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Principles of Relativity By means of the Charge Q

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Research Article

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ABSTRACT

Concurring to the rule of relativity in its most amplified sense the space and time of material science are simply a mental framework in which for our possess comfort we find the discernible marvels of Nature. Wonders are conditioned by other marvels agreeing to certain laws but not by the space-time framework which does not exist exterior our brains. As more often than not communicated the laws of movement and of electrodynamics presuppose a few specific estimation of space and time; but on the off chance that the guideline is genuine the genuine laws interfacing wonders must be free of our system of reference—the same for all frameworks of co-ordinates. Of course it may be that marvels are conditioned by something exterior observation—a considerable ether which plays the portion of an outright outline of reference. But the taking after Contemplations may appear that the perfect of relativity isn't unreasonable. Each perception comprises of an assurance of coincidence in space or time.

INTRODUCTION

It is important to state that in this analysis we derive the Energy-Charge Equation by using tensor analysis and the Albert Einstein Theory of Relativity which describes the relationship between the ordinary energy of any particle and the ordinary charge Q of the same particle [1]. This equation is also called the MOAQAT Energy- Charge Equation which is:

$$\xi = \frac{Q\,v\,c^{2}}{[1-(v^{2}/c^{2})]^{1/2}}$$

V is the magnitude ordinary velocity of that same particle under consideration in Space-Time and c is the speed of light [2,3].

Some Important Constants:

= 8.85 X10 – 12 Farad / meter

=permittivity of free space in a vacuum

= 3.14 (approximately).

=1.260 Nano H / meter

=permeability of free space in a vacuum

c= 3.0 × 10^{8} meter/second

=speed of the light in a vacuum

$C^2 = 1 / \mu \epsilon$

MATERIALS AND METHODS

Based on the fact that we have obtained the MOAQAT ENERGY- CHARGE equation

$$\xi = \frac{Q \nu c^2}{[1 - (v^2/c^2)]^{1/2}} \qquad (1.2)$$

It is seen that we can employ relativistic velocity U of any particle where

$$U = \nu / [1 - (v^2/c^2)]^{1/2}$$

V is the ordinary magnitude velocity of the same considered particle [4]. That is hence we can transfer electric magnetic heat mechanical power in terms of the charge Q of the said particle. Again we must note here in our conclusion that the charge Q resulting from the velocity U of any particle under consideration is the charge resulting from applying any of the electric magnetic fields on the same particle [5-7]. Thus in a similar discussion it is obvious that we can use the charge Q of any considered particle in order to transform energy from any prospective possible form to another possible form where we must have by tensor rules the Maxwell's equations differential geometry in quantum mechanics that the energy transferred or transformed is expressed in terms of that particle's charge Q by the MOAQAT-ENERGY Charge Equation which is:

$$\xi = Q\ U\ c^2 .$$

That is concluded and explained in brief as follows by the use of Maxwell's equations and the Albert Einstein' s principle of Relativity . In studying the electro-dynamic behaviors of any particle upon introducing the 4 potential in space we can form the 4 potential vector such that It is seen that the associated 4 electric vector E and the 4 charge vector Q are regarded as the fields which affect any particle in motion in Space Time having the 4-relativistic velocity vector U ; where v is the ordinary velocity and U is the relativistic velocity of the same considered particle while in motion in the 4 Dimensional continuum Space-Time.

According To Albert Einstein in his "The Meaning of Relativity" p.16-18 A. Einstein published by Princeton University Press in 1922 we recall the following concepts and principles which are considered by Vector and Tensor Analysis and The Theory of Relativity in the continuum 4 D Space-Time. Now by A. Einstein's principles in

Relativity if an event takes place anywhere in space we can assign to it three co-ordinates x_i, i=123 and a time t in a 4- coordinate system as soon as we have specified the time of the clock at the origin O which is simultaneous with the event. Therefore we give an objective significance to the statement of the simultaneity of distant events [8]. It may be seen that the time so specified is at all events independent of the position of the system of coordinates in our space of reference and is therefore an invariant with respect to the Lorentz group transformation. Besides

$$x'_\alpha = y_\alpha = a_\alpha + \mathrm{LOR}_{\alpha\beta}\, x_\beta \ ;$$

reciting the statement of the simultaneity of distant events and being concerned with the simultaneity of two experiences of an individual it seen that we can use the covariance of the Lorentz Transformation we can express with a sufficient high degree of efficiency in translation of coordinates the position of any particle in another system S while taking isotropy of the medium into account and homogeneity in Cartesian coordinate systems by the geometrical line equation [9].

