Online ISSN: 2249-4626
Print ISSN: 0975-5896

Global Journal

of Science Frontier Research: A

Physics and Space Science

Theory of Gravitation

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Highlights

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Unitary Quantum Theory

Discovering Thoughts, Inventing Future

VOLUME 13 ISSUE 5 VERSION 1.0

Global Journal of Science Frontier Research: A
Physics & Space Science

Global Journal of Science Frontier Research: A
Physics & Space Science
Volume 13 Issue 5 (Ver. 1.0)

Open Association of Research Society

Incorporation No.: 0423089
License No.: 42125/022010/1186
Registration No.: 430374
Import-Export Code: 1109007027
Employer Identification Number (EIN):
USA Tax ID: 98-0673427

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Open Scientific Standards

Publisher's Headquarters office

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USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

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Contents of the Volume

Global Journal of Science Frontier Research
Physics and Space Science
Volume 13 Issue 5 Version 1.0 Year 2013
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Contemporary Problems of Sciences in the View of Unitary Quantum Theory

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Abstract - The present article discuses the problems of new Unitary Quantum Theory in its applications to the different aspects of the reality. There are spectacular examples of such applications.

Keywords : *unitary quantum theory, standard model, quantum electrodynamics, maxwell equations, schro-dinger equation, solid state physics, zone theory, semiconductors, tunneling effects, spectrum masses, lorentz transformations.*

GJSFR-A Classification : *FOR Code: 010505p*

Strictly as per the compliance and regulations of :

Contemporary Problems of Sciences in the View of Unitary Quantum Theory

Leo G. Sapogin [α], V. A. Dzhanibekov [σ] & Yu. A. Ryabov [ρ]

Abstract - The present article discuses the problems of new Unitary Quantum Theory in its applications to the different aspects of the reality. There are spectacular examples of such applications.

Keywords : unitary quantum theory, standard model, quantum electrodynamics, maxwell equations, schrodinger equation, solid state physics, zone theory, semiconductors, tunneling effects, spectrum masses, lorentz transformations.

I. Introduction

It seems that the majority of researches have absolutely forgotten the fact that one of the master spirits of contemporary world, A. Einstein, till the end of his life had not adopted the standard quantum mechanics at all. Better to cite his well-known words: «*Great initial success of the quantum theory could not make me believe in a dice game being the basis of it I do not believe this principal conception being an appropriate foundation for physics as a whole… Physicists think me an old fool, but I am convinced that the future development of physics will go in another direction than heretofore I reject the main idea of modern statistical quantum theory… I' m quite sure that the existing statistical character of modern quantum theory should be ascribed to the fact that that theory operates with incomplete descriptions of physical systems only*. A. Einstein (back translation).

At the first stage of quantum mechanics evolution in the frame of classical physics theory the mechanism of corpuscular-wave dualism was not discovered at all, as it was done later in the UQT [2,3,12-14] It's worth a surprise that the super abstract quantum ideology ad hoc designed by Niles Bohr was suitable in general for the description of quantum reality. An explorer did contradict anything by strictly using new frequently paradoxical quantum rules, and any paradox could be removed by the simple prohibition of its analysis. Although many researches tried to solve these problems they were not successful. The outspoken interpretation of quantum theory had become out of any criticism. More over the determination of simulators describing one of the sides of quantum reality had been announced as the main target of quantum science, while the picture in figures and a-going had become simply an optional target.

Nevertheless one general philosophic problem had been remaining: the dual principles of the fundamental physics. There were particles the points being the source of a field that could not be reduced to the field itself, the researchers did not do their utmost, though. Introduction of this micro-particle had resulted in a wide range of different divergences - anybody knows that electric power of a point charge equals infinity. A lot of ideas had appeared, absolutely brilliant ideas from mathematical point of view, suitable for these appearing infinities abolishing. We can use as a cover the words of P.A. Dirac:"… *most physicists are completely satisfied with the existing situation. They consider relativistic quantum field theory and electrodynamics to be quite perfect theories and it is not necessary to be anxious about the situation. I should say that I do not like that at all, because according to such perfect theory we have to neglect, without any reason, infinities that appear in the equations. It is just mathematical nonsense. Usually in mathematics the value can be rejected only in the case it was too small, but not because it is infinitely big and someone would like to get rid of it.* "Direction in Physics, New York, 1978 (back translation).

The substantial success of the quantum mechanics (particularly in the stationary cases) was based on the simple correlation of de Broglie wave length and geometric properties of potential. Formally the particle was considered as a point; in other case it was difficult to add probability amplitude character to the wave function. But the point-character of a charge as well the principle of Complementarily did not allow to go ahead in the elementary particles structure and thus the further development of the quantum theory of the field in the frames of the assumed paradigm had resulted in total fiasco of the field quantum theory itself.

There is another concept in physics; it comes from W.Clifford, A.Einstein, E.Schrodinger and Louis de Broglie in which the particle is considered as a bunch (wave packet) of a certain unified field. The position of associates of the concept would be expressed the most clearly by the following words of A.Einstein: "*We could therefore regard matter as being constituted by the regions of space in which the field is extremely strong. A*

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thrown stone is, from this point of view, a changing field in which the states of the greatest field intensity travel through space with the velocity of the stone There is no place in this new kind of physics both for the field and the matter, for the Field is the only reality... and the laws of motion would automatically follow from the laws of field." (Back translation). By (M. Jammer, 1961) definition if the particle is a wave packet, so this consideration is called unitary.

The first articles concerning this matter were published in [2,3,6]. The entire term unitary belongs to who has classified quantum wave's theories. The term unitary he correlated with the theories that represent particle as a wave packet. In Unique Quantum Theory a particle is described as a wave packet that in its movement is periodically spreading along the Meta-galaxy and is gathering again. For such moving wave packet both the relativistic and the classical mechanics follow from these unitary quantum equations, probably the Maxwell equations and the gravitation follow from exact UQT equations [7,12-14] but this has not been proved yet being the problem of the future. Nevertheless the UQT scalar equation (a telegraph type) in general makes it possible to obtain not only Schrodinger but also Maxwell equations. But for this purpose for the derivation of the scalar unitary telegraph equation we should assume imaginary the resistance of derivation and shunt conductance that physically is not so clear. The field of investigations of the Unified Unitary Quantum Theory (UUQT) is the most profound level of substance: the level of elementary particles and quantum effects.

As well known all particles have besides corpuscular properties wave properties too (particles can interfere with each other or with themselves), and their behavior is described by means of the wave function. In the case of a particle moved in the free space, the wave function is described as de Broglie plane wave which wavelength is inverse to the momentum of the particle. If the particle is slowing down or accelerating by applied fields then its wavelength is increasing or decreasing, respectively. The wave itself has no physical interpretation, but the squared value of its amplitude is proportional to the probability to find the particle in a defined place. That is why these waves are also called waves of probability or waves of knowledge, etc.

There is another problem: the particle has no exact value for coordinate and for momentum at the same time, although either value could be measured arbitrarily closely (uncertainty relation). That is why the definition of trajectory of a quantum particle has no sense.

As opposed to the laws of the classical physics with its determinism where one can predict results of the motion of separate particles, in the quantum theory one can only predict the probability of the behavior of separate particles. Even the nature does not know the way a particle goes by in the case of diffraction by two slits.

But it is not the most depressing. The Quantum Physics has wave-corpuscle dualism as well as field dualism and matter dualism. All particles act as sources of field, but it appears that they are only points which have no relation to these fields, and one can t tell anything in concrete about them.

Let us continue to confuse the reader. We shall consider an extremely simple experiment with single particles in the terms of the modern quantum theory. It will allow us to understand what is going on and will be useful for us in the future.

Let single photons fall on a semitransparent mirror directed at the angle of 45 degrees to their stream. Semitransparent means that a half of the falling light is reflected and another one passes by. Photon counters are installed on the paths of reflected and passed rays Fig. 1. In the terms of the wave theory everything is simple: an incident wave will be reflected and will be passed partially. But particles as they are indivisible have to be reflected or be passed by. If a counter of reflected beam s particles registers an event it's evidently to suppose that the second counter will register nothing. It is easy to see that if one will re-unite passed and reflected beams and sends them to the screen then...it's all about the way how we are going to argue. From the wave theory there will be an interference pattern, but from the corpuscular theory it will not occur. In fact, an interference pattern is observed in experiments even for single photons, and our suppositions are wrong to say the least. **In order to spare the doubts about how is it possible, it is better to forbid one to think about it.** And the principle of complementarily in the modern physics does it in any case. It allows asking only the questions for which it's possible to give an answer by experimentally only. When one tries to find a particle it means that one rejects to observe the interference pattern and vice versa. As though we could know from experiment either a particle has passed by or has been reflected, we would realize the real particle behavior. But it`s impossible to do by the means of macro-instruments.

The principle of complementarity makes the quantum physics descriptively inaccessible. Eventually we have to admit that the prohibitions of the principle of complementarity respond to the weakness philosophy, and the role of this principle is obviously analogous to the role of a calorie, a phlogiston and other obsolete concepts.

II. Unified Field Theory Approach

Let us ask the questions that are forbidden by the principle of complementarity. What is the wave of an electron? What is the behavior of an electron indeed,

when nobody looks at it? (it`s natural behavior?) How does it manage to go through a potential barrier when its energy is less than the barrier height (tunneling effect)? How does it, as it is indivisible, go simultaneously by two slits which are divided by a great distance in comparison with its own size? What structure has an atom of hydrogen constructed at the lowest energy state (s-state)? How can the probabilistic consideration of a wave function to result from the mathematical formalism of the theory? Why is the actual Quantum Mechanics reversible? This is a primary law, and the irreversibility has to follow from it for dispose the paradoxes in the statistical mechanics. Last but not least: what structure has the electron itself described in the terms of probability? This is a huge complex of mysteries. All (or almost all) physicists resigned and even prefer not to speak about it. But there is also someone who does speak. E. Schrodinger wrote that he *was happy for three months* when he had got the idea to consider the particle as the packet (bunch) of de Broglie waves until the English mathematician Darwin proved that the packet would spread and vanish. But the trouble of all of these attempts (E.Schrodinger, Louis de Broglie, etc) was the fact they always tried to construct it by means of de Broglie waves with such dispersion that any wave packet has to spread. The including of nonlinearity (Louis de Broglie) just extremely complicated the problem but didn`t solve it.

III. Unified Unitary Quantum Theory Interpretation

The critical feature of the Unified Unitary Quantum Theory (UUQT) is the fact that it describes the particle as a bunch (packet) of certain unified field, but not as a *questionable* structure of the de Broglie waves of probability.

For spying upon the particles which we consider as very small bunches of the real field, let us consider a Hypothetic Observer (HO) which is able to measure the parameters of these bunches with the hypothetic microprobe. Dimensions of microprobe are much less than the dimensions of the particles. The result of these measurements will be a certain structure function that describes bunch of the real field. Obviously, this hypothetic HO and microprobe couldn`t exist, but our thought experiments will be as simple as possible.

If we choose the dispersion of these partial waves equal to linear, we could have an extremely curious process, which mathematical formulation used never before. If we have dispersion, then harmonic components of partial waves propagated with different velocities will result in spreading of the wave packet over all space or over all Metgalaxy.

Mathematical investigations show that the spreading goes on without any changes of the form of the wave packet; but at the end, there is a moment when a wave packet vanishes at all. Where does its energy disappear to? It remains in the form of harmonic components that set up a certain background in any point in the space. As these waves are not damped and continue to propagate with velocity of their own, then after a while the wave packet begins to revive in another point, but its sign will be changed at that. During the motion, the packet will appear and disappear periodically. Fig. 2.

The envelope of this process is locus of points, locus of points of its maximum, it is a sinusoidal quantity and it rests in all reference frames; in other words, its phase velocity is equal zero in *any* reference frame, i.e. it's relativistic ally invariant (only by means of it the results of the relativistic dynamics are absolutely correct). If we change a reference frame, we will receive a different value of wavelength of the envelope, but it will be motionless as well. As the computing shows the wavelength of the envelope is exactly equal to de Broglie wavelength, and the dependence of this wavelength on packet velocity is the same! As you see, all the Unified Unitary Quantum Theory is occupied with the resolute exploiting of this basic idea. It should be stressed that this periodical appearing and disappearing of particles doesn`t refer to the Quantum Mechanics, as an immovable packet doesn`t oscillate. The requirement of the relativistic invariance, that would be the main requirement for any theory, specifies the idea further. It states the following: when Lord has excited in space continuum wave packet with his finger and then he has taken it away, then the packet will go on oscillating as a membrane or a string after impact. The frequency ω_S of these free oscillations is very high: it is proportional to the rest energy of the particle and it is equal to the frequency of the so called Schrodinger`s trembling ("zitter-bewegung")

$$\omega_S = \frac{mc^2}{\hbar\gamma},\ \gamma = \sqrt{(1 - v^2/c^2)}$$

Within the motion there arise de Broglie vibrations with frequency $\omega_B = mv^2/\hbar\gamma$ due to dispersion. At small energies $\omega_s >> \omega_B$ and the presence of quick own oscillations has no influence on experiment. So, all quantum phenomena result from de Broglie oscillations. The value of frequency ω_B tends to ω_s with growth of energy and resonance phenomenon appears that results in oscillating amplitude increase and in mass growth. **Thus the well-known graph of particle mass dependence on the velocity Fig.3 approaching to light c velocity constitutes actually a half of usual resonance curve for forced oscillation of harmonic oscillator if energy dissipation is absent.** In the case when $v \to c$, frequency $\omega_B \to \omega_s$

(frequency resonance), $\gamma \to 0$ and the beats appear with difference frequency

$$\omega_d = \omega_s - \omega_B \approx mc^2\gamma/\hbar$$

and particle will obtain absolutely new low-frequency envelop with wave length

$$\wedge = \frac{h}{mc\gamma}$$

This is a new wave. This can be checked experimental in CERN In ultra-relativistic limit much greater as typical dimension of quantum case the value of $\wedge$ becomes system it (new wave) interacts with. Now the length of new wave grows with energy contrary to de Broglie wave length slowly decreasing, and particle requires the form of quasi-stationary wave packet moving in accordance with classical laws.

That explains the success of hydrodynamics fluid theory concerning with numerous particle birth when the packet having extremely big amplitude is able to split into series of packets with smaller amplitudes. But such splitting processes characterize not only high-energy particles. Something like this takes place at small energies also, but overwhelming majority of arising wave packets are under the barrier and so will not be detected. It would be perfect to examine by experiments at future accelerators the appearance of such new wave with the length growing together with energy [2, 3, 14-16,17-19].

If our HO places at the way of motion of the wave packet quite a number of his microprobes, then due to the dispersion spreading s and rebuilding s he can observe the envelope of this process, and all of this will not be at variance to the general Quantum Mechanics, as this envelope corresponds to the wave function.

This figure, i.e. a sinusoidal envelope with a regular shape, can be seen by the HO in the only case: if the only single particle would exist in the world. But the real world consists of an enormous number of particles moving each other with different velocities. The partial waves (harmonic components) of those particles which have vanished at this moment can be summarized and emerge real fluctuations of the field or in other words the vacuum fluctuations that will act in a random manner. These fluctuations could destroy all idyllic character of measurements of our HO (Hypothetic Observer) for single particle in Universe because the sinusoidal envelope will be distorted by vacuum fluctuations and it will be difficult to separate it clearly.

Any wave packet that is described in the terms of the becoming structural function could be decomposed by means of Fourier transforming into plane sinusoidal (partial) waves. These waves are infinitely numerous, and their amplitude is infinitesimal. If we summarize them it will emerge zero everywhere except of the area occupied by the structure function. Thus the structure function could be represented either as a function of time (time representation) or as a function of an amplitude of harmonic components related to frequency (spectral representation). It is absolutely equivalent to mathematical representations. Now there is no necessity in the principle of complementarily that was a very convenient view *ad hoc*. It is easy and clear how the synthesis of corpuscular and wave properties is realized. Corpuscular properties occur due to the localization of a wave packet in a small spatial region. The wave properties of the de Broglie waves can be explained in the following way: when the wave packet approaches to the diffraction system (for example Young s experiment with two slits) then we have an ordinary diffraction of partial waves by splits, and the diffraction pattern of partial waves appears at the screen. HO could observe it with his microprobes. As these packets are not overlapped then everything is linear and the superposition of the partial waves creates a total diffraction pattern modulated by the de Broglie wave, although the plain de Broglie wave doesn`t exist at all. It should be stressed that de Broglie wave is a packets locus of points of maximum in his motion, and it is a superposition of partial waves, that is why it appears in any diffraction and interference experiment. Any wave packet must divide. For example electron split see [32-34].

IV. Quantum Measurements

Let us try to consider real instruments, which are always macroscopic. Atomic nuclei and electron shells are situated very near to each other and form a very numerous, but discrete series. A transition from the one such a state to another is a quantum jump. **That is why the absorption and emitting of energy between the atomic systems is carried out by means of the quanta.** However, it doesn`t mean that in the motion process the quantum or the particle propagates as something constant and indivisible. The energy of the particle can be divided or changed by vacuum fluctuations. The wave packet of a photon, for example, can, in the issue of the overlapping of vacuum fluctuation, turn into meson at short time, and photon can disguise oneself as a proton or as a neutron. It's assumed in the ordinary quantum field theory that a proton has an atmosphere mesons; it follows from the interpretation of the results of its collisions with another particles. There is no mesons atmosphere indeed. A proton appears and disappears during its motion constantly at the de Broglie wavelength, and its mass changes periodically from the double value of a proton s mass to zero, taken on the intermediate values of mesons masses. Eventually, all of the quantum measurements are based on energy absorption and present inconvertible processes [2,3].

For every instrument founded a particle will operate, a quantum of energy is needed at least, thus it is a threshold energy of instrument defining its responsively. By the way, we would like to notice that our HO (Hypothetic Observer) uses the instruments with zero threshold energy that is why it can register even vacuum fluctuations.

