt}> = 0 = <\frac{d\vec{F}}{dv}\frac{d\vec{r}}{dt}> \quad (14)$$

From equation (14) we deduce that the second variation of the virial Fr quantity is zero hence we prove the virial theorem in quantum mechanics.

CONCLUSIONS

In quantum mechanics we are told of the role of the observer. Since the volume and surface is changing and we have a spacetime curvature we put forth the following formula:

$$mc^2\frac{d\Omega}{4\pi dV} = B \rightarrow VdP = mc^2\frac{d\Omega}{4\pi} \rightarrow \frac{dSd\Omega}{KdV} = dm \quad (15)$$

In equation (15) Omega stand for the solid angles of the observer witnessing the swirling droplets surrounded by a surface mass density.

REFERENCES

[1] Black holes and thermodynamics, S. W. Hawking, Phys. Rev. D 13, 191 – Published 15 January 1976
[2] Spiros Koutandos, Physical Science & Biophysics Journal,MEDWIN PUBLISHERS "Is Schrodinger Equation a Relativistic Effect? " Volume 5 Issue 1
[3] Spiros Koutandos, "Regarding the Total Time Derivative of the Radius " IOSR Journal of Applied Physics (IOSR-JAP) Volume 10, Issue 6 Ver. I (Nov. – Dec. 2018), 26-27 www.iosrjournals.org ,DOI: 10.9790/4861-1006012627
[4] Spiros Koutandos, "Rewriting the Master Equation",IOSR Journal of Applied Physics (IOSR-JAPVolume 11, Issue 3 Ser. II (May. – June. 2019), PP 72-74
[5] Bershadskii, A. "Generalized vorticity in transitional quantum turbulence "2007arXiv0709.2501B