For simplicity by considering above that a to be zero i.e. the origin O of the coordinate system S we arrive at

$$x'_\alpha = y_\alpha = \mathrm{LOR}_{\alpha\beta}\, x_\beta \ ;$$

obtaining the Lorentz Transformation equations; characterized by the equations

Similar arguments apply if using 3 components (2 real components and a 3rd which may be selected as imaginary) in Space-Time.

DISCUSSION

1. The Galilean Transformation Equations

Consider two inertial frames S and S'. That's where frame S' moves with a constant 3 velocity v along the common x and x ' axes respectively where v is measured as relative to frame S. We assume the origins of S and S' coincide at t = 0 and an event occurs at point P in space at some instant of time. An observer in frame S describes the event with space–time coordinates (x, y, z, t) whereas if we have an observer in frame S 'then: such an observer uses the coordinates (x' y ' z't ') to describe the same event. Now from the geometry and by using the Galilean Transformation equations that the relationships among these various coordinate can be written

$$x' = x - \mathrm{v}t\ ,\ y' = y\ ,\ z' = z\ ,\ t' = t$$

The equations above are the Galilean space–time transformation equations. It must be noted in the said Galilean equations that time is assumed to be the same in both inertial frames. So that by using Galilean Transformation Equations then that means that within the framework of classical mechanics all clocks run at the same rate regardless of their velocity so the time at which an event occurs for an observer in S is the same as the time for the same event in S' . By using the said Galilean Equations then the time interval between two successive events should be the same for both observers. Although one sees that this assumption may seem to be obvious yet it turns out to be incorrect in situations where the velocity v is comparable to the speed of light [10].

2. The Lorentz Transformation Equations

Suppose that two events occur at the points P and Q in space and are reported by two observers one at rest in a frame S and another in a frame S' that is moving to the right with speed v. The observer in frame S reports the events with space–time coordinates (x, y, z, i, c, t) while the observer in frame S' reports the same events using the coordinates (x', y', z', i, c, t') [11,12]. Then from above this predicts that the distance between the two points in space at which the events occur does not depend on motion of the observer: $\Delta x=\Delta x'$. Due to the fact that this prediction is contradictory to the notion of length contraction then it is found that the Galilean transformation is not valid when v approaches the speed of light. In the following we present the correct transformation equations that apply for all speeds in the range $0<v<c$. These equations which are valid for all speeds and that enable us to transform coordinates from frame S to frame S' are called the Lorentz transformation equations:

$$x'=\gamma[x-vt],\ y'=y,\ z'=z,\ t'=\gamma[t-(vx/c^2)]$$

Further it must be noted that these transformation equations were developed in 1890 in connection with electromagnetism.

However it was for Albert Einstein who recognized the physical significance of these equations. That is where he took the bold step of interpreting them within the framework of the special theory of relativity [13]. One important aspect to notice here is the difference between the Galilean and Lorentz time equations. In the Galilean case the time t = t'. However in the Lorentz case the value for t' assigned to an event by an observer O' in frame S' depends both on the time t and on the coordinate x as Measured by an observer O in the S frame which is consistent with the notion that an event is characterized by four space–time coordinates (x, y, z, i, c, t) [14]. So in other words in relativity space and time are not separate concepts. However they rather are closely interrelated with each other. If one wishes to transform coordinates in the S' frame to coordinates in the S frame THEN: One simply replaces v by and then interchanges the primed and unprimed coordinates in the Lorentz Transformation Equations:

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$$x = \gamma [x' - vt'], y = y', z = z', t = \gamma [t' + (vx'/c^2)]$$

When v<<c the Lorentz transformation equations should reduce to the Galilean equations [15]. However as v approaches zero v/c<<1; therefore and the Lorentz Transformation Equations stated above indeed reduce to the Galilean space-time transformation equations in the Galilean Transformation Equations stated earlier above. In many situations we would like to know the difference in coordinates between two events or the time interval between two events as seen by observers O and O'. From the Lorentz Equations stated above we can express the differences between the four variables x x't and t' in the following form

$$\left.\begin{aligned} \Delta x' &= \gamma [\Delta x - v\Delta t], \\ \Delta y' &= \Delta y, \\ \Delta z' &= \Delta z, \\ \Delta t' &= \gamma [\Delta t - (v\Delta x / c^2)] \end{aligned}\right\} \text{For transforming from frame S to S}'$$

That is while we use the equations

$$\left.\begin{aligned} \Delta x &= \gamma [\Delta x' + v\Delta t'], \\ \Delta y &= \Delta y', \\ \Delta z &= \Delta z', \\ \Delta t &= \gamma [\Delta t' + (v\Delta x' / c^2)] \end{aligned}\right\} \text{For transforming from frame S}' \text{ to S}$$

Further discussions are presented about the Lorentz Transformation equations stated above. Meanwhile we have already presented the issues Rotation of the Coordinates from one frame to another for additional explanation about the said equations in the continuum 4 Dimensional Space-Time.