Let us consider the process of interaction of a particle with a macro-instrument [4,5]. As the particle is a wave packet then its energy is proportional to the intensity of the packet, but it can be changed because of periodic spreading s and appearances. Besides the packet itself can be divided during the interactions. For macro-instrument could register a particle it has to wait for a moment when the total energy of the particle and of the fluctuation of the atom would be more or equal to threshold energy. It is clear that the probability of the operation of the apparatus will be proportional to the amplitude of the wave packet, or more exactly, to the value of intensity of the envelope of the wave function. If the wave packet with a too low intensity in comparison with threshold energy of the macro-instrument apron-aches to the macro-instrument, the great fluctuation of vacuum is required, but the probability of such an event is too small, and it means that the probability to detect the particle is small too (Fig. 4). The theory of the quantum measurements is developed in the Unified Unitary Quantum Theory (UUQT), and the statistical interpretation follows now from the theory, but not just postulated, as it was before in the conventional quantum theory Universe. **This point of view requires auto-matically that the value of the dispersion of vacuum fluctuations is finite that, in another turn, requires the finiteness of the Universe.**

V. Unitary Quantum Illustrations

The uncertainty relation arises because energy and momentum are not constants, but they periodically change because of the dispersion owing to disappearance and appearance of the particle [12-14,18-22]. Besides because of statistical laws of measurements with macro instruments, there is no any way to measure anything accurately owing to the unpredictable fluctuations of the vacuum. HO (Hypothetic Observer) could predict the coordinate, the momentum or the energy of the packet, if he would be the only one in the Universe, i.e. in the case of absence of the vacuum fluctuations.

The presence of unpredictable vacuum fluctuations makes all of the laws of the micro-world principally statistical for any observer. An accurate prediction of expected events requires an accurate knowledge of the vacuum fluctuation in any moment of time, what is impossible, because it is necessary to have the information on the structure and the behavior of any packet (particle) in the universe and to control their motion. The mechanical determinism of Laplace went absolutely lost in the modern physics as well as in the future one. Maxwell was right when he told; "*the true logic of the universe is calculation of the probabilities*." (Back translation).

The envelope of partial waves, occurring due to linear transformations at the wave packet and being in the ruins of splitting of the packet corresponds to Huygens principle. It explains how the relating of a moving particle with a monochromatic de Broglie wave is formally possible, propagating in the direction of the motion, and with all wave properties. There are partial waves that we consider as participants of diffraction and interference, but due to the principle of superposition we get the same result as if it a de Broglie wave would participate at the process. The new linear equations of the UUQT allow the time inversion with simultaneous replacing of the wave function with a conjugated one, with the formal reversibility. Actually this reversibility takes place just in the case if the Universe consisted of the only one particle, as in the real world the recovering of the previous vacuum fluctuation is also needed for the total reversibility of the process. But there is a simultaneous reversibility of all processes in the Universe required for it that is impossible. It doesn't mean that quantum processes are inconvertible, just the reversibility has a statistical character, but **now direction of the current of time defines entropy only with other hand velocity of any processes determinate gravitational potential.**

The envelope, introduced before, is accurately monochromatic, but it does not exist as a traveling plane wave with such properties in the reality. Though it is related to the energy of the particle, the following definitions, such as waves of the probability, waves of the knowledge, could be related with it too. In contrast to the general quantum theory, now a very important phase is coming. It is the most easy to show it as the tunneling effect.

We would like to mention these established quantum phenomena to the reader. If we have a sufficiently narrow barrier with the height that is bigger than the energy of an incident particle, then it will never go through the barrier in the classical mechanics. In the general quantum theory, the incident wave reflects and passes by partially, and we have a finite quantity of the probability that the particle will be behind the barrier. In these cases the general Quantum Mechanics states that the particle makes a tunnel in the barrier for itself, hiding the method of creation of this tunnel.

Let us listen to what HO says of this process. If a particle is approaching closely to a potential barrier in the phase of an absolute collapse, then it easily goes through the barrier, not interacting with it because of linear of all of equations for the small amplitude of the field. It just appears behind the barrier, without interacting with it, if its width is much less than de Broglie wavelength. And there is no necessity for it to

make a tunnel. However, if it approaches in the phase with the maximal value of the packet, then the particle would be reflected because of the nonlinear interaction of the waves with the field of the barrier.

Now let us return to the experiment with the semitransparent mirror, discussed above. In terms of the described point of view, the wave packet (particle) will be divided at the mirror and enter in every beam, that depends on the packet phase near the mirror and on the structure of the mirror in this place. We have, in general, two not equal wave packets fragments with less values of the amplitude that can interfere. The changing of the parts of the fragments does not follow by because all process are linear, i.e. they are not dependants on amplitude. Besides the probability of detecting of the fragments is reduced, because an appreciable fluctuation of the vacuum is necessary for arising of threshold of detection of the counter. Consequently, in the results of the measurements the particles have to be lost or be observed as single particles in both of the beams simultaneously. The creation of two particles from a single is not a confusing fact, because the energy of the fragments will be reconstructed to the necessary level by means of the vacuum fluctuation.

Note, the statement of Standard Quantum Mechanics a particle may be present simultaneously at many points of quantum world being strange from the common sense and remained earlier without any understanding scientific explanations is correct in principle within bounds of UQT. At present we have an ambiguous situation because too many of such experiments have been carried out, for example the classical experiments of Brown and Twists and the variations of them (Fig. 1). It was found out that frequently both of the counters detect particles simultaneously, that is confirmed by the proposed mechanism. Furthermore, most of such experiments (including experiments with entangled photons) confirm directly this interpretation. The results of experiments with entangled particles become so simple and understanding within bounds of UQT, that the idea to seek some over light mystic relations between particles is fully meaningless.

In consequence, an increasing number of photon pairs is always observed in the beam of light. However, it was found out that we can carry out such experiments which effect remains also in the situation when there is no any way for any induced radiation. If we will collide particles of any kind, and if in the colliding point one or two particles are vanished, then they have to go against another without any interaction. Indeed, in the proton-proton interactions 6% of the particles don't interact, but go through the others. An analogous effect takes place in the atom of hydrogen in the state of minimum of energy. It is well known that this s-state is not rotational, and Bohr-Sommerfeld's atom model describes the spectrum strictly in the relativistic case. If we apply this model to the s-state of the electron, we will obtain that the paths of the electron pass through the nuclear, and they were early excepted as absolutely absurd. Today it is clear that an electron just oscillates along a straight, going through the proton. All this allowed one of the authors to consider the problem of deuteron-deuteron interaction in other respects and to predict the cold fusion [6]. Quantum object is getting classical one with a simultaneous increasing of its mass, i.e. in the case of superposition of a large number of wave packets. The case when all of packets consisting a body will consolidate and spread simultaneously is impossible in physics, as they have different velocities and masses. That is why such a combination seems as a stable and permanent object, moving according to the classical mechanics laws, though every packet is described in terms of the Quantum Mechanics. It looks like all particles in the Universe owe their existence to each other, and itself is just a the **Universe mathematical illusion, a trick.**

In justice to the adherents of the complementarily we have to say the following. They do not retract it, though they have to wriggle, they have to tell that particles always go to the mirror as correlated pairs, and one of them goes through, but the second is reflected. Of course we need to consider the induced radiation effect, when the one atom s radiation is increasing the probability of emitting from another excited atom of the same source, but it does not always happen. Let us return to the principle of complementarily. It is clear, that if we would not be interested in the nature of the particle and consider it just as an indivisible point then the principle of complementarily is correct. It is a very curiously principle and it is amazing how N. Bohr could invent it.

In recent years a numerous of experiments was carried out, which found out superluminal speeds. Not debating if the special theory of relativity is right or not, let us show that in the Unified Unitary Quantum Theory (UUQT) any velocity is possible and the velocity of light is not maximum possible.

Let us consider Euclidean plain space, in which the photon propagates along the *X*-axis. According to the UUQT it is a wave packet and it could be presented as an infinite sum of harmonic components, that exist on the *X*-axis, figuratively speaking, placed at a distance of a million light years ahead and backwards. Now if we place on the *X*-axis arbitrarily far the specially device, creating an anomalistic high dispersion, then the photon could occur at the exit of the device, because the harmonic components shifted each other. The most interesting in this process is that nothing has moved between incident and reconstructed photons at this velocity! With other words, the **conventional definition of the velocity is getting obsolete** [18, 22].

Such experiments were carried out by some teams (in Berkeley, Vienna, Cologne, Florence, etc.) and

they emerged the superluminal speeds. The most interesting were Lijun Wang`s investigations [30] in which the velocity 310 times bigger than the speed of the light (Fig. 5) was found. Wang gives the same interpretation as ours but only for a impulse of light. In this case it is a wrong interpretation, because in the experiment the envelope of the light pulse is not distorted absolutely, but it has to be obligatory, and he notices it amazed. Wang supposes that the special theory of relativity is absolutely destroyed. But it is not quite true.

Our idea that particles are wave packets is an absolutely original idea for the worldwide science. The waves at the Fig. 5 have to be realized as separated partial waves of the spectral decomposition of the wave packets of the separated photons, but not as a spectral decomposition of the light pulse. Then the form of the momentum s envelope will not be distorted. The aspects of the Unitary Quantum Theory are confirmed by results of their practical applications to traditional tasks of physics. The UUQT allows firstly in the international science, not either to compute the electron charge and the fine structure constant (1/137) with the great precision (0.3%) [8,9,29] but even to compute masses of many elementary particles [14-16] with the accuracy of 0.1-0.003%! It's amazing that in the calculated spectrum of masses there is a particle mass about 131.7 GeV that could be called Higgs boson [14-16,24]. The Modern Standard Model and quantum theories of field couldn`t even raise these problems mathematically. It should be stressed than when we will find the spectrum of masses and charges of electron, time won t be a part of the ultimate equations and it will stay Newtonian, in other words, *time exists only in our minds.*

In the Unified Unitary Quantum Theory all interactions and particle production (packet split) are considered as an effect of diffraction of the packets by each other because of the nonlinearity. An analytical solution of these tasks will require new mathematical methods, and it is not even clear how to start with it at presence.

VI. Approximated Equation with the Oscillating Charge

There are such hard rules in the modern theoretical physics. Any new theory has to include classical results. This is strictly satisfied because the Hamilton-Jacobi relativistic equation and Dirac equation follow from the UUQT, i.e. all modern basics of the fundamental quantum science. In the linear equations of the UUQT the mass was replaced by the rest energy divided to square speed of light, and then the system of 32 nonlinear integro-differential equations appears as a consequence. They were firstly found out by L. Sapogin and V. Boichenko [2,3,7] in 1984, and only in 1988 they solved the dimensionless scalar version of this equation that allows to get the fine structure constant 1/137 and electron charge with accuracy 0.3% [7,8,29].

In this approximation of the UUQT, the wave packet is realized as a spatial divided electric charge that oscillates, its equation depends on time, coordinate and velocity and it could work in the rough model of the particle as oscillated charge, so we can exploit the Newton equations. It is becoming easy to see the tunneling effect: while the moving particle is approaching to the potential barrier, in the phase when the charge is extremely small, it is easy for it to go through the barrier, and when the quantity of the charge is large, the repulsion force is increasing, and the particle will be reflected. The numerical solution of these equations [5,14,15,18,19] for the most common quantum tasks emerges approximately the same results as the calculation of the general Quantum Mechanics (QM). By the way, by means of the UUQT it is possible to get this equation from the Schrodinger`s one with very low energies [5,14,15,18,19]. But there are though some interesting differences. The equations of motion of the oscillated charge were not treated in physics before and they have an important difference from the classical laws of motion the invariance of the motion in the relation to invariance translations. ***It means the absence of the great classical momentum and energy conservation laws. They appear in the UUQT and then in the classical mechanics only with an averaging for all particles.***

The consideration of the problems concerning oscillations of particles with an oscillating charge in a parabolic well (harmonic oscillator) besides the common results of QM for stationary states results in two different solutions that are shown on Fig. 6. New amazing solutions appeared, one of them was called "Maternity home" and another was called "Crematorium".

In the first case the energy of the particle can increase indefinitely, furthermore if we proceed from a very low initial quantity in the equation, it results in the increasing of the energy of the particle in the production of the matter, indeed. The second solution could due to collapse (disappear) of the matter-particle. These solutions are logically independent directly, and their appearance depends on initial phase. With other words, one solution describes the matter (energy) production, and another one its collapse; and it may be said that the Unified Unitary Quantum Theory (UUQT) allows describing the creation of the matter and the Universe, but not as a result of the Big Bang. The Universe wouldn`t be given to us in the static form, it arose in some way and it continues to develop, and we could see that one of the basic features is the filling of space by matter.

VII. The Uncertainty Relations

As far as many nonsense have been announced concerning the uncertainty relation we would like to give more detailed of their obtaining first by Wheeze berg then by N. Bohr and of not quite adequate their interpretation. So, Heisenberg derived the uncertainty relation on well-known now way, now called the method of Heisenberg's microscope and based on the analysis of conditions when micro particle's position and motion can be experimentally detected. In principle, the particle's position can be determined by observations of light rays reflected, diffused or emitted by the particle. The particle is considered as a source of light and the results of its observation will be always the diffraction circle with radius equal to the wave length λ of this light rays. So the particle position can be determined with precision of order λ.

The most primitive idea to improve the accuracy of measurements is to use light rays with λ being as small as it is possible. It is possible to use, for example, gamma sources, technical implementation of that idea for the time being is not so important. But at the same time we faces A. Compton effect; in the process of measuring the gamma quantum is scattered by the particle and with it the impulse of the particle will be changed for the value equal $\hbar/\lambda$. It is paradoxical, but, for example, we will get the same result, for example, in the case of atom while being allocated with the help not of scattered light but of light emitted by atom itself. If the light is emitted in the form of quantum $\hbar\omega$, then atom will receive recoil momentum $\hbar/\lambda$, and again the study of atoms position will depend on its velocity changes. In both cases the accuracy of atom position determined with the help of scattered or emitted light equals to the wavelength of the light, and momentum change connected with it will be inversely λ. Increasing the measurements accuracy of particle position, we enlarge the error of definition its momentum. In the result it is impossible to determine the particle momentum at the exact moment of time, when is determined the position of particle since the momentum of particle sharply changes at that very instant. The same considerations would be taken into account at velocity determining also, that resulted in famous Heisenberg relations.

The following philosophical problem appears: is it possible, in principle, to observe any phenomenon without changing it or interfering in it? This problem is no doubt quite old and banal. Anybody agrees that, for example, measuring the electric potential of anybody should to change to a certain degree this potential. Any innovations of that measuring apparatus have dealt mainly with tendency to enlarge voltmeter internal resistance and with unachievable idea to make it equal to infinity. Every experimentalist has learned to take into account such non-ideal characteristics of instruments in the process of measuring. And nobody was thrown into confusion with that.

It was proudly announced at the outset of quantum theory that micro-particle does not have at the same moment of time the exact values of co-ordinate and momentum and their values are connected by relation:

$$\Delta x \cdot \Delta p \geq h \qquad (*)$$

and that statement and that inequality were called as corresponding to nature of micro-worlds objects and quite not caused by lack of appropriate measuring instruments. But the following question may be put: what will happen if within future decades indirect methods possible to use for measuring purposes will be opened? Nowadays even the problem of mass spectrum is infinitely far from solution and nobody can say whether there is or not any indirect methods. Who is able to foreseen the future?

Shortly after another relation was derived, viz. between energy and moment of time, when that energy being measured:

$$\Delta E \cdot \Delta t \geq \hbar$$

That relation appeared in great number of books due to intellectual inertia of some authors. And only much later the investigators made out that such relation does not exist within strict quantum mechanics as well as the following relation

$$t \cdot \hat{H} - \hat{H} \cdot t = i\hbar$$

does not exist.
On the other hand, the operator relation

$$x \cdot \hat{p}_x - \hat{p}_x \cdot x = i\hbar$$

exists and results in uncertainty relation for the coordinate and momentum. To get the uncertainly relation for the energy and time, the energy operator $i\hbar\frac{\partial}{\partial t}$ should be similar to momentum operator $-i\hbar\frac{\partial}{\partial x}$ for p_x. But in reality, according to strict quantum theory, the energy operator $\hat{H}$ is an operational relation for momentum and coordinate operators, i.e.

(*) It is the simplified form of the Heisenberg relation. The strict relation is expressed by the dispersions of the errors $\Delta x, \Delta p$.

$$c\hat{H} \equiv \hat{H}\left(\hat{p}_x, \hat{p}_y, \hat{p}_z, x, y, z\right)$$

So, the energy is within strict quantum theory a quantity having quite definite value at given moment of time, but time t in contrast to coordinates *x,y,z,* is not an operator. That is why the time plays in quantum theory quite special role.

N. Bohr have obtained the same relation after manipulating with wave packets of de Broglie waves (creating a particle from these waves packets), but he had carefully forgotten that these wave packets were spreading. To put it mildly that approach is not quite correct. More over the principle of complementarily offered by Bohr *ad hoc*, forbade the constructing any speculative models of particle's motion. Since that *the main task of the physics became the search of mathematical expressions to be set in one experimental data to obtain the other by computations.* According to it, the lack of picture in images and motions within quantum physics is not the object of anxiety.

We would rehabilitate the strict standard quantum theory and notice once again that, according to it, the uncertainty relation is obtained as the relation between canonically conjugate additional dynamic variables, and we have nothing to say against. In the essence, the corpuscular – wave dualism became the winner. As we can see now, the uncertainty relation is without any doubts valid but methods used *at first* for its obtaining were not totally adequate.

UQT overcomes the situation quite easily. As far as the particle (wave packet) is periodically appearing and vanishing at de Broglie wave length (more precisely, the packet disappears twice, and the probability of its detecting is sufficiently big in maximum region only) the position of such a packet may be detected with error [12-14,18,24]

$$\Delta x \geq \frac{\lambda}{2}$$

and then

$$\Delta x \cdot P \geq \frac{h}{2}.$$

As at measuring of momentum module is inevitable the error $\Delta P = 2P$, then we have following inequality:

$$\Delta x \cdot \Delta P \geq h$$

The statements of standard quantum mechanics that particles do not have a trajectory become more understandable. Of course, there is a lot of truth in those words. First, it is possible to say so about intermittent (dotted) motion of the particle with oscillating charge. Second, any packet (particle) is able during its motion to split into few parts. Each of that parts being summed with vacuum fluctuation may results, in principle, in few new particles. Or *visa versa* the broken particle may vanish at all and contribute to general fluctuating chaos of the vacuum. But in any case it is better to have more clear idea of particle concrete motion than operate with generally accepted nowadays-obscure sentence about lack of trajectory.