3. Concept of Energy of a System

It is necessary to mention that the concepts of definitions of quantities such as position velocity acceleration and force and associated principles such as the Newton's relativistic second law have allowed scientists to be able to solve a variety of everyday real-life physics problems [16]. Some problems that could theoretically be solved with relativistic Newton and Albert Einstein's laws however are very difficult to practice. Eventually those laws can be made simpler with a different approach in the 4 D Space-Time. Here in the following we will take a look to investigate this new approach which will include definitions of quantities that may be made familiar to the reader. Looking at other quantities one can say that some other different ones may sound familiar but they may have more specific meanings in physics than in everyday life [17].

To give some brief overlooking view and or notion about energy one must have some understanding about the arbitrary notion about energy. It must be stated in science and engineering the concept of energy is one of the most important topics. In everyday lives one may think of energy in terms of fuel for transportation and heating electricity for lights and appliances and foods for consumption. These ideas however do not truly define energy. Energy is present and exists in the Universe in various forms. It is quite fair to state that every physical process that occurs in the Universe involves energy and energy transfers or transformations. Despite its extreme importance yet energy cannot be defined in some easy manners. The variables in previous chapters were relatively concrete; we have everyday experience with velocities and forces for example. It is necessary to mention as well that the concept of energy can be applied to mechanical systems magnetic systems electric etc without resorting to the ordinary but not the relativistic Newton's laws. In addition to the above it must state furthermore that the energy approach allows us to understand thermal and electrical phenomena for which the ordinary Newton's laws are of no help [18].

It was noted that until about 1850 the fields of thermodynamics and mechanics were considered to be two distinct branches of science. So the law of conservation of energy seemed to describe solely few kinds of mechanical systems. However experiments in the mid-19th century performed by Englishman James Joule and others showed a strong connection between the transfer of energy by heat in thermal processes and the transfer of energy by work in mechanical processes. Nowadays it has become evidently known that mechanical energy may be transformed to internal energy which may be formally defined in one way or another. Thus once the concept of energy was generalized from mechanics to include internal energy the law of conservation of energy emerged as a universal law of nature [19,21]. This analysis focuses on kinetic energy and to some extent on the concept of internal energy as well. That is in addition to respecting the identity of obeying the invariance of universal law of thermodynamics heat transfer and some important applications of the first law. It must state that the first law of thermodynamics describes to a great extent systems in which the only energy change is that of internal energy and the transfers of energy are by heat and work. One important thing to mention is that a major difference in our discussion of work in this analysis from that in most of the chapters on mechanics is that we do also consider work done on deformable systems with entropy [22-24].

4. Electric & Magnetic

We wish to talk about the 4 electric in any electric electromagnetism in any reference frame S. That is by using the charge electric field and the magnetic field. The 4 electric field is expressed in a 4-component vector E in any reference frame S while the 4 magnetic field is denoted by a 4-component vector H in any reference frame S. That is where we have by using 1st rank covariant components such that

$$E_{\alpha} = -\partial_{\alpha} \phi + \frac{\partial \Omega_{\alpha}}{\partial l}$$

The 1st rank contravariant components take the formmas follows,

$$E^{\alpha} = -\partial^{\alpha} \phi + \frac{\partial \Omega^{\alpha}}{\partial l}$$

Then, we get for the real divergence of the 4-potential ,

$$\text{div } \boldsymbol{A} = A^{\alpha}{}_{;\alpha} = \Omega^{\alpha}{}_{;\alpha}$$

That is, also, by using the notation

$$\text{div } \boldsymbol{\Omega} = A^{\alpha}{}_{;\alpha} = \Omega^{\alpha}{}_{;\alpha}$$

It follows that by using pure imaginary values for the imaginary divergence of the 4- potential we have

$$i \text{ div } \boldsymbol{A} = i A^{\alpha}{}_{;\alpha} = i \Omega^{\alpha}{}_{;\alpha}$$

$$i = \sqrt{-1}$$

In the same manner as with the case in 3-space when using the Lorentz Condition or under the Lorentz Gauge and employing 3- vector components entities we have that in 4- vector notation that

$$A^{\alpha}{}_{;\alpha} + \frac{\partial \phi}{\partial l} = 0$$

Talking about the purely imaginary equation of continuity stated above we have Or in an alternative way we maywrite the above Lorentz Condition identity Equation as expressed here below such that the identity

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$$i\, A^{\alpha}{}_{;\alpha} + i \frac{\partial \phi}{\partial l} = 0$$

$$\operatorname{div} \boldsymbol{A} + \frac{\partial \phi}{\partial l} = 0$$

So that for the purely imaginary Lorentz Condition we then have in 4-vector notation as follows

$$i \operatorname{div} \boldsymbol{A} + i \frac{\partial \phi}{\partial l} = 0$$

COMPETING INTERESTS

There are no competing interests to declare.

REFERENCES

1. John-Hopkins, et al. Pancreas: Anatomy and Functions. 2020.
2. Nandy D, et al. Growth factor mediated signaling in pancreatic Pathogenesis. Cancer. 2011;3:841-871.
3. Dennis LK, et al. Harrison’s Principles of Internal Medicine Nineteenth ed. McGraw Hill Education Medical. New York. 2015.
4. Le Bras S, et al Fibroblast growth factor 2 promotes pancreatic epithelial cell proliferation via functional fibroblast growth factor receptors during embryonic life. Diabete. 1998;1236–1242.
5. Edlund E. Pancreatic organogenesis—Developmental mechanisms and implications for therapy. Nat Rev Genet. 2002;3:524-532.
6. Yamanaka Y, et al. Overexpression of acidic and basic fibroblast growth factors in human pancreatic cancer correlates with advanced tumor stage. Cancer Res. 1993;53:5289-5296.
7. Johnson DE. Diverse forms of a receptor for acidic and basic fibroblast growth factors. Mol Cell Biol. 1990;10:4728-4736.
8. Jaye M, et al. Fibroblast growth factor receptor tyrosine kinases: Molecular analysis and signal transduction.Biochim Biophys Acta. 1992;1135:185-199.
9. Mignatti P, et al. *In vitro* angiogenesis on the human amniotic membrane: Requirement for basic fibroblast growth factor-induced proteinase. J Cell Biol. 1989;108:671-682.
10. Moscatelli D, et al. Purification of a factor from human placenta that stimulates capillary endothelial cellprotease production DNA synthesis and migration.ProcNatlAcad Sci. 1986;83:2091-2095.
11. Montesano R, et al. Basic fibroblast growth factor induces angiogenesis *in vitro*. ProcNatlAcad Sci.

e-ISSN:2320-2459
p-ISSN:2347-2316

1986;83:7297-7301.

12. Abadpour S, et al. Glial cell-line derived neurotrophic factor protects human islets from nutrient deprivation and endoplasmic reticulum stress induced apoptosis. Sci Rep. 2017;7:1575.
13. Mwangi S, et al. Glial cell line-derived neurotrophic factor increases beta-cell mass and improves glucose tolerance. Gastroenterol.2008;134:727-737.
14. Heuckeroth RO, et al. Neurturin and GDNF promote proliferation and survival of enteric neuron and glial progenitors *in vitro.* Dev Biol. 1998;200:116-129.
15. Baloh RH, et al. The GDNF family ligands and receptors -implications for neural development. Curr Opin Neurobiol. 2000;10:103-110.
16. Seaberg RM, et al. Clonal identification of multipotent precursors from adult mouse pancreas that generate neural and pancreatic lineages. Nat Biotechnol. 2004;22:1115-1124.
17. Pierucci D, et al. NGF-withdrawal induces apoptosis in pancreatic beta cells *in vitro* Diabetologia. 2001;44:1281-1295.
18. Teitelman G, et al. Islet injury induces neurotrophin expression in pancreatic cells and reactive gliosis of peri-islet Schwann cells. J Neurobiol. 1998;34:304-318.
19. Dong Set, et al. Regenerating β cells of the pancreas -potential developments in diabetes treatment. Expert Opin Biol Ther. 2018;18:175-185.
20. Kimlin L, et al. 3D *in vitro* tissue models and their potential for drug screening. Expert Opin Drug Discov. 2013;8:1455-1466.
21. Peck Y, et al. Three-dimensionally engineered biomimetic tissue models for *in vitro* drug evaluation: delivery efficacy and toxicity. Expert Opin Drug Deliv. 2013;10:369-383.
22. DHuh D, et al. From 3D cell culture to organs-on-chips. Trends Cell Biol. 2011;21:745-754.
23. Kourtzelis, et al. Regulation of Instant Blood Mediated Inflammatory Reaction (IBMIR) in Pancreatic IsletXeno-Transplantation: Points for Therapeutic Interventions. Adv Exp Med Biol. 2015;865:171-188.
24. Sumi S, et al. A multiple-funnels cell culture insert for the scale-up production of uniform cell spheroids. Regen Ther. 2017;7:52-60.