If we turn a retrospective look into all philosophic-physical mess dealing with uncertainty relation, it is impossible to throw off the idea that phenomenon of social-scientific idea were predicted by V.I. Lenin in his work "Materialism and empirical criticism" long before quantum mess:

"The really important cognitive-theoretic question, dividing philosophical tendencies, is not a degree of accuracy that our description of causality have achieved and whether these descriptions are expresses in fine mathematical formulation, but *whether objective rule of nature is the source of our knowledge of these connections, or it is the property of our mind, its ability to cognize the known a priory truth inherent to it…"* (Italics is our).

The uncertainty relation is usually used for justification of non-determinism of quantum theory because it makes nonsensical application of Laplace determinism to microcosm phenomena. First of all, uncertainty relation itself has no connection with the question of truth or falsity of determinism because it only reveals the sense of quantum state concept, but neither truth nor falsity of determinism. Second, uncertainty relation really makes nonsensical the application of Palladian determinism to microcosm phenomena. Actually, if there are no definite values of coordinate and momentum, then in this case their simultaneous definite values cannot be predicted in future too. That is a philosophical reason. Physical reason is that random non-foreseen vacuum fluctuations may change both particle's coordinate and momentum and agrees, in essence, with philosophical reason. UQT shows that determinism in physics has not the Laplacian form only and, in general, has not only a form inherent to classical physics.

The whole preceding science was based on classical description of objects without taking into consideration material character of the observation process. In other words it was the description of objects or processes "in itself". Quantum science has assigned some limit of such understanding, and although UQT allows describing hypothetically the behavior of quantum objects in "images and motions" there is now either above mentioned hypothetical researchers or their hypothetical experimental devices, and we will have to be content with experimental data obtained with the help of macro-devices.

The principle of complementarily introduced by N. Bohr cannot be explained so easily as it were in the

case of uncertainty relation, because it is a set of some philosophical discourses with marks of previous years fight between materialism (it was also called Marxism-Leninism) and other philosophical trends. We would like just now isolate ourselves from any politics, because authors do not sympathize politics and philosophical brawls, and tried never to participate in it. Nevertheless, there are objective laws that will not be changed even authors and readers disappear, and politicians declare the collapse of materialism and of the said laws. As UQT is able to show many "intimate" sides of quantum behavior and to give the sufficient interpretation of existing quantum processes, the result is quite simple: materialism is gained.

VIII. The Principle of Complementarity

Let us consider rather in more details the principle of complementarily. It is hard to disjoint it from uncertainty relation. Even the origin of its name came from ordinary mechanics, where operators non-commutating with each other correspond to complementary quantities. As we have seen above the uncertainty relation descends from that also. Nevertheless, it is appeared a lot of philosophical explanations which Bohr even had not suspected of. The principle of complementarily can be stated quite popular as follows:

1. A quantum object is extremely complicated formation, not quite easily understood yet, and its corpuscular and wave characteristics are absolutely unlike and only supplement each other. We can draw rough analogy: maps of Eastern and Western hemispheres, men' photos in full and half face and so on.
2. There are two classes of experimental devices. With the help of ones we can measure the coordinate, the energy and the momentum – the attributes of a particle. With other, while observing the processes of interference or diffraction, one can measure the wavelength. At any measuring (in cases of small energies) particle "is lost" or its parameters change radically in the result of macro situation effect. All that is called as uncontrolled effect that is why it is impossible to measure at the same moment of time corpuscular and wave parameters.
3. We should not ask Nature questions that will not be experimentally answered.
4. It is not necessary to make attempts in constructing the quantum pictures in images and motions as it were within before-quantum science. It is quite enough to be able mathematically to solve and to analyze different quantum equations and to apply the new rules derived within quantum mechanics.

The attitude of Paul Lange in to the last two items was as to something disgusting and he called the principle of complementarily as "intellectual debauchery".

The other numerous statements are based on variants of uncertainty relation.

There were many physical and philosophical discussions about photon behavior at semitransparent mirror (Fig. 1). With the help of complementarily principle it was analyzed in what flux (reflected or penetrated) the photon is located while the interference of penetrated or reflected flux is observed and how it correlate with the number of particles to be appeared in penetrated and reflected fluxes. When the flux of particles falling down on the translucent mirror one after another was observed with big exposition, then the interference picture became visible. It contradicts the fact that the particles was detected either in penetrated or reflected flux, and it is incomprehensible how could the interference picture arise. If the particle remains in reflected flux, then it could not been observed in the passed flux, and it is impossible to understand what and with what would interfere. The observed facts of rare simultaneous signals of two particle counters were explained by random appearance of two photons "nearby", and one of them has penetrated the mirror and the other – has reflected. There were some reasons due to observations of induced radiation (that is the main principle the lasers based on). There were made quite enough different experimental variations at that matter [26-35,]. We should note that they are do not contradict the ideas developed within UQT.

Of course not only the processes of splitting cause the phenomena of interference and diffraction. It was shown in section 2.11 that even indivisible particle described by equation with oscillating charge while spreading is able to show the behavior having seemingly a wave character. All these processes look very knotty.

N. Bohr has offered well-known interpretation of that phenomenon from the principle of complementarily viewpoint. We shall remind it shortly. The particles' flow falling down at the mirror is described by wave function (i.e. by the amplitude of probability). The particle after hitting at translucent mirror is, so to say, in a potency state: the particle may belong to penetrate or to reflected flux, it may be appeared (detected) and maybe not. Namely, that potency is interfering, i.e. possibility of particle's location here or there. These potential possibilities become actual at the finish of object and device interaction only. And though probabilities are referred to potential- possible, i.e. to non-finished experiment, but statistics based on these probabilities is a statistics of realized interactions, i.e. of finished experiments. But if an experimental device would be created being able to follow the destiny of individual particle and to detect to what flux (penetrated or reflected) the particle belong, then the particle would be absorbed or its parameters would be changed at such a

value that we would not be able to speak about its participation in interference process. If this process is studied, then it is impossible without violation of interference process to detect the flux, where the photon is located. Either one thing or another, they cannot exist together.

We should note, - *it is worthy of astonishment that N. Bohr was able to imagine that principle and interpretation, because it turned out that if one follows strictly the prescribed principles and rules, then the right results are obtained and no contradictions arise.* All paradoxes were eliminated by simple prohibition to think about it. It stimulated a great philosophical discussion but physicists did not pay attention at. And they were right since that discussion took the form of some talks resulted in nothing, but orthodox quantum interpretation answered every physical question to be asked within new unusual game rules and served as perfect instrument of knowledge. Nevertheless for any thinking researcher the question whether it true raised always. Why we could not even imagine that particle has exact values of momentum and coordinate and follow it dynamics in details? Why we could not study with any indirect methods the concrete sides of particle motion (as it take place in other sciences)?

There are appeared also absolutely new philosophical problems about "free will" and even about the existence of particles in connection with probability interpretation of wave function. Religion was also admixed due to A.Eddington.

There was quite solitary the question about the cause of quantum mechanics statistical character. In connection with that the words of A.Einstein are quoted especially frequently about his unbelief in "*God is playing cards*". There are so many different speculations about that. But the main is that *statistical interpretation does not belong to quantum mechanics instrument and does not result from it but simply postulates.* That is not so within our UQT and the probability of phenomena appears due to inner content of this theory, and, as we hope, the question about how "*God plays cards*" has disappeared for most part of our readers at the moment of reading these words.

The authors are sure that all additional philosophical quantum-mechanical images of the nature will be crushed down in the nearest future and UQT will gain, and the above mentioned problems will surprise future generation as well as now we are amazed at ancient opinions about three elephants and three whales supporting our Earth. It is astonishing but even these quite naïve ideas had relaxed or rather lulled humanity mind during very long time.

The statements of standard quantum mechanics that particles do not have a trajectory become more understandable. Of course, there is a lot of truth in those words. First, it is possible to say so about intermittent (dotted) motion of the particle with oscillating charge. Second, any packet (particle) is able during its motion to split into few parts. Each of that parts being summed with vacuum fluctuation may results, in principle, in few new particles. Or *visa versa* the broken particle may vanish at all and contribute to general fluctuating chaos of the vacuum. But in any case it is better to have more clear idea of particle concrete motion than operate with generally accepted nowadays-obscure sentence about lack of trajectory.

IX. The New Sources of Energy

As well known, in all experiments the local law of energy conservation (LEC) and the law of conservation of momentum in individual quantum processes are correct only for high-energy states. For low energies we can t claim that, because of the uncertainty relation and the stochastic nature of QM s predictions. That is why the idea of the global, but not of local LEC exists invisibly in the QM and it's not a new one.

For the physics it only means that for the stationary solution with fixed discrete energy levels (the general QM) of the velocity of the particle reflected by a wall is equal to incident one. The UUQT allows to consider another ways too. Thus if the velocity of the particle for every reflection is decreasing then it is corresponding to the crematorium solution, but if it is increasing then it is corresponding to the "Maternity home". What scenario would turn to the reality depends on the initial phase of the wave function and on the energy of the particle. Besides the UUQT is fundamentally inapplicable for closed systems, because such systems are idealizations, which are very useful, but not according to the base of consideration used in the UUQT.

Anyway, the whole modern science, including the Quantum Mechanics (QM), is still based on the great LEC. However, there is a difficult situation in the Quantum Mechanics. It deals with the fact that the LEC follows only from the Newton mechanics. QM generalizes the facts of the classical mechanics including all of its laws, but its results have a sufficiently statistical nature, they are correct only for large amounts of particles. But how do we have to consider single particles, with their individual processes? It appears that for the single particles LEC does not follow from QM (!), thus individual events are absolutely incidental and do not follow this law. **To evade this question it was announced that Quantum Mechanics does not describe individual events (!?)**

Let us discuss a thought experiment. To make our reasons more simple let operate a certain quantum ball-particle. If the ball is approaching to the wall, then its velocity after reflection will always be equal to the incident velocity (here we neglect a quantity of the friction force and consider that the ball and the wall are

perfectly elastic). In the case of the quantum ball the velocity after the reflection would possess the whole arrange of the values, in different experiments under equal conditions. There would be some balls that would be reflected with velocities that are higher and some that are lower than the initial velocity, and some of them with velocities equal to the incident one, and every case would be considered statistical in the terms of the Quantum Mechanics.

Let us answer the following question: what would happen if we place another wall opposite the first, and would try to increase the velocity of the ball after every reflection? Then we would get increasing of energy of the ball without action of any external force. The energetic of the systems in the XXI century will treat the question of constructing of initial conditions for a numerous quantity of particles to realize only the "Maternity home" solution so that the "Crematorium" solution would be damped as far as possible. But it depends on the selection of initial phases and the geometry of the system.

Thus, if we use the ideas of the Unified Unitary Quantum Theory appropriately then does not exist a general prohibition for creating of a quantum perpetuum mobile. Formally there is no such a prohibition even in the general Quantum Mechanics, because there are no conservation laws for a single process under the low energy conditions, but it treats with probabilities instead of this. In other words, the Quantum Mechanics (QM) also offers opportunities for getting energy by collecting of random process someway. It seems that UUQT affords today such an opportunity and suggests the ways how to regulate the values of probabilities.

Together with theoretical investigations the numerous numerical solutions of equations with oscillating charge was performed, momentum of particles falling with different velocities were summarized and the result was compared to momentum of reflected particles. It was found out that for different repulsive potentials, the total momentum of reflected particles is equal to momentum of the falling particles with a high accuracy, but for a single scattering particle the value of momentum could be either less or more than the momentum of the falling particle. This problem is very complicated and it requires subsequent researches as all this depends on initial conditions (velocity, phase, distance) complexly as well.

The prospects following from the UUQT are not even the most significant. Any flat bans as the impossibility of perpetuum mobile creation and any other confirmations of the immovability of conservation laws are unacceptable in philosophy. No, these laws would never be neglected; but there would be such areas in science and technology, very limited in the beginning, so that these laws would be not enough.

The problem of existing of the global conservation laws (we have proved that they are not local laws) is left in abeyance. Nothing but the idleness and atavism of the human thinking lead to it. But this idleness of thinking --concerning the physics-- manifests itself in the intuitive atavism for the Newton laws.

Yes, the conservation laws are incontestable in the classical mechanics and in terms of this theory a continuously operating machine is theoretically impossible. It should be stressed that the conservation laws were transferred to the Quantum Mechanics as an object of worship of the classical mechanics. But the Quantum Mechanics is more fundamental, Newton laws follow from it as a particular case**. And if in the terms of the Quantum Mechanics a possibility to get energy from nothing is theoretically possible, thus a quantum perpetuum mobile could be constructed.**

It is made possible by means of the equation with oscillating charge. It describes single particles; the difference in their behavior depends on the initial phase of the wave function, but there are no conservation laws for an individual particle at all, they appear only after an ensemble averaging. The equation with an oscillating charge is absolutely new type of motion equation [12-14,19]. For such equation energy and impulse conversation laws do not exist. It appears after the ensemble averaging. By the way Schrodinger mechanics also do not propose energy conversation laws for small energies (it can offer only a probability of this or that event happening) but it can not advise how to combine processes and energy liberation while UQT can. A theorem on the circulation does not work in the equation with oscillating charge that allows using different way to move charge from the point *A* to the point *B*, but different ways operations will be diverse and this difference should be used. The authors are trying to design new power plant working at these principles. We think that such a plant will be able to produce energy with extremely small spending of energy. If such power program would be fulfilled on our Planet then it will no doubt result in overheating of the environment. But UQT suggests the solution again: we can construct refrigerating plants which realize the "Crematorium" solution and promote the cooling. Extra heat will disappear. Numerous experiments with the cold nuclear fusion (including the latest of Andrea Rossi - Italy) have shown that nuclear reactions do exist but the nuclear reactions products by themselves are not enough for the explanation of huge amount of heat being produced. It is the responsibility of the UQT solutions Maternity home [12-14,19,21]. So it looks like catalysis mechanism described above. Besides all the equation with oscillating charge is quite good in describing the wave properties of the particle. We predict that experiments on the diffraction reflection of electrons from the lattice (classical experiments of Davisson-Germer) can be simulated by supercomputer, but authors do not have such possibility.

Interestingly enough, there are devices called Testatik Machine M/L Converter from religious group Methernitha. They belong to a religious Christian commune, situated in Linden near Bern. Theirs maker is Swiss physicist Paul Baumann living in the commune. These fantastic devices run as direct current generators, are made as a four dimensions (sizes) type with power value of 0.1, 0.3, 3 and 10 kW. In outward appearance this device resembles an electrostatic machine with Leyden jars, so familiar from school physics laboratory. There are two acrylic discs with 36 narrow sectors of thin aluminium stuck to it. The discs rotate in different directions and their mechanical energy is hundreds times lower that produced energy it accounts for about 100 mW in measurements. The largest device with the power value of 10 kW has disc diameters more than 2 m, and the smallest has 20 cm; the device with the power value of 3 kW has 20 kg in weight. There is no cooling or heating of the air during the long operation of the device, it just smells of ozone there. It was found out that the inventor doesn't clearly understand the principle of operation of the device.

Professor S. Marinov (Austria), whom the commune had given as a present the device with the power value of 100 W wrote in his book called "Difficult way to the truth --documents on the violation of conservation laws", issued in 1989 by International Publishers East-West: "*I can confirm without any doubt that this device is a classical perpetuum mobile. Without any initial impact, it could rotate an unlimited long period of time and generate electrical energy equal to 100 W... In that device, the motor and generator are connected... However, it is not clear how is it possible."* (back translation).

The authors of the Unified Unitary Quantum Theory know approximately how this device is constructed, but in this article we are going to do only what is absolutely clear: we are going to show that the operation of this device completely corresponds with the UUQT. Evidently, it operates due to the charge separation concept. Let us consider two metallic spherical surfaces with a hole isolated from the Earth and from each other. If we carry a first electron from sphere *A* to the inner surface of sphere *B* through the hole by means of an isolated stick, then there appears a potential difference. Further, if we carry the second one and the subsequent electrons, sphere *A* would attract the carried charge, and *B* -would repeal it. It is clear that to move the charge we will have to spend energy. (Fig. 7).

In the Technical University MADI (Moscow) professor V.I. Uchastkin gives lectures on the Unified Unitary Quantum Theory (UUQT) and new energy sources. In his explanations, he uses the figurative analogy: "*Let us consider a sack of potatoes which mass is* m*. If we carried it to the fourth floor (the height is* h*), then we spend the quantity of work opposite to the gravitational field which is equal to* mgh*. And if we throw it down we would get kinetic energy mv2/2, and these quantities would be equal to each other. But we could also carry not the whole sack, but every potato one by one. The work of one quantum of a potato s transfer depends on time, velocity and coordinate, and it must be carried in such way that the spent work would be minimal. If you carry the whole sack in this way, you can get the quantity* mv2/2 > mgh*. So, there are no changes in the system, but the energy has appeared."*

X. Prospects

Let us remember the problem about the maintenance of long-term flights to the outer space with electricity. The Prof. Uchastkin s analogy describes precisely a theoretical approach for solving this problem. Of course, there is a great deal to do though, to understand what phenomenon will play the role of those quantum potatoes and how to construct an instrument that would be able to support a minimal energy to bring them to the fourth floor. How can a spaceship be supplied with energy during many months of flight? Near the Earth, photovoltaic cells are used but the more the distance to the Sun is increasing, the more needless they are; using of a nuclear energy source is problematical for different causes. Today we can neither improve this situation considerably nor do we have even any theoretical conditions which could let us approach it. On the base of such a situation there are common ideas of the construction of matter and its properties. Now then, a new conception of physics is being proposed. Like many others as well. If we stay by the space technology, it's over constructing of engines based on new principles of energy production, maintaining of real-time telecommunication on the distances in outer space, free of limits which are proper to the diffusion of electromagnetic waves It follows from the foregoing that UUQT opens up a perspective of a solution for the communication problem on extremely wide distances in outer space for it excludes the limits of information exchange between Earth and spaceship. The theory also predicts the approaches to creating of the new energy sources and of the new types of engines that would be almost ideal for creating of spaceships of the future.

Conventional jet propulsions transform the conducted energy in the kinetic energy of the beam of a working body flowing from the engine, and the reaction force of this beam the pulling force accelerate the spaceship. Therefore space flights to extremely wide distances will require huge stocks of working body.

A classical progression curve reflects the velocity increasing of a thrown-off mass of the working body. Though there is a possibility for creating of a very weak constant pulling but! without throwing off of mass.

Let us use the method of analogy again. Regard a classical trick problem in physics for

universities admission tests: there is a boat in motionless water and a man with a sandbag in this boat. Can he move the boat by performing any manipulations with the sandbag, for an endless time?

Correct answer: throw the sandbag from the front part of the boat to its back, then carry it back slowly, throw it again and so on. As the viscous friction force by Stocks is proportional to the velocity, the boat will perform swinging motions, over which some linear movement will be applied. Based on this idea, marsch buggies were constructed in Germany--there is heavy mass moving in there, in one direction quickly and back slowly. Many decades ago, the same effect (Dean`s engine) was wide-ragingly discussed in the USSR in popular science magazines and on TV.

There is a similar phenomenon in the classical electrodynamics as well as in the quantum electrodynamics and it's related to the Lorentz radiative friction force. The appearance of Lorentz force becomes evident by considering the interaction of the charge and the field caused by it. For a motionless charge the force of such an interaction or self-action is equal to zero, otherwise the free charge would experience a self-acceleration. The charge begins to move, but the electromagnetic field, as its spread s velocity is finite, can t reschedule immediately. The accelerated charge practically flies onto its own field; with other words, this effect can be described as appearance of energy flow which is directed upstream to the flow and slowing it down. It generates electromagnetic viscosity which value is related to the acceleration.

How can this phenomenon be used? If there is a charge cloud in flat capacitor, it is possible to make it swing between sheets with different values of acceleration forwards and backwards by applying a sawing motion to the sheets. Because of different forces of radiation friction in the alternate and opposite direction, pulling force appears along the lines of electric field. The radiation of such accelerated charges is always perpendicular to their movement and can be screened, but the most important thing on it is the fact that it doesn`t change its impulse in relation to the direction of the capacitor s field. It may be paradoxical, but it seems that we get a pulling force by spending energy for this process without throwing-off of any mass in the direction, which is opposite to the motion s one. The authors even published in the US-magazine Journal of New Energy vol.5, #1, 2000 an article, containing an exact analytical solution of this problem: the pulling of some micrograms appears in a flat capacitor, containing a cloud of 10^{19} electrons in which the distance between the sheets is many meters long, by applying of sawing potential of millions of volts. Of course, it is an insignificant result in relation to such a huge (hypothetical) instrument employment, and the using of electron cloud in a flat capacitor has practically no prospects. But if stabile charged particles exist which mass is at least one millionth of electron mass, then this idea becomes very interesting from the technical point of view. Do such stabile charged leptons exist at all and how is it possible to generate them in a sufficiently large number? Today nobody can give an answer...

To generate pulling it is still possible to throw off the mass/ matter, created potential hole, accelerating in it in the same moment. Generally, UUQT allows such solution that is evident from the "Maternity home" solution.

Let us consider the results. UUQT will in future let us solve several basic problems of the worldwide energy supply and all problems in outer space: immediate information changing, the problem of energy supply and constructing of new engine types. It is absolutely precipitant to make technical plans for those solutions, but the foregoing should be considered not as a wanton imagination, but as a possible future program of fundamental researches to transpose our civilization to new physical principles

The UQT ideas are presented in instinctively absolutely clear picture of quantum events in terms of figures and movements. And philosophical principal of Complementarity can be now retired with well-deserved honors. In spite of mathematical complexity, the UQT delivers the physics from ordinary Quantum Mechanics paradoxes and consequently frank words of Richard Feynman:"*I can easily say that nobody understands quantum mechanics"* will become the property of history.

Moreover, it became possible:

1. To obtain after solving some QUT equations an electron charge with the high precision,
2. To obtain after solving the scalar telegraph equation the mass spectrum of numerous elementary particles with appropriate precision the mass spectrums of numerous elementary particles [14,15,17]. The same spectrum was followed from the solutions of the Schroedinger equation and Klein –Gordon integro-differential equations.

The risk of computed mass spectrum being random is less than 10^{-60}. Of course such results cannot be obtained without sacrifice. What would be offered in sacrifice if Ordinary Quantum Mechanics is replaced by the Unitary Unified Quantum Field Theory (UUQFT):

1. There are no in UUQFT strict principles of superposition. It is violated if wave packets are colliding.
2. There are no strict close systems in UUQF and the Conservation Laws works or very energies only. Note that the Conservation Laws forbid beginnings of the Universe.

3. The classical relativistic relation between energy and impulses is valid in UUQFT only after averaging of observed phenomena and Relativistic Invariance itself is not "the sacred cow".
4. The Space in UUQFT is not homogenous and not isotropic.
5. The particles and their interaction are not local.
6. The existing Standard Model Quantum Theory of Elementary Particles requires much alteration.
7. The velocity concept as quotient from division of the traversed path to sometime interval is not quite appropriate in UQT. If a wave packet (particle) is spreading along the Mega galaxy and then appearing somewhere else, what should we do with the rate, if nothing moves between the points of disappearance and arrival, does it mean that particle has just simply disappeared and then appeared in a new place?

There was observed resembling crushing defeat of physics 50 years ago as "weak interaction" burst, so to say, into physics.

As soon UQT is nonlinear it automatically combines all four interactions that can pass from one into another distance.

Below we analyze the most important fields of science from UUQFT general physics positions.

XI. Lorentz Transformations

It's quite complicated. The special relativity is in fact Lorentz transformations (1904) derived by V.Vogt (1887) in the century before last. These transformations followed from the properties of Maxwell equations which are also proposed in the nineteenth century (1873). One of these equations connecting electrostatic field divergence and electric charge (Gauss' law of flux), in fact is just another mathematical notation of Coulomb's law for point charges.

But today anybody knows that Coulomb s law is valid for fixed point charges only. If charges are frequently moving Coulomb s law is not performed. Besides anybody knows that lasers beams are scattered in vacuum one over another, which is absolutely impossible in Maxwell equations. That means that Maxwell equations are approximate - and for the moving point charges experimental results essentially differs from the estimated ones in the case charges areas are overlapping. Few people think about the shocking nonsense of presenting in any course of physics of point charge electric field in the form of a certain sun with field lines symmetrically coming from the point. But electric field is a vector, and what for is it directed? The total sum of such vectors is null, is n`t it?

There are no attempts to talk about, but such idealization is not correct. We should note that Sir Isaac Newton did not used term of a point charge at all, but it's ridiculous to think that such simple idea had not come to him! As for Einstein, he considered *electron is a stranger in electrodynamics*. Maxwell equations are not ultimate truth and so we should forget, disavow the common statement about relativist invariance requirement being obligatory permission for any future theory.

To reassure severe critics we should note that UQT is relativistic invariant, it allows to obtain correct correlation between an energy and impulse, mass increases with a rate, as for relativistic invariance just follow of the fact that the envelope of moving packet is quiet in any (including non-inertial) reference systems. To be honest we should note that subwaves the particles consist of are relativistic abnormal, at the same time envelope of our wave packet being immovable in all coordinate-systems corresponds to of Lorentz transformations.

The success of Maxwell equations in description of the prior-quantum view of world was very impressing. Its correlation of the classical mechanics in forms of requirement to correspond Lorentz transformations was perfectly confirmed by the experiments that all these had resulted in unreasoned statement of Maxwell equations being an ultimate truth ther reasons for this were later very carefully investigated by a disciple of one of the authors (L.S.), Professor Yu.L.Ratis. (S.Korolev Samara State Aero-Space University), who has formulated the modern spinor quantum electrodynamics from the UQT point of view:

1. Maxwell equations contain constant *c,* which is interpreted as phase velocity of a plane electromagnetic wave in the vacuum.
2. Michelson and Morley have never measured the dependence of the velocity of a plane electromagnetic wave in the vacuum on the reference system velocity as soon plane waves were mathematical abstraction and it was impossible to analyze their properties in the laboratory experiment in principle.
3. Electromagnetic waves cannot exist in vacuum by definition. A spatial domain where an electro-magnetic wave is spreading is no longer a vacuum. Once electromagnetic field arises in some spatial region at the same moment such domain acquires new characteristic it became a material media. And such media possesses special material attributes including power and impulse.
4. Since electromagnetic wave while coming through the abstract vacuum (the mathematical vacuum) transforms it in a material media (physical vacuum) it will interact with this media.
5. The result of the electromagnetic wave and physical vacuum interaction are compact wave packets, called photons.

6. The group velocity of the wave packet (photon) spreading in the media with the normal dispersion is always less its phase velocity.

All abovementioned allows making unambiguous conclusion: *the main difficulties of the modern relativistic quantum theory of the field arise from deeply fallacious presuppositions in its base. The reason for this tragic global error was a tripe substitution of ideas--velocity of electromagnetic wave packets' c' being obtained in numerous experiments physics was adopted as constant' c' appearing in Maxwell equations and Lorentz transformations. Such blind admiration of Maxwell and Einstein geniuses (authors in no case do not doubt in the genius of these persons) had led XX century physics up a blind alley. The way out was in the necessity of revision of the entire fundamental postulates underlying the modern physics.* Exactly that was done by UUQFT [12-14,18, 22].

Some time ago CERN has conducted repeated experiments of the neutrino velocity measurement that appeared to be higher than velocity of the light. For UUQFT they were like a balm into the wounds. The administration of CERN renounced after sometimes these results considering them as the consequence of experimental errors. As far as the authors know, not all participants of this experiment agree to such renouncing. Besides, many astronomers detect superluminal velocities during observations of stars and galaxies. In fact the movements in excess of the light velocity were discovered earlier by numerous groups of researches. Nearly everybody disbelieved it. And now the neutrino movements exceeding the velocity of the light were disclosed in CERN. The importance of these experiments for UUQFT is settled in the article [22] where at the page 69 it is written that *this should be considered as direct experimental proof of UUQFT principle.*

Note, this question is terribly complicate and probably is to be leaved to next generations. From one side, the time in UQT exists, so to say, in our head only. From other side, the Lorenz Transformations describe correctly some experimental facts, for example, the mass growing with velocity. Otherwise, all atomic accelerators would be out of order. Thereafter, it is a big mistake to consider all Special Relativity Theory as erroneous.

There are also other ideas. For example, at «New Relativistic Paradoxes and Open Questions», by Florentin Smarandache, shows several paradoxes, inconsistencies, contradictions, and anomalies in the Theory of Relativity. According to the author, not all physical laws are the same in all inertial reference frames, and he gives several counter-examples. He also supports superluminal speeds, and he considers that the speed of light in vacuum is variable depending on the moving reference frame. The author explains that the red shift and blue shift are not entirely due to the Doppler Effect, but also to the medium composition (i.e. its physical elements, fields, density, heterogeneity, properties, etc.). Professor Smarandache considers that the space is not curved and the light near massive cosmic bodies bends not because of the gravity only as the General Theory of Relativity asserts (Gravitational Lensing), but because of the Medium Lensing [27,35].

In order to make the distinction between clock and time, he suggests a first experiment with a different clock type for the GPS clocks, for proving that the resulted dilation and contraction factors are different from those obtained with the cesium atomic clock; and a second experiment with different medium compositions for proving that different degrees of red shifts/blu shifts would result. To regret, the authors today have no decisive position to these complicate questions.

XII. Standard Model

As soon relativistic invariance underlies every of the numerous quantum theories of the field, it leaves a devilish imprint at everything. Nevertheless relativistic ratio between energy and impulse although being absolutely correct in fact are not obligatory follow from relativistic invariance only and can result from another mathematical reasons that will be discovered in future. Nowadays Standard Model (SM) contains the most elegant mathematical miracles of researches which hands were tied with relativistic strait-jacket and it not so bad describes these experimental data. Amazing that it was possible to think it out at all.

Nowadays to confirm SM one should find a Higgs boson and for this purpose the governments of some countries assigned essential sums for the construction of Large Hadron Collider (LHC). For entire SM the interaction with Higgs field is extremely important, as soon without such a field other particles just will not have mass at all, and that till lead into the theory destruction.

To start with we should note that the Higgs field is material and can be identified with media (aether) as it was in former centuries. But SM authors as well as modern physics have carefully forgotten about it. We would not like to raise here once again the old discussion about it. It's a quite complicated problem and let us leaves it to the next generation.

But another problem of SM has never mentioned before: in the interaction with Higgs field any particle obtains mass. As for Higgs boson itself, it is totally falling out of this universal for every particle mechanism of mass generation! And that is not a mere trifle, such mismatching being fundamental fraught with certain consequences for SM.

After Higgs boson discovery nothing valuable for the world will happen except an immense banquet.

Of course boson will justify the waste of tens billions of Euros. But even now some opinions in CERN are expressed that probably boson non-disclosure will reveal a series of new breath-taking prospects and where were these voices before construction, we wonder? But that's not the point! If this elusive particle were the only weakness of SM!

To our regret today this theory cannot compute correctly the masses of elementary particles including the mass of Higgs boson. More worse, that SM contains from 20 to 60 adjusting arbitrary! - parameters (there are different versions of SM). SM does not have theoretically proved algorithm for spectrum mass computation and no ideas how to do it!

All these bear strong resemblance to the situation with Ptolemaic models of Solar system before appearance of Kepler s laws and Newton s mechanics. These earth-centered models of the planets movement in Solar system had required at first introduction of so called epicycles specially selected for the coordination of theoretical forecasts and observations. Its description of planets positions was quite good; but later to increase the forecasts accuracy it had required another many additional epicycles. Good mathematicians know that epicycles are in fact analogues of Fourier coefficients in moment decomposition in accordance with Kepler`s laws; so by adding epicycles the accuracy of the Ptolemaic model can be increased too. However that does not mean that the Ptolemaic model is adequately describing the reality. Quite the contrary…

The Unitary Quantum Theory allowed computing the mass spectrum of elementary particles without any adjusting parameters. By the way computed spectrum [14-17] has particle with mass 131.51711 GeV (L=2, m=2). Once desired it can be called Higgs boson, it lies within declared by the CERN+ Tevatron mass interval 125-140 GeV expected to contain Higgs boson. CERN promises to obtain more precise mass value by December 2012.

Note the following remarkable fact: the standard theory allowed to detect spectra by using always the quantum equations with outer potential and as corollaries to geometric relations between de Broglie wave s length and characteristic dimension of potential function. The quantum equations of our theory do not contain the outer potential and describe a particle in empty free space; the mass quantization arises owing to the delicate balance of dispersion and non-linearity which provides the stability of some wave packets number. It is the first case when spectra are detected by using the quantum equations without outer potential.

XIII. Nuclear Physics

Nuclear physics as a part of quantum theory is very luckless. Thus the potential of the strong interactions is so complicated that no one even very bulky and intricate mathematical expression is able to describe with more or less veracity the experiments of two nucleons interaction. This interaction depends in very complicated manner from all parameters of the nucleons movement and their orientation towards vectors of velocity, acceleration, spin, magnetic movement, etc. Scarcely one can find a parameter which practice interaction does not depend on. From UQT point of view the strong interactions appear in the result of nucleons represented by the wave packets overlapping. Today the way of mathematical notation of the overlapping wave packets interaction is absolutely vague as soon nonlinear interaction in any space-time point of the waves is different due to different amplitudes.

It's a really complicated problem as soon there is only one nonlinear mathematical problem existing for each space-time point and even with the intuitive clearance of situation we do not expects its soon solution. The complete understanding of the nuclear structure hardly can be expected in the soonest time without exact expression for the potential of the strong interaction.

In general it should be noted that quantum world looks more clear and simple in UQT than in the general quantum mechanics, but we cannot repeat it while speaking about the mathematics used. The appearance of the exact analytical solution of the scalar problem of elementary particles mass spectrum can be considered as Fate gift (or God s help) for UQT. By the way the standard Schrodinger quantum mechanics has the same gift -- the exact analytical solution of the Hydrogen atoms equation.

The nuclear process at small energies should be reviewed. Today the strict nuclear physics does not assume nuclear reactions at small energies and that contradict experimental data. Here we should also note our skepticism towards the idea of nuclear fusion in Tokomaks, we consider this way as hopeless. To justify these experiments we have to mention that the solution was obtained in the absentia of other ideas and under the great pressure of the future power problems. But the use of the reactions of classical cold fusion for the power output is also difficult due to the complexity of colliding nuclei phasing. This phenomenon is well described by the equation with oscillating charge, while the cold nuclear fusion had been predicted in UQT 6 years before its real discovery [6].

XIV. Solid State Physics

The band theory of solid is based at the point on the solution of the problem of an electron movement in the field of two or more charges. But this problem does not have analytical solution jet, in practice a speculative quality solution is used only. The results are that electrons in the solid have quite specific allowed

power bands. This field of the science is very successful and hardly will be revised. Any solution of the equations with the oscillating charge for the electron moving in the field of few nuclei also result in appearance of allowed and forbidden bands [12-14,19]. Somewhat apart is classical tunneling effect. In UQT the probability of tunneling effect appearance depends on the phase of the wave function (in contrast to the ordinary quantum theory, where at the squaring of the wave function module it dependence on the wave phase totally disappears). It could be interesting to prove such dependence by the experiments. It can be easily done if creating a new transistor on the basis of absolutely new principle of the electron current control [20].

We are not going to analyze the modern theory of superconductivity, but we are sure that the equation with oscillating charge will deepen on both understanding of superconductivity as well as mysterious properties of quantum liquids.

XV. Astrophysics and Cosmology

The authors regret not being in sympathized with the ideas of the Universe origin from one singular point. The most amazing in this theory is a detailed computation of events occurred in the first fractions of the second just after the Big Bang. Today when the fundamental physics is making only first shy steps towards the real understanding of the quantum processes we still do not have clear model of the particles, or understanding of a spin appearance, a charge and magnetic moments. According to UQT the processes of the multiple particle production at collision is a common result of the waves packets of big amplitudes diffraction in periodic structures one another, as for the multiple outgoing in different directions particles they correspond to the general diffraction maximums. But we do not assume the responsibility of the mechanism of the multiple particles production for the Universe appearance. To our opinion the complete understanding of the quantum world will arise only after solving of 32 nonlinear integral-differential equations of UQT [7, 8, 12-14]. To their regret the authors are not able to solve like castrates in a harem can only look at.

And many cosmologists would like to use theories assuming existence Universe localities where the energy is coming into being and also other localities where the energy annihilates. For example, British astronomer Fred Hoyle has developed the theory of Universe where it takes the place the continuous creation of matter. He wrote*: "Different atoms constituting the matter do not exist at some given moment of time and then after instant they exist already. I must admit this idea may look as strange But all our ideas about creation are strange. According to previous theories the whole quantity of matter in Universe was coming into being just as whole and all process of creation looks as super-gigantic instant explosion. As for me, such idea seems much stranger, than idea of continuous creation".* F.Hoyle, La nature de l Universe, - 1952. The official astronomical science does not accept the ideas of F.Hoyle and of some other astronomers (H.Bondi, T.Gold, and P.Jordan) about continuous creation of matter in Universe because the Conservation Laws are considered as infallible. But from the viewpoint of our UQT these ideas are quite not strange.

Our real world continuum consists of an enormous quantity of particles moving with different velocities. Partial waves of the postulated vanishing particles create real vacuum fluctuations that change in a very random way. Certain particles randomly appear in such a system, owing to the harmonic component energy of other vanished particles. The number of such dependant particles changes, though; they suddenly appear and vanish forever, as the probability of their reappearance is negligibly small, and so we do expect that all particles are indebted to each other for their existence. Yet, if some particles are disappearing within an object, other particles are arising at the same moment in that object due to the contribution of those vanishing particles harmonic components and vice versa. The simultaneous presence of all of the particles within one discrete macroscopic object is unreal. Some constituent particles vanish within the object while others appear. In general, a mass object is extant overall, but is not instantaneously substantive and merely a false image. It is clear that the number of particles according to such a theory is inconstant and all their ongoing processes are random, and their probability analysis will remain always on the agenda of future research.

In accordance with UQT there are another solutions for the quantum harmonic oscillator besides stationary, where the given tiny incipient fluctuation is growing, gaining power and finally becoming a particle. It is so called "Maternity Home" solution. There are also other solutions where substance (power) is disappearing. Such solutions have been called "Crematorium". *May be Metgalaxy is simply entangled in searching the balance, is no` t it?* All this allows expecting that space continuum in the centers of Galaxies produces different particles, electrons, protons, neutrons, which are the sources of light atoms. Later thanks to the gravitation light atoms are transformed into gas nebulas where under gravity compression the stars are lighting. It's quite possible that the current theory of Stars evolution is correct in general while describing (via Supernova) the production of other atoms apart Hydrogen and Carbon the planets consist of. We do not think nuclear process at small energies (which are possible in UQT, but impossible in standard quantum theory) will essentially modify evolutionary view of the Galaxies development.

It is interesting that the state with the minimum quantum values L=0,m=0 belongs to the very heavy neutral scalar particle (WIMP) with our name "Dzhan" and mass about 69.6 TeV, which in principle should purely interact with the others [14,15-17]. With the growth of the quantum numbers the mass of the particle is diminishing. So there should be a lot of "Dzhan"-particles due to the small quantum numbers. And probably their existence is responsible for the dark matter in general, in accordance with some evaluations Metagalaxy consist of up to 80-90% of the dark matter.

XVI. Gravitational Theory

It seems Gravitational theory should follow from 32 nonlinear integro-differential equations of UQT and the authors are expecting that it can be done in future [7,12-14]. Nevertheless we will make now some conservative assertions. The current data regarding the Universe expansion can be interpreted as the change of the gravitational potential sign (gravity is replacing by repulsion) at great distances for the great masses. Probably the difference between absolute the values of electric charge of a proton and a electron, say in 15-20 signs, is responsible for his phenomena, but for us this idea is extremely unsympathetic.

Gravitational interaction remains an extraordinary mysterious appearance in UQT as actually it has a very high speed of interactions distribution and approximately is in 10^{40} times weaker than electromagnetic interactions. The origin of such an enormously big number remains the greatest riddle.

On the other hand if any particle is a package of partial waves of some uniform field, probably is possible a following curious phenomenon which was observed and described by us more than once earlier [12-14,22]. If to put a ditch with the substance having abnormal dispersion on a way of the wave package moving in flat Euclidean space, the package after ditches can appear even if it is situated at distance of many light years from a package as formally mathematically harmonious components exist on all infinite rectilinear coordinate of package movement as ahead of it, and behind. Thus the package can disappear in that place where it was, and to appear at huge distances ahead of a package, or behind. Thus the package didn't move at all between points of disappearance and new appearance, and the normal idea of speed in the unitary quantum theory loses its initial meaning. Similar teleportation was observed oftentimes. Probably, it is actually a long-range action, (couplage à longue distance) observed in gravitation. A curious though appears that the waves building a package, could be connected with gravitation and all particles consists of a gravitational field. Then *this field can be a stage or a scene where all other processes with final speeds of interaction transfer are played.* It will allow connecting the quantum theory and the gravitation theory which while aren't connected yet today in the future. But it is a task for the future generations.

At the same time according to the processed information (Hlistunov at all [31]) from Russian Command-and-Measuring Complex for the monitoring and control of the space objects at the entire moment of collision geodesic satellites Tope -Poseidon and GEO_IK began swaying at their orbits. Normally the orbit of a geodesic satellite lies inside the tube with about 1 km diameter and the orbit can be control with the high accuracy not more than one meter precision for the position data and centimeters per second for velocity. During the collision the sensors registered 5-8 times increase of the trajectory tube diameter. In the same article Hlistunov at all on the basis of correlation analysis of the position data measurements and information obtained from earthquake-detection station it was shown that the waves of gravitational potential variation were the trigger for earthquakes. To the authors regret they do not have the similar information from NASA.

XVII. Chemical Catalysis

The process of chemical catalysis and the catalysts are the great mystery of the modern science. The number of chemical catalysis theories equals the number of chemical catalytic processes. Specialist of chemical catalysis used to think that this or that reaction is not being processed only if a special catalyst has not been found. Even Michael Faraday studied these problems. He seems to say platinum black being the universal catalyst. Only this (while platinum practically does not react with anything) immediately suggests an idea that chemical processes are not enabled at all and we should look for the physical universal mechanism of reactions.

The UQT has such a process. The details are listed in the articles [14,15,17,21]. The universal mechanism of heterogeneous catalysis for example in Ammonia synthesis consists of the following: Nitrogen molecule falls into a cavity (hole) of the catalyst few tens of Angstrom unit size. At some initial moment the molecule starts oscillating with an energy augmentation implementing thus solution Maternity home like in a normal potential well. If the augmented energy excesses the binding energy of molecule Nitrogen then atomic Nitrogen at the exit from the cavity will be caught by protons (Hydrogen), form Ammonia and then quit the game and free cavity for the new deeds.

We are sure that in such a way water can be decomposed for Oxygen and Hydrogen. At normal conditions the mixture of Oxygen and Hydrogen is stable. In other words two stable substances (water and gas mixture) are simply divided by a high energy barrier, that can be overcome (tunneling effect analogue) by using the exact catalyst and the UQT ideas. For today a

lot of experiments of water decompositions are known, the energy evolved in the process of hydrogen combustion is ten times higher than necessary for decomposition. It makes possible to construct an water-engine for autos.

XVIII. Conclusion

It would be appropriate to mention one more statement of one of quantum theory founders (quite disavowing this theory, but almost unknown – why? – among broad scientific community): *"There are many experiments that we are just not able to explain if we don't consider the waves as namely waves exerting its influence upon all region, where they spread, and assume the location of these waves being "possibly here, possibly there according to probabilistic viewpoint".* E. Schrödinger, Brit.J.Philos.Sci, vol.3, page 233, section 11, 1952, (back translation).

In conclusion it would be relevant to mention that Louis de Broglie predicted this discovery: *"Those who say that new interpretation is not necessary I would like to note that new interpretation may have more deep roots and such theory in the long run will be able to explain wave-particle dualism, but that explanation will not be received either from abstract formalism, modern nowadays, or from vague notion of supplementary. But I think that the highest aim of the science is always to understand. The history of the science shows if any time somebody succeeded in deeper understanding of physical phenomena class, new phenomena and applications appeared. Hope that many researchers will study that enthralling question casting aside preconceived opinions and not overestimating the importance of mathematical formalism, whatever beautiful and essential it was, because that may result in loss of deep physical sense of phenomena"* Louis de Broglie, Compt. Rend, 258, 6345, 1964, (back translation).

The offered outline of unitary quantum mechanics for a single particle from the position of unified field is rather simple and obvious from hypothetical observer's point of view. If a hypothetical observer usually can measure the value of the wave function amplitude, we cannot do it at all. We have to be satisfied with its probability interpretation keeping in mind that rather very simple mechanism is hidden behind and this mechanism open the way for explanation of quality transformations of quantum phenomena, and allows to reduce the description of the whole nature to description of some united field, and the continuous transformations of that field show the astonishing variety of phenomena being under observation.

Now the UQT is the new Quantum Image of the World. It is a realized the Unitary Program formulated at first by William Clifford, Louis de Broglie and Erwin Schrödinger and later declared by Albert Einstein. William Clifford (1870) wrote (back translation): *"I have no doubts about the following: small parts of space are similar in their nature to irregularities on a surface which, on the average, is flat. The quality of being curved and deformed continuously passes from one part of space to another like the phenomenon that we call the movement of matter, ethereal or corporeal. In the real physical world nothing happens except these variations, which is probably in compliance with the continuity law."*

Now we have an abstract base as some unified field only. Any particle is represented as a cluster or a wave packet formatted inside this field. And we have intuitively intelligible explanation of the wave-corpuscular dualism, clearing up mechanisms of tunnel effect, of uncertainty relation, of cold nuclear fusion, of electron's division, of chemical catalysis, photon entanglement, teleportation etc.

In essence, our theory UQT discovered new world properties and new theoretical possibility of the radical transformation of the civilization.

Let us to remind of the prophetical words of the famous US science-fiction author Arthur Clarke: *Something that is theoretically possible will be achieved practically independent of technical difficulties. It's enough to desire it.* (back translation)- Profiles of the Future, 1963.

XIX. Acknowledgement

The authors thank for discussions to professors V.A.Boichenko, A.S.Bogomolv, V.V.Graboshnikov, P.I.Pospelov, V.M.Prihod'ko, Yu.P.Savin, V.I.Uchastkin.

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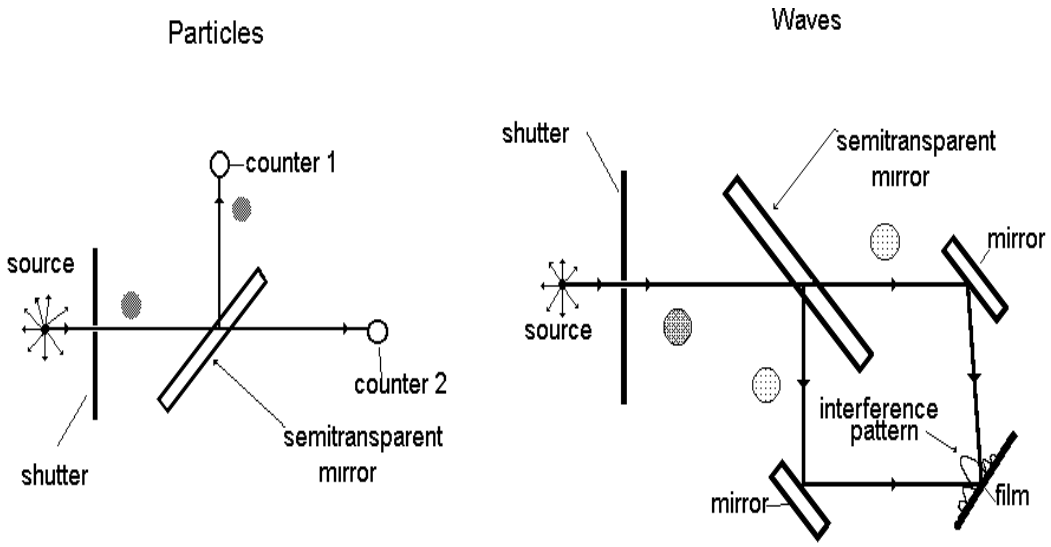

Figure 1 : Experiments with individual photons on semitransparent mirror

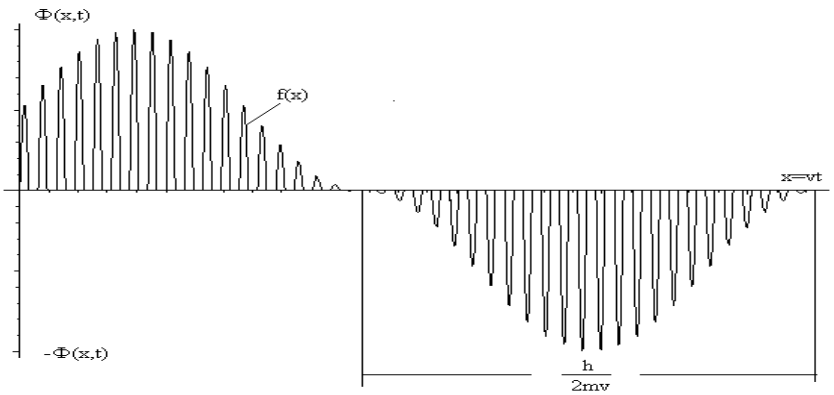

Figure 2 : Behaviour of wave packet in linear dispersion medium
(i.e., rather like a series of stroboscopic photographs)

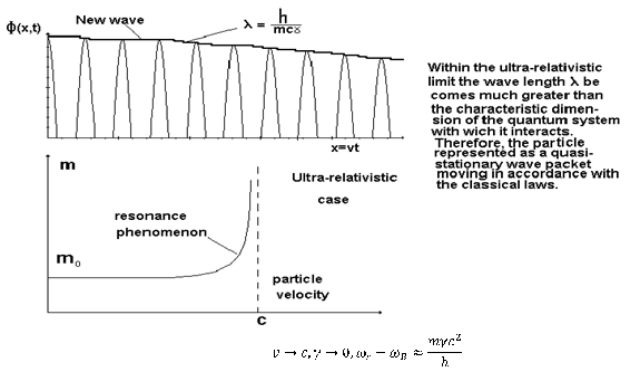

Figure 3

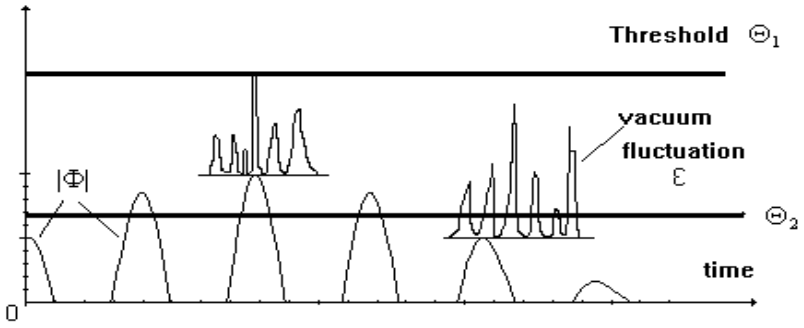

Figure 4

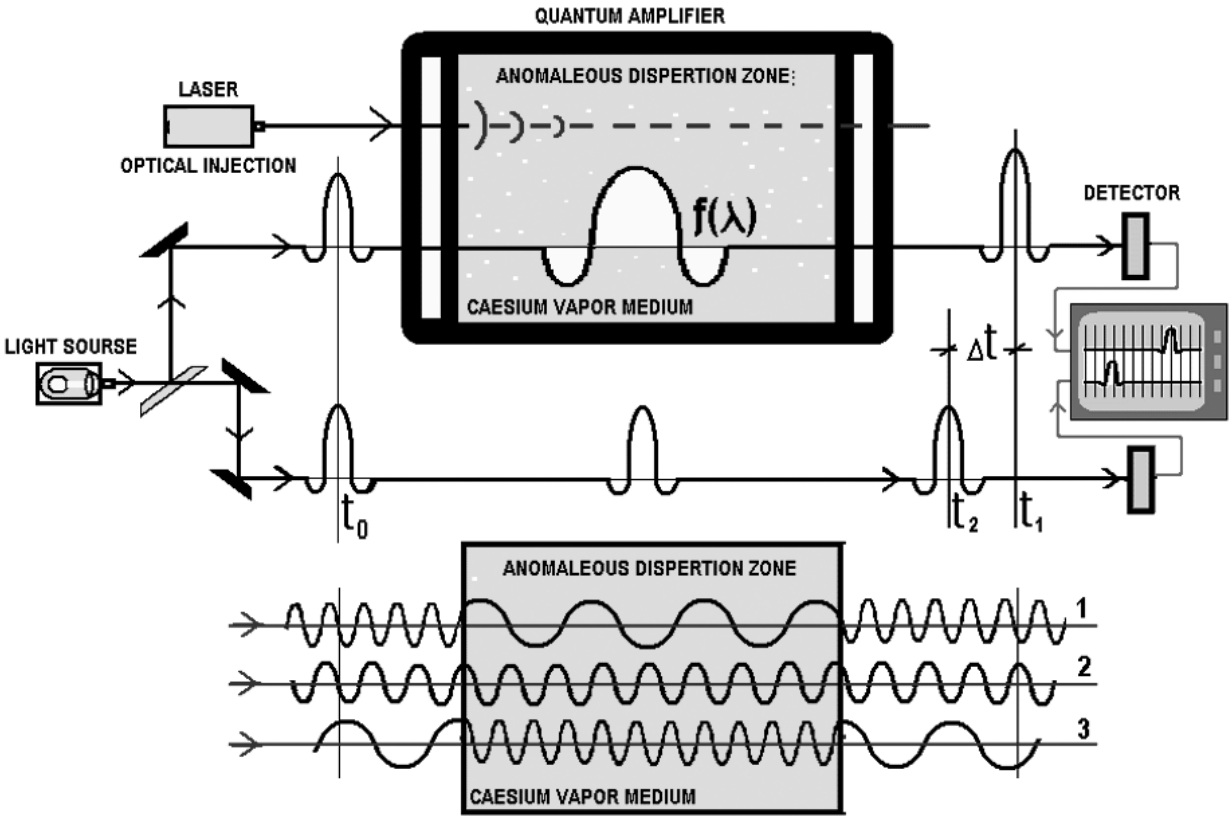

Figure 5 : Experiments of L.Wang - superluminal light propagation

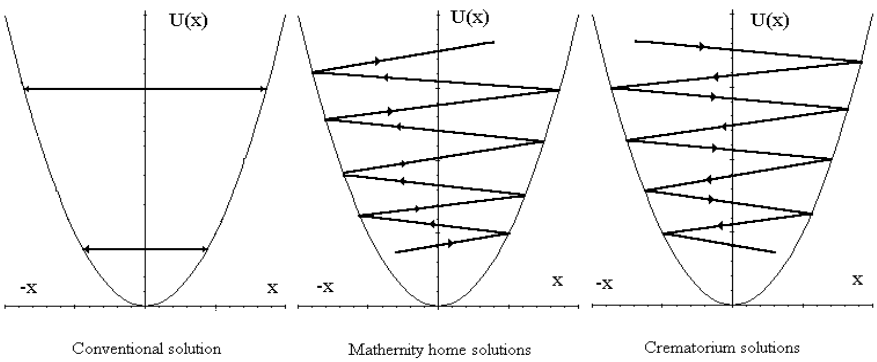

Figure 6

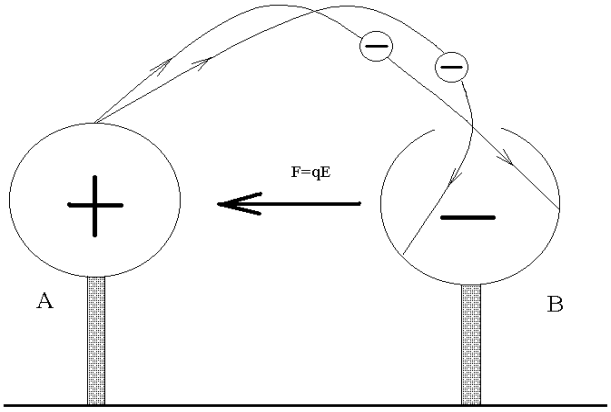

Figure 7 : Work for transferring the charge depends on the mode of transferring and on the path

Global Journal of Science Frontier Research
Physics and Space Science
Volume 13 Issue 5 Version 1.0 Year 2013
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Bianchi Type-I Universe with Wet Dark Fluid in Scalar-Tensor Theory of Gravitation

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Abstract - Field equations in the presence of wet dark fluid are obtained in Saez-Ballester theory using Bianchi type-I space-time. A new equation of state for the dark energy component of the Universe has been used. It is modeled on the equation of state $p = \gamma(\rho - \rho_*)$ which can describe a liquid for example water. The exact solutions are obtained in quadrature form. The solution for both power-law and exponential forms are studied. The physical and geometrical properties of the model are also studied.

Keywords : *Bianchi type-I universe, Saez- Ballester theory, wet dark fluid.*

GJSFR-A Classification : *FOR Code: 010505p, 260201*

Strictly as per the compliance and regulations of :

Bianchi Type-I Universe with Wet Dark Fluid in Scalar-Tensor Theory of Gravitation

V R Chirde [α] & P N Rahate [σ]

Abstract - Field equations in the presence of wet dark fluid are obtained in Saez-Ballester theory using Bianchi type-I space-time. A new equation of state for the dark energy component of the Universe has been used. It is modeled on the equation of state $p = \gamma(\rho - \rho_*)$ which can describe a liquid for example water. The exact solutions are obtained in quadrature form. The solution for both power-law and exponential forms are studied. The physical and geometrical properties of the model are also studied.

Keywords : Bianchi type-I universe, Saez- Ballester theory, wet dark fluid.

I. Introduction

Observational data like Ia Supernovae suggest that the universe is dominated by two dark components containing dark energy (DE) and dark matter (DM). Dark energy with negative pressure is used to explain the present cosmic accelerating expansion while dark matter is used to explain galactic curves and large-scale structure formation.

Origin of the dark energy and dark matter and their natures remains unknown and we hope that Large Hadron Collider (LHC) can gives us these hints. Certainly the nature of dark energy component of the universe (Riess et al. [1], Perlmutter et al. [2]; Sahani [3]) is one of the mysteries of cosmology. Cosmological constant, Quitessence [4, 5, 6], K-essence [7, 8, 9], Phanton energy [10, 11, 12] are some of the candidates of dark energy. To explain the acceleration of the Universe, Cardassion expansion [13, 14, and 15] and what might be derived from brane cosmology [16, 17] have been used. Also there are interacting DE models like Chaplygin gas [18, 19], holographic models [20, 21, 22] etc. have been proposed but none of these models are entirely convincing so far.

In the spirit of the generalized Chaplygin gas (GCG), we use Wet Dark Fluid (WDE) as a model for dark energy. Here the motivation stemmed from empirical equation of state proposed by Tait [23] and Haywords [24] to treat water and aqueous solution.

There has been a lot of interest in scalar-tensor theories of gravitation proposed by Brans and Dicke [25], Nordtvedt [26] and Saez-Ballaster [27] among them Saez-Ballaster scalar-tensor theory is considered to be viable alternative to general relativity, in this theory metric is coupled with a dimensionless scalar-field in a simple manner. Reddy et al. [28] has given a brief review of Saez-Ballaster [27] theory for the combined scalar and tensor field are

$$G_{ij} - \omega\phi^n\left(\phi_{,i}\phi_{,j} - \frac{1}{2}g_{ij}\phi_{,a}\phi^{,a}\right) = -kT_{ij}\,, \qquad (1.1)$$

and the scalar-field ϕ satisfies the equation

$$2\phi^n\phi^i_{;j} + n\phi^{n-1}\phi_{,a}\phi^{,a} = 0\,, \qquad (1.2)$$

where $G_{ij} = R_{ij} - \frac{1}{2}g_{ij}R$ is the Einstein tensor, R the scalar curvature, ω and n are constants, T_{ij} is the stress tensor of matter, and comma and semicolon denote partial and covariant differentiation respectively.

Many authors have studied the different cosmological models in the framework of scalar-tensor theories . Particularly Reddy and Naidu [29], Rao et al. [30,31] are some of the authors who have investigated several aspects of the cosmological models in Saez-Ballaster scalar-tensor theory. Recently Rao et al. [32] and Chirde et al. [33] have studied dark-energy cosmological models in this theory.

The equation of WDF is

$$p_{WDF} = \gamma(\rho_{WDF} - \rho_*)\,. \qquad (1.3)$$

Here the parameters γ and ρ_* are taken to be positive and we restrict ourselves $0 \le \gamma \le 1$. If C_s denotes the adiabatic sound speed in WDF then $\gamma = C_s^2$ (Babichev et al.).

To find the WDF energy density, we use the energy conservation equation

$$\dot{\rho}_{WDF} + 3H(p_{WDF} + \rho_{WDF}) = 0\,. \qquad (1.4)$$

Using the equation of WDF (1.3) and the relation $3H = \frac{\dot{V}}{V}$ in above equation, we get

$$\rho_{WDF} = \frac{\gamma}{1+\gamma}\rho_* + \frac{C}{V^{(1+\gamma)}}\,, \qquad (1.5)$$

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where C is the constantof integration and V is the volume expansion. WDF includes two components, a piece that behaves a cosmological constant as well as a standard fluid with an equation of state $p = \gamma\rho$.

If $C > 0$, the strong energy condition $p + \rho \geq 0$ will not be violated by this fluid

$$p_{WDF} + \rho_{WDF} = (1+\gamma)\rho_{WDF} - \gamma\rho_{*}$$

$$= (1+\gamma)\frac{C}{V^{(1+\gamma)}} \geq 0. \qquad (1.6)$$

The wet dark fluid has been used as dark energy in the homogeneous isotropic FRW case by Holman and Naidu. Singh and Chaubey [35] studied Bianchi-I Universe with wet dark fluid in general relativity. Katore et al. [36] studied plane symmetric Universe with wet dark fluid in general relativity. Recently Adhav et al.[37,38] studied Bianchi type-III Magnetized wet dark universe and Einstein-Rosen wet dark universe in general relativity respectively. R Chaubey [39] studied Bianchi type-V wet dark universe in general relativity. Very recently Samanta et al. [41] studied, five dimensional LRS Bianchi type-I bulk viscous cosmological model with wet dark fluid in general relativity. This motivates the authors to study Bianchi type-I went dark fluid in Scalar-tensor theory of gravitation.

II. The Metric and Field Equations

We consider Bianchi type-I space time given by

$$ds^2 = dt^2 - A^2dx^2 - B^2dy^2 - C^2dz^2, \qquad (2.1)$$

where the metric potentials A, B, C are functions of t only.

The Einstein's field equations for the metric (2.1) are written in the form

$$\frac{\ddot{B}}{B} + \frac{\ddot{C}}{C} + \frac{\dot{B}}{B}\frac{\dot{C}}{C} - \frac{\omega}{2}\phi^n\dot{\phi}^2 = kT_1^1, \qquad (2.2)$$

$$\frac{\ddot{A}}{A} + \frac{\ddot{C}}{C} + \frac{\dot{A}}{A}\frac{\dot{C}}{C} - \frac{\omega}{2}\phi^n\dot{\phi}^2 = kT_2^2, \qquad (2.3)$$

$$\frac{\ddot{A}}{A} + \frac{\ddot{B}}{B} + \frac{\dot{A}}{A}\frac{\dot{B}}{B} - \frac{\omega}{2}\phi^n\dot{\phi}^2 = kT_3^3, \qquad (2.4)$$

$$\frac{\dot{A}}{A}\frac{\dot{B}}{B} + \frac{\dot{B}}{B}\frac{\dot{C}}{C} + \frac{\dot{A}}{A}\frac{\dot{C}}{C} + \frac{\omega}{2}\phi^n\dot{\phi}^2 = kT_4^4 \qquad (2.5)$$

$$\ddot{\phi} + \dot{\phi}\left(\frac{\dot{V}}{V}\right) + \frac{n}{2}\frac{\dot{\phi}^2}{\phi} = 0. \qquad (2.6)$$

Here k is the gravitational constant and overhead dot denotes differentiation with respect to t.

The energy-momentum tensor of the source is given by

$$T_i^j = (\rho_{WDF} + p_{WDF})u_iu^j - p_{WDF}\delta_i^j, \qquad (2.7)$$

where u^i is the flow vector satisfying

$$g_{ij}u^iu^j = 1. \qquad (2.8)$$

In co-moving co-ordinate system, using equation (2.7), we get

$$T_1^1 = T_2^2 = T_3^3 = -p_{WDF} \text{ and } T_4^4 = \rho_{WDF}. \qquad (2.9)$$

Using equations (2.2)-(2.6) and equation (2.9), we get

$$\frac{\ddot{B}}{B} + \frac{\ddot{C}}{C} + \frac{\dot{B}}{B}\frac{\dot{C}}{C} - \frac{\omega}{2}\phi^n\dot{\phi}^2 = -kp_{WDF}, \qquad (2.10)$$

$$\frac{\ddot{A}}{A} + \frac{\ddot{C}}{C} + \frac{\dot{A}}{A}\frac{\dot{C}}{C} - \frac{\omega}{2}\phi^n\dot{\phi}^2 = -kp_{WDF}, \qquad (2.11)$$

$$\frac{\ddot{A}}{A} + \frac{\ddot{B}}{B} + \frac{\dot{A}}{A}\frac{\dot{B}}{B} - \frac{\omega}{2}\phi^n\dot{\phi}^2 = -kp_{WDF}, \qquad (2.12)$$

$$\frac{\dot{A}}{A}\frac{\dot{B}}{B} + \frac{\dot{B}}{B}\frac{\dot{C}}{C} + \frac{\dot{A}}{A}\frac{\dot{C}}{C} + \frac{\omega}{2}\phi^n\dot{\phi}^2 = k\rho_{WDF}, \qquad (2.13)$$

$$\ddot{\phi} + \dot{\phi}\left(\frac{\dot{V}}{V}\right) + \frac{n}{2}\frac{\dot{\phi}^2}{\phi} = 0. \qquad (2.14)$$

Using equations (2.10) and (2.11), we get

$$\frac{d}{dt}\left(\frac{\dot{A}}{A} - \frac{\dot{B}}{B}\right) = -\left(\frac{\dot{A}}{A} - \frac{\dot{B}}{B}\right)\left(\frac{\dot{A}}{A} + \frac{\dot{B}}{B} + \frac{\dot{C}}{C}\right). \qquad (2.15)$$

Let V be a function of t defined by

$$V = ABC. \qquad (2.16)$$

From equation (2.15), we get

$$\frac{d}{dt}\left(\frac{\dot{A}}{A} - \frac{\dot{B}}{B}\right) = -\left(\frac{\dot{A}}{A} - \frac{\dot{B}}{B}\right)\frac{\dot{V}}{V} \qquad (2.17)$$

Integrating above equation, we get

$$\frac{A}{B} = d_1e^{x_1\int\frac{1}{V}dt}. \qquad (2.18)$$

Similarly using equations (2.10), (2.11) and (2.12), we get

$$\frac{B}{C} = d_2 e^{x_2 \int \frac{1}{V} dt}, \tag{2.19}$$

$$\frac{A}{C} = d_3 e^{x_3 \int \frac{1}{V} dt}, \tag{2.20}$$

where d_1, d_2, d_3 and x_1, x_2, x_3 are constants of integration.

In view of $V = ABC$, we get

$$A(t) = D_1 V^{\frac{1}{3}} e^{X_1 \int \frac{1}{V} dt}, \tag{2.21}$$

$$B(t) = D_2 V^{\frac{1}{3}} e^{X_2 \int \frac{1}{V} dt}, \tag{2.22}$$

$$C(t) = D_3 V^{\frac{1}{3}} e^{X_3 \int \frac{1}{V} dt}, \tag{2.23}$$

where $D_i (i = 1,2,3)$ and $X_i (i = 1,2,3)$ satisfy the relation $D_1 D_2 D_3 = 1$ and $X_1 + X_2 + X_3 = 0$.

Now using the equations (2.10)-(2.13), we have

$$2\frac{\ddot{A}}{A} + 2\frac{\ddot{B}}{B} + 2\frac{\ddot{C}}{C} + 4\left(\frac{\dot{A}}{A}\frac{\dot{B}}{B} + \frac{\dot{B}}{B}\frac{\dot{C}}{C} + \frac{\dot{A}}{A}\frac{\dot{C}}{C}\right) = \frac{3k}{2}\left(\rho_{WDF} - p_{WDF}\right) \tag{2.24}$$

Using $V = ABC$, equation (2.24) becomes

$$\frac{\ddot{V}}{V} = \frac{3k}{2}\left(\rho_{WDF} - p_{WDF}\right). \tag{2.25}$$

The conservational law for the energy-momentum tensor gives

$$\dot{\rho}_{WDF} = -\frac{\dot{V}}{V}\left(\rho_{WDF} + p_{WDF}\right). \tag{2.26}$$

Using equations (2.25) and (2.26), we get

$$\dot{V} = \pm\sqrt{2\left(\frac{3k}{2}\rho_{WDEF} V^2 + C_1\right)}, \tag{2.27}$$

where C_1 is the constant of integration.

From equation (2.26), we obtain

$$\frac{\dot{\rho}}{\rho_{WDF} + p_{WDF}} = -\frac{\dot{V}}{V}. \tag{2.28}$$

By considering that the energy density obeying an equation of state $p_{WDF} = f(\rho_{WDF})$, we conclude ρ_{WDF} and p_{WDF}.

Therefore the right hand side of equation (2.25) is a function of V only. From equation (2.25)

$$\ddot{V} = \frac{3k}{2}\left(\rho_{WDF} - p_{WDF}\right)V \equiv F(V). \tag{2.29}$$

The equation (2.29) can be interpreted as equation of motion of a single particle with unit mass under the force $F(V)$ therefore,

$$\dot{V} = \sqrt{2\left(\in - U(V)\right)} \tag{2.30}$$

Here $\in$ is taken as energy and $U(V)$ as the potential of the force F.

Comparing equations (2.27) and (2.30), we have

$$\in = C_1 \text{ and } U(V) = \frac{3k}{2}\rho_{WDF} V^2.$$

Therefore the solution of equation (2.27) can be written in quadrature form as

$$\int \frac{dV}{\sqrt{2\left[C_1 + \frac{3k}{2}\rho_{WDF} V^2\right]}} = t + t_0, \tag{2.31}$$

where t_0 is the constant of integration and can be taken to be zero, since it gives only shift in time.

Using equations (1.5) and (2.31), we get

$$\int \frac{dV}{\sqrt{2\left[\frac{3k}{2}\left(\frac{\gamma}{1+\gamma}\rho_* + \frac{C}{V^{1+\gamma}}\right)V^2 + C_1\right]}} = t. \tag{2.32}$$

From equation (2.14) ,we yield

$$\phi = \left[\frac{(n+2)\alpha}{2}\int \frac{1}{V} dt\right]^{\frac{2}{n+2}}. \tag{2.33}$$

III. Some Particular Cases

Casel. $\gamma = 1$ **(Zel'dovich fluid)**

Equation (2.32) reduces to

$$V = \sqrt{\frac{6kC + 4C_1}{3k\rho_*}} \sinh\left(\sqrt{\frac{3k\rho_*}{2}}\ t\right). \tag{3.1}$$

Using equations (2.21)-(2.23) and equation (3.1), we get

$$A(t)=D_1\left(\frac{6kC+C_1}{3k\rho_*}\right)^{\frac{1}{6}}\left(\sinh\sqrt{\frac{3k\rho_*}{2}}\ t\right)^{\frac{1}{3}}\exp\left\{\frac{X_1}{\sqrt{3kC+2C_1}}\log\tanh\left(\frac{\sqrt{3k\rho_*}}{2\sqrt{2}}\ t\right)\right\}, \tag{3.2}$$

$$B(t)=D_2\left(\frac{6kC+C_1}{3k\rho_*}\right)^{\frac{1}{6}}\left(\sinh\sqrt{\frac{3k\rho_*}{2}}\ t\right)^{\frac{1}{3}}\exp\left\{\frac{X_2}{\sqrt{3kC+2C_1}}\log\tanh\left(\frac{\sqrt{3k\rho_*}}{2\sqrt{2}}\ t\right)\right\}, \tag{3.3}$$

$$C(t)=D_3\left(\frac{6kC+C_1}{3k\rho_*}\right)^{\frac{1}{6}}\left(\sinh\sqrt{\frac{3k\rho_*}{2}}\ t\right)^{\frac{1}{3}}\exp\left\{\frac{X_3}{\sqrt{3kC+2C_1}}\log\tanh\left(\frac{\sqrt{3k\rho_*}}{2\sqrt{2}}\ t\right)\right\}, \tag{3.4}$$

Where $D_i(i=1,2,3)$ and $X_i(i=1,2,3)$ satisfy the relation $D_1D_2D_3=1$ and $X_1+X_2+X_3=0$.

Using equations (1.5) and (3.1), we obtain

$$\rho_{WDF}=\frac{\rho_*}{2}+\frac{3k\rho_*C}{6kC+4C_1}\cos ech^2\left(\sqrt{\frac{3k\rho_*}{2}}\ t\right). \tag{3.5}$$

Using equations (1.3)and(3.5), we get

$$p_{WDF}=-\frac{\rho_*}{2}+\frac{3k\rho_*C}{6kC+4C_1}\cos ech^2\left(\sqrt{\frac{3k\rho_*}{2}}\ t\right). \tag{3.6}$$

Using equation (2.33), we yield

$$\phi=\left[\frac{(n+2)\alpha}{2\sqrt{3kC+2C_1}}\log\tanh\left(\frac{\sqrt{3k\rho_*}}{2\sqrt{2}}t\right)\right]^{\frac{2}{n+2}}. \tag{3.7}$$

The physical quantities in cosmology are the expansion scalar θ, the mean anisotropy parameter A_m, the shear scalar σ^2 and the deceleration parameter q are defined as

$$\theta=3H, \tag{3.8}$$

$$A_m=\frac{1}{3}\sum_{i=1}^{3}\left(\frac{\Delta H_i}{H}\right)^2, \tag{3.9}$$

$$\sigma^2=\frac{1}{2}\left(\sum_{i=1}^{3}H_i^2-3H^2\right)$$

$$=\frac{3}{2}A_mH^2, \tag{3.10}$$

$$q=\frac{d}{dt}\left(\frac{1}{H}\right)-1. \tag{3.11}$$

Using equations (3.8)-(3.11) the physical quantities can be expressed as

$$\theta=\sqrt{\frac{3k\rho_*}{2}}\ \coth\left(\sqrt{\frac{3k\rho_*}{2}}\ t\right), \tag{3.12}$$

$$A_m=\frac{3X^2}{3kC+2C_1}\sec h^2\left(\sqrt{\frac{3k\rho_*}{2}}\ t\right), \tag{3.13}$$

$$\sigma^2=\frac{3X^2k\rho_*}{4(3kC+2C_1)}\cos ech^2\left(\sqrt{\frac{3k\rho_*}{2}}\ t\right), \tag{3.14}$$

$$q=3\sec h^2\left(\sqrt{\frac{3k\rho_*}{2}}\ t\right)-1, \tag{3.15}$$

where $X^2=X_1^2+X_2^2+X_3^2=$ Constant .

Casell. $\gamma=0$ **(Dust fluid)**

Equation (2.32) reduces to

$$\int\frac{dV}{\sqrt{3kC+2C_1}}=t, \tag{3.16}$$

which gives

$$V=\frac{3kC}{4}t^2-\frac{2C_1}{3kC}. \tag{3.17}$$

Casella. When $t>\frac{2\sqrt{2C_1}}{3kC}$

Using equations (2.21)-(2.23) and (3.17), we get

$$A(t) = D_1\left(\frac{3kC}{4}t^2 - \frac{2C_1}{3kC}\right)^{\frac{1}{3}} \exp\left\{-X_1\sqrt{\frac{2}{C_1}}\coth^{-1}\left(\frac{3kC}{2\sqrt{2C_1}}t\right)\right\} \tag{3.18}$$

$$B(t) = D_2\left(\frac{3kC}{4}t^2 - \frac{2C_1}{3kC}\right)^{\frac{1}{3}} \exp\left\{-X_2\sqrt{\frac{2}{C_1}}\coth^{-1}\left(\frac{3kC}{2\sqrt{2C_1}}t\right)\right\} \tag{3.19}$$

$$C(t) = D_3\left(\frac{3kC}{4}t^2 - \frac{2C_1}{3kC}\right)^{\frac{1}{3}} \exp\left\{-X_3\sqrt{\frac{2}{C_1}}\coth^{-1}\left(\frac{3kC}{2\sqrt{2C_1}}t\right)\right\} \tag{3.20}$$

where $D_i (i = 1,2,3)$ and $X_i (i = 1,2,3)$ satisfy the relation $D_1 D_2 D_3 = 1$ and $X_1 + X_2 + X_3 = 0$.

Using equations (1.5) and (3.17), we obtain

$$\rho_{WDF} = C\left[\frac{3kC}{4}t^2 - \frac{2C_1}{3kC}\right]^{-1}. \tag{3.21}$$

Using equations (1.3) and (3.21), we get

$$p_{WDF} = 0, \tag{3.22}$$

Using equation (2.33), we get

$$\phi = \left[\frac{-(n+2)\alpha}{\sqrt{2C_1}}\coth^{-1}\left(\frac{3kC}{2\sqrt{2C_1}}t\right)\right]^{\frac{2}{n+2}}. \tag{3.23}$$

Using equations (3.8)-(3.11), the physical quantities can be written as

$$\theta = \frac{3kCt}{2\left[\frac{3kC}{4}t^2 - \frac{2C_1}{3kC}\right]}, \tag{3.24}$$

$$A_m = \frac{4X^2}{3k^2C^2t^2}, \tag{3.25}$$

$$\sigma^2 = \frac{72k^2C^2t^2}{\left(9k^2C^2t^2 - 8C_1\right)^2}, \tag{3.26}$$

$$q = \frac{1}{2} + \frac{4C_1}{3k^2C^2t^2}, \tag{3.27}$$

where $X^2 = X_1^2 + X_2^2 + X_3^2 =$ constant

The model becomes isotropic, for large value of t.

CaseIIb. When $t < \frac{2\sqrt{2C_1}}{3kC}$

Using equations (2.21)-(2.23) and (3.17), we get

$$A(t) = D_1\left(\frac{3kC}{4}t^2 - \frac{2C_1}{3kC}\right)^{\frac{1}{3}} \exp\left\{-X_1\sqrt{\frac{2}{C_1}}\tanh^{-1}\left(\frac{3kC}{2\sqrt{2C_1}}t\right)\right\} \tag{3.28}$$

$$B(t) = D_2\left(\frac{3kC}{4}t^2 - \frac{2C_1}{3kC}\right)^{\frac{1}{3}} \exp\left\{-X_2\sqrt{\frac{2}{C_1}}\tanh^{-1}\left(\frac{3kC}{2\sqrt{2C_1}}t\right)\right\} \tag{3.29}$$

$$C(t) = D_3\left(\frac{3kC}{4}t^2 - \frac{2C_1}{3kC}\right)^{\frac{1}{3}} \exp\left\{-X_3\sqrt{\frac{2}{C_1}}\tanh^{-1}\left(\frac{3kC}{2\sqrt{2C_1}}t\right)\right\} \tag{3.30}$$

where $D_i (i = 1,2,3)$ and $X_i (i = 1,2,3)$ satisfy the relation $D_1 D_2 D_3 = 1$ and $X_1 + X_2 + X_3 = 0$.

Using equations (1.5) and (3.17), we get

$$\rho_{WDF} = C\left[\frac{3kC}{4}t^2 - \frac{2C_1}{3kC}\right]^{-1}. \tag{3.31}$$

Using equations (1.3) and (3.31), we get

$$p_{WDF} = 0, \tag{3.32}$$

Using equations (2.33), we get

$$\phi = \left[\frac{-(n+2)\alpha}{\sqrt{2C_1}} \tanh^{-1}\left(\frac{3kC}{2\sqrt{2C_1}}t\right)\right]^{\frac{2}{n+2}}. \tag{3.33}$$

Using equations (3.8)-(3.11), the physical quantities can be written as

$$\theta = \frac{3kCt}{2\left[\frac{3kC}{4}t^2 - \frac{2C_1}{3kC}\right]}, \tag{3.34}$$

$$A_m = \frac{4X^2}{3k^2C^2t^2}, \tag{3.35}$$

$$\sigma^2 = \frac{72k^2C^2t^2}{\left(9k^2C^2t^2 - 8C_1\right)^2} \tag{3.36}$$

$$q = \frac{1}{2} + \frac{4C_1}{3k^2C^2t^2} \tag{3.37}$$

where $X^2 = X_1^2 + X_2^2 + X_3^2 =$ Constant.

The model becomes isotropic, for large value of t.

IV. Models with Constant Deceleration Parameter

Casel. Power law:

Here we take

$$V = at^b, \tag{4.1}$$

where a and b are constants.

Using equations (2.21), (2.22), (2.23) and (4.1), we get

$$A(t) = D_1 a^{\frac{1}{3}} t^{\frac{b}{3}} \exp\left\{\frac{X_1}{a(1-b)} t^{(1-b)}\right\}, \tag{4.2}$$

$$B(t) = D_2 a^{\frac{1}{3}} t^{\frac{b}{3}} \exp\left\{\frac{X_2}{a(1-b)} t^{(1-b)}\right\}, \tag{4.3}$$

$$C(t) = D_3 a^{\frac{1}{3}} t^{\frac{b}{3}} \exp\left\{\frac{X_3}{a(1-b)} t^{(1-b)}\right\}, \tag{4.4}$$

where $D_i (i = 1,2,3)$ and $X_i (i = 1,2,3)$ satisfy the relation $D_1 D_2 D_3 = 1$ and $X_1 + X_2 + X_3 = 0$.

Using equations (1.5) and (4.1), we get

$$\rho_{WDF} = \left(\frac{\gamma}{1+\gamma}\right)\rho_* + \frac{C}{a^{1+\gamma}} t^{-(1+\gamma)b}. \tag{4.5}$$

Using equations (1.3) and (4.5), we get

$$p_{WDF} = \gamma\left[\frac{C}{a^{(1+\gamma)}} t^{-(1+\gamma)b} - \frac{1}{1+\gamma}\rho_*\right]. \tag{4.6}$$

Using equations (2.33) and (4.1), we get

$$\phi = \left[\frac{(n+2)\alpha}{2a(1-b)} t^{(1-b)}\right]^{\frac{2}{n+2}}. \tag{4.7}$$

Using equations (3.8)-(3.11), the physical quantities can be written as

$$\theta = \frac{b}{t}, \tag{4.8}$$

$$A_m = \frac{3X^2}{a^2 b^2 t^{2(b-1)}}, \tag{4.9}$$

$$\sigma^2 = \frac{X^2}{2a^2 t^{2b}} \tag{4.10}$$

$$q = \frac{3}{b} - 1, \tag{4.11}$$

where $X^2 = X_1^2 + X_2^2 + X_3^2 =$ constant

The model becomes isotropic, for large value of t and $b > 1$.

Casell. Exponential type:

Here we take

$$V = \alpha_1 e^{\beta t}, \tag{4.12}$$

where α_1 and β are constants.

Using equations (2.21), (2.22), (2.23) and (4.12), we get

$$A(t) = D_1 \alpha_1^{\frac{1}{3}} e^{\frac{\beta t}{3}} \exp\left\{\frac{-X_1}{\alpha_1 \beta} e^{-\beta t}\right\}, \tag{4.13}$$

$$B(t) = D_2 \alpha_1^{\frac{1}{3}} e^{\frac{\beta t}{3}} \exp\left\{\frac{-X_2}{\alpha_1 \beta} e^{-\beta t}\right\}, \tag{4.14}$$

$$C(t) = D_3 \alpha_1^{\frac{1}{3}} e^{\frac{\beta t}{3}} \exp\left\{\frac{-X_3}{\alpha_1 \beta} e^{-\beta t}\right\}, \tag{4.15}$$

Where $D_i (i = 1,2,3)$ and $X_i (i = 1,2,3)$ satisfy the relation $D_1 D_2 D_3 = 1$ and $X_1 + X_2 + X_3 = 0$.

Using equations (1.5) and (4.12), we get

$$\rho_{WDF} = \left(\frac{\gamma}{1+\gamma}\right)\rho_* + \frac{C}{\alpha_1^{1+\gamma}} e^{-(1+\gamma)\beta t}. \qquad (4.16)$$

Using equations (1.3) and (4.12), we get

$$p_{WDF} = \gamma\left[\frac{C}{\alpha_1^{(1+\gamma)}} e^{-(1+\gamma)\beta t} - \frac{1}{1+\gamma}\rho_*\right]. \qquad (4.17)$$

Using equations (2.33) and (4.12), we get

$$\phi = \left[\frac{-(n+2)\alpha}{2\alpha_1\beta} e^{-\beta t}\right]^{\frac{2}{n+2}}. \qquad (4.18)$$

Using equations (3.8)-(3.11), the physical quantities can be written as

$$\theta = \beta, \qquad (4.19)$$

$$A_m = \frac{3X^2}{\alpha_1^2\beta^2} e^{-2\beta t}, \qquad (4.20)$$

$$\sigma^2 = \frac{X^2}{2\alpha_1^2} e^{-2\beta t}, \qquad (4.21)$$

$$q = -1, \qquad (4.22)$$

where $X^2 = X_1^2 + X_2^2 + X_3^2 =$ constant

The model becomes isotropic, for large value of t.

V. Conclusion

In this paper we have studied Bianchi Type-I Universe with wet dark fluid in Saez-Ballaster scalar – tensor theory of gravitation. The new equation of state for the dark-energy component (known as wet dark fluid) has been considered. The solution has been obtained in quadrature form. The model with constant deceleration parameter has been discussed in detail. The behaviour of the models for large time have been analyzed. When $\phi \to 0$ our results resemble with the results obtained by Singh and Chaubey[35].

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Global Journal of Science Frontier Research
Physics and Space Science
Volume 13 Issue 5 Version 1.0 Year 2013
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Latent Heat Storage System: A Panacea to Address Energy Needs

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Abstract - The need for alternative sources of energy is of vital importance in the present time when the world's non-renewable energy sources are rapidly getting depleted. The reason for this depletion is that humans are utilizing the energy at a much faster rate than is being produced. Additionally, in some cases, it is inevitable that the primary source of certain forms of energy will just get exhausted. Clearly this is a problem that requires a lot of attention and it becomes imperative that effective solutions are devised. Solar energy is one such alternative form. It is renewable, environment friendly, easily available and free of cost. One major drawback is that solar energy is available for use only during the day. Hence it becomes necessary that a way is found by which we can utilize solar energy even during the absence of the Sun. This project attempts to do just that. The objective of this project is to utilize solar energy during the day and store some of the unused energy for use at night. There are two ways in which thermal energy can be stored, the first being via the sensible heat of a material and the second being via the latent heat. Of course, it is possible that a combination of the two is also used.

Keywords : *alternative, concentric, lauric, night, solar, thermal.*

GJSFR-A Classification : *FOR Code: 090607, 091305*

Strictly as per the compliance and regulations of :

Latent Heat Storage System: A Panacea to Address Energy Needs

Ujjwala Sharma [α], Vaibhav Dixit [σ] & Prof. D.V. Mahindru [ρ]

Abstract - The need for alternative sources of energy is of vital importance in the present time when the world's non-renewable energy sources are rapidly getting depleted. The reason for this depletion is that humans are utilizing the energy at a much faster rate than is being produced. Additionally, in some cases, it is inevitable that the primary source of certain forms of energy will just get exhausted. Clearly this is a problem that requires a lot of attention and it becomes imperative that effective solutions are devised. Solar energy is one such alternative form. It is renewable, environment friendly, easily available and free of cost. One major drawback is that solar energy is available for use only during the day.

Hence it becomes necessary that a way is found by which we can utilize solar energy even during the absence of the Sun. This project attempts to do just that. The objective of this project is to utilize solar energy during the day and store some of the unused energy for use at night. There are two ways in which thermal energy can be stored, the first being via the sensible heat of a material and the second being via the latent heat. Of course, it is possible that a combination of the two is also used.

Additionally, due to the plethora of applications of solar energy, this project limits the use of solar energy for cooking purposes only. This project employs a parabolic trough collector to capture solar energy and phase change materials to store that energy. The captured energy is then retrieved when required during the night. Finally, the effectiveness of the project is determined by the maximum surface temperature achieved on the cooking unit due to the energy extracted from the Phase Change Material (PCM).

After conducting the experiment, a water boiling test was performed on the flat plate cooking unit. From the results, it was concluded that Lauric acid can be effectively used as a phase change material for solar cooking application. Cooking using solar energy is extremely beneficial as it is inexpensive and solar energy is easily available. Several types of solar cookers have been developed. These can be classified broadly under two headings namely concentration type and box type. In the concentration type solar cooker parabolic or spheroid reflectors are used with the cooking pot placed at their sun ray focal point. In the box type solar cooker, the solar radiation direction enters through the glass window to cook the food. The experimental set up was created in-house and extensive experimental work was carried out to demonstrate the basic concepts. The real pictures of the set up have been presented in the Project report[1].The detailed theoretical analysis has been carried and the results indicate that the concept if implemented can address the energy needs of a country like India which has enormous resources of Solar Energy that too for a longest period. This acts as panacea to address the energy needs of developing country like India.

Keywords : alternative, concentric, lauric, night, solar, thermal.

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I. Introduction

Nobel Laureate Richard E. Smalley outlined humanity's top ten problems for the next 50 years in a talk given to the Massachusetts Institute of Technology Enterprise Forum. According to professor Smalley, energy was the biggest problem that humanity would face for the next 50 years. Some of the other problems included water, food, the environment and poverty. It becomes quite clear that some of these problems can be solved to some extent by focusing on improving the energy crisis that the world faces. For instance, utilizing renewable sources of energy in an inexpensive manner would lead to reduced expenditure on energy production. The savings garnered by doing so could be utilized to solve problems related to food and water. Thus, it becomes very evident that energy constitutes one mammoth problem for humanity and becomes an issue of highest priority when it comes to seeking a solution. The energy scenario in India is not very different from that of the rest of the world. Up till the end of 2009, data reveals that 64% of the installed power generation capacity comes from thermal energy. Nuclear energy contributes 2.6% whilst renewable sources of energy contribute the rest. This clearly indicates that thermal energy is India's backbone when it comes to energy sources used. Unfortunately, this is not a good sign for the country. One reason for this is that most of the raw material used to generate thermal energy is not of good quality. Take coal as an example. The coal available in India contains about 45% ash. This is not desirable and it only prevents the efficient production of thermal energy.

II. Description

a) Parabolic Trough Collectors

A parabolic trough collector is a type of solar thermal energy collector. It is constructed as a long parabolic mirror with a collector tube running its length at the focal point. Sunlight is reflected by the mirror and concentrated on the collector tube. A heat transfer fluid, also frequently referred to as working fluid in this report,

runs through the collector tube to absorb the thermal energy from concentrated sunlight Parabolic trough collectors are designed to reach temperatures over 100 degree C and up to 450 degree C and still maintain a high collector efficiency by having a large solar energy collecting area, called aperture area, but a small surface where the heat is lost to the environment (absorber surface). The concentration ratio, defined as the ratio of the aperture area to the absorber surface, determines the temperature up to which the heat transfer fluid can be heated in the collector tube.

b) Operating Principle

The reflecting surface of the parabolic trough collector has a parabolic cross section. The curve of the parabola is such that light traveling parallel to the axis of a Parabolic mirror will be reflected to a single point from any place along the curve. Since the Sun is at a very large distance, the solar light coming directly is essentially parallel making the sunlight concentrate at the focal point. A parabolic trough collector extends the parabolic shape to three dimensions along a single direction, creating a focal line along which the absorber tube is run. This is shown in Figure 2.1.

c) Tracking

Parabolic trough collectors – like other solar concentrating systems – have to track the Sun. The troughs are normally designed to track the Sun along one axis oriented in the North-South or East-West direction. Such systems are called single axis tracking systems. Figure 2.2 shows such a system in which the collector is oriented along the North South direction, thereby enabling tracking of the Sun in the East-West direction.

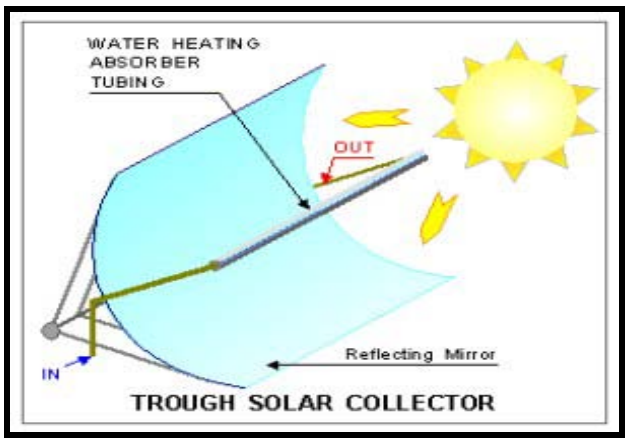
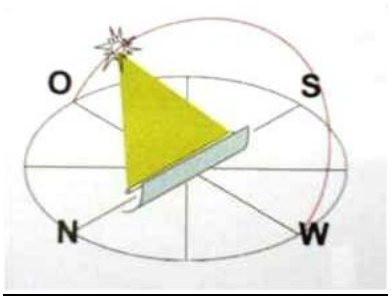
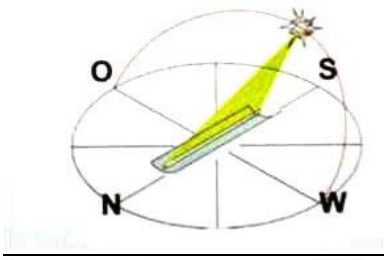
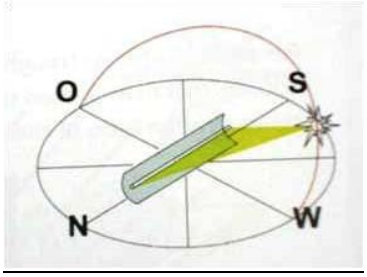


Figure 2.2 : Parallel sun rays being concentrated onto the focal line of the collector







d) Phase Change Materials

A phase change material (PCM) is a substance with a fairly high heat of fusion capable of storing and releasing large amounts of energy. These substances have high heat retention capabilities in that they do not lose the heat absorbed quickly. Heat is absorbed or released as the material changes from the solid phase to the liquid phase and vice versa.

As a result, PCMs are also referred to as latent heat storage materials. Figure 2.3 on the following page shows the simplified heating curve for a phase change material.

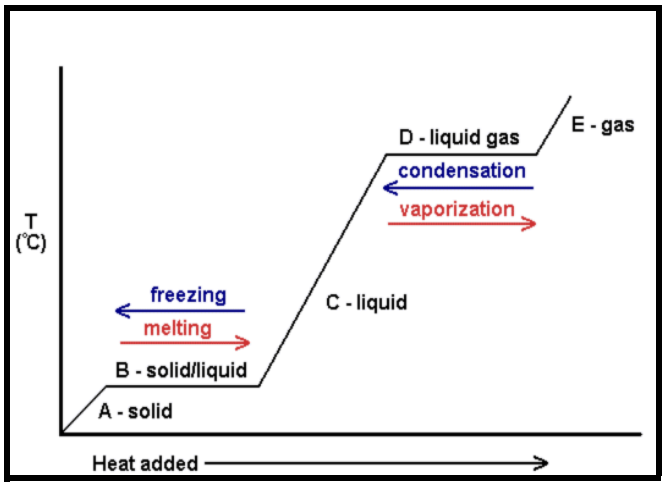


Figure 2.3 : Heating curve for a phase change material

i. *Properties*

Phase change materials have certain properties which make them desirable for latent heat storage in thermal storage applications. Some of these properties are listed on the following page.

(1) High latent heat of fusion per unit volume.
(2) High specific heat to provide additional sensible heat storage.
(3) High thermal conductivity of both solid and liquid phases to assist the charging and discharging of energy.
(4) Small changes in volume on phase transformation to reduce containment problems.
(5) High rate of crystal growth so that the system can meet demands of heat recovery from the storage system.
(6) Chemical stability
(7) No degradation after a number of solidification/melting cycles.
(8) Non corrosive, non toxic and non flammable.
(9) Easy availability and fairly low cost.

e) Classification

Phase change materials can be broadly classified into three types namely organic, inorganic and eutectic. Organic phase change materials are generally paraffin and fatty acids. Inorganic PCMs are salt hydrates while eutectics include organic-organic, organic inorganic and inorganic-inorganic compounds. The phase change material used in this project is LAURIC ACID an organic compound. Figure 2.4 shows the chemical structure of LAURIC ACID.

Figure 2.4 : Chemical structure of Lauric Acid

f) Energy Storage Systems

There are two ways in which thermal energy can be stored, the first being via the sensible heat of a material and the second being via the latent heat. Of course, it is possible that a combination of the two is also used.

i. *Sensible Heat Storage*

In sensible heat storage, the substance storing energy is heated causing its temperature to rise. The heat added as the temperature increases is called sensible heat. Similarly, when heat is removed, the temperature falls and this heat is also called sensible heat. Thus, in sensible heat storage, heat added during charging or removed during discharging is accompanied by a change in temperature. The stored energy can be calculated by taking the product of mass, average specific heat capacity and the temperature change.

ii. *Latent Heat Storage*

In latent heat storage, the substance storing energy is heated causing it to change its phase. Since the heat absorbed or released results in a change in phase, there is no temperature change accompanying the process. In this case, the stored energy can be calculated by taking the product of the mass and the latent heat capacity of the substance.

iii. *Sensible heat storage versus latent heat storage*

Amongst the two thermal heat storage techniques, latent heat thermal energy storage is particularly attractive due to its ability to provide high energy storage density and its characteristic to store heat at a constant temperature corresponding to the phase transition temperature of the phase change material.

III. Riview of Previous Work

3.1Vast amount of research has been done on the collection, storage and applications of solar energy. Papers have been published regarding the same. Given below are some of the papers that were consulted. Based on the information that each paper provided, the drawbacks related to cooking using solar energy were identified. An attempt was made to reduce these in this project.

Felix Regin, S.C. Solanki, J.S. Saini (2005) conducted an experiment analyzing the melting behaviour of paraffin wax as a phase change material (PCM) encapsulated in a cylindrical capsule, used in a latent heat thermal energy storage system with a solar water heating collector. The heat for melting of the PCM in the capsule was provided by the hot water surrounding it.

Buddhi and Sahoo (1997) have studied the use of stearic acid (melting point 69°C) as a PCM for heat storage.

Buddhi and Sahoo filled the PCM below the absorbing plate of the cooker. In such a design, the rate of heat transfer from the PCM to the cooking pot during the discharging mode of the PCM was found to be slow, and more time was required for cooking an evening meal.

Peng Ye and Thomas Byron (2008) showed that Lauric acid has a high tendency to crystallize when cooled from its molten state. It has a polymorphic crystalline structure and consists of 3 polymorphs (Alpha, Beta and Gamma).

Bo Tong, Rui-Bin Liu et al. (2010) used a differential scanning calorimeter to perform the thermal analysis of Lauric acid under high purity nitrogen (99.99%) with a flow rate of 40 mL/min. 3 to 5 mg of the sample was used and experiments were conducted in an alumina crucible. The heating rate used was 10 K/min. TG measurements of the sample were carried out by a thermogravimetric analyzer under N2 with a flow rate of 40 ML/min and at heating rates of 5, 10, 15, 20 and 25 K/min. The temperature range used was 300 K to 800 K. The DSC curves revealed information about the melting point of Lauric acid while TG-DTG curves showed its thermo stability. It begins to lose mass at about 540 K, reaches a maximum rate of mass loss at about 650 K and completely loses its mass when the temperature reaches 700 K. The peak temperature of decomposition was also shown to increase with heating rate.

Tyagi .S.K et al. (2006) made an exergy analysis and parametric study on concentrating type solar collectors. The exergetic performance of concentrating type solar collector is evaluated and the parametric study is made using hourly solar radiation. Most of the performance parameters, such as, the exergy output, exergetic and thermal efficiencies, stagnations temperature, inlet temperature, ambient temperature etc. increase as the solar intensity increases. The performance parameters, mentioned above, are found to be the increasing functions of the concentration ratio but the optimal inlet temperature and exergetic efficiency at high solar intensity are found to be the decreasing functions of the concentration ratio.

Sharma et al. (2000) designed and developed a cylindrical PCM storage unit for a box type solar cooker to cook food in the late evening. Since this unit surrounds the cooking vessel, the rate of heat transfer between the PCM and the food is higher, and cooking can be faster. They reported that by using 2.0 kg of acetamide (melting point 82°C) as a latent heat storage material, a second batch of food could be cooked if it is loaded before 3:30 pm during winter. They recommended that the melting temperature of a PCM should be between 105 and 110°C for evening cooking.

From this literature review, it could be observed that solar energy was being utilized mainly during the day. In order to store solar energy, the usage of suitable phase change materials was required. These phase change materials required high heat capacities and high melting points and stored solar energy in the form of latent heat. Some of the papers described the properties of Lauric acid and it was found that most of the properties were characteristic of a good phase change material. Hence, this project attempts to test the performance of Lauric acid as a PCM. The design process for efficient cooking units was also learnt.

IV. Experimental Setup and Basic Operation

Figure 4.1 shows the schematic of the experimental setup

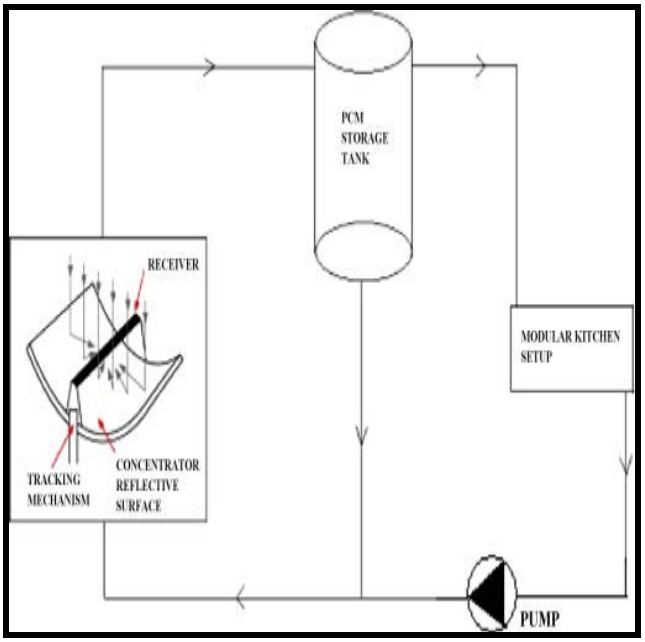


Figure 4.1 : Schematic of the experimental setup

By the proper control of the valves, the following operations are possible

1. **Day operation with cooking:** During the day, the working fluid passes through the Parabolic Trough Collector (PTC) and absorbs the solar energy. A part of the hot fluid then passes through the bottom of the PCM Tank and leaves from the top. In the PCM Tank, heat is absorbed by the PCM thereby cooling the working fluid. The remaining hot fluid can be used for cooking during the day by passing it through the cooking unit. The working fluid leaving the cooking unit then meets that leaving the PCM Tank and the fluid is then pumped back through the PTC.
2. **Day operation without cooking (charging process):** In this, all of the working fluid, after absorbing heat in the PTC, is passed through the PCM Tank for storage. The 18 working fluid leaving the PCM Tank is then pumped back into the PTC and the cycle continues.
3. **Night operation (discharging process):** Here, the PTC is cut-off from the circuit and the cooled working fluid is passed through the PCM Tank. The PCM balls located in the tank lose the heat that they captured during the day to the working fluid. The hot working fluid then leaves the PCM Tank and passes through the cooking unit, thus enabling cooking at night. The fluid leaving the cooking unit is then circulated through the PCM Tank once again and the process is continued till required.

a) Individual Component Specifications

In this article, the specifications of each of the components used are provided.

i. *Concentric Trough Collector*

Figure 4.2 shows a photo of the parabolic trough collector. Its specifications are as follows:

(1) Collector aperture area = 0.7088 metre square
(2) Collector length = 0.98cm
(3) Support structure materials = Cast iron

Figure 4.2

ii. *PCM Storage Tank*

The photos in Figures 4.3 show the PCM tank. Its specifications of the PCM tank are as follows:

(1) Height of PCM tank = 31.4 cm
(2) Diameter of tank = 10 cm

Figure 4.3

iii. *Pump*

(1) Speed = 220rpm
(2) Capacity = 2.4 W
(3) Head = 3.2m (maximum)

iv. *Cooking Units*

Diameter of Inner bowl = 20cm
Depth of Bowl = 15cm

b) Working of Cooking Units

In order to describe how the cooking units work, we use the bowl type cooking unit as a specific example. The working of the flat plate cooking unit is based on the same principle.

Lauric acid, the working fluid passes through the PTC and absorbs the solar energy. A part of the hot fluid then passes through the bottom of the PCM Tank and leaves from the topIn the PCM Tank, heat is absorbed by the PCM thereby cooling the working fluid.

The remaining hot fluid can be used for cooking during the day by passing it through the cooking unit. The working fluid leaving the cooking unit then meets that leaving the PCM Tank and the fluid is then pumped back through the PTC.

Fig 4.4 : Latent Heat Storage Solar Cooking Unit

c) Thermal Analysis of Lauric Acid

Thermal energy storage in domestic solar space heating and cooling application has been given attention since it can utilize this renewable energy to reduce the greenhouse gas emissions. It also provides a reservoir of energy to adjust the mismatch between peak and off peak time and meet the energy demand at all times. Thermal energy storage is basically classified as latent, sensible and chemical energy storage. The concept of using latent heat storage as energy saving vehicle provides the advantages of storing a large amount of energy in a small mass/volume and the phase transition occurring at nearly constant temperature.

In Phase Change Materials (PCMs), latent heat storage stores heat as latent heat of fusion during phase changes that undergo melting and solidification process. To gain a comfortable temperature in a space, the PCM can be employed to absorb heat when melting and release it when solidify. For a material to be used as PCM, some of the following criteria need to be fulfilled: high heat of fusion, high thermal conductivity, high density, and high specific heat, congruent melting, small volume changes during phase changes, chemical stability, and non corrosive, non poisonous, non flammable and non explosive. It is also noteworthy to take into consideration the availability as well as cost (Beghi, 1982).

The selection of PCM has recently been directed towards the use of low melting organic materials in an effort to avoid some of the problems inherent in inorganic phase change materials, such as super cooling and segregation. Special attention has been given to fatty acids since they can easily be obtained from renewable sources such as oils/fats (Feldman and Banu, 1996). Fatty acids show solid-liquid transitions within narrow temperature ranges. They possess some superior properties over other PCMs such as melting congruency, good chemical stability, non-toxicity and suitable melting temperature range for solar passive heating and cooling applications. In the liquid phases, these materials have surface tensions in the order of 20-30 dyne cm-1 and are therefore high enough to be retained in the structure of the host material. These materials possess elevated latent heat of transition and high specific heat (in the range 1.9-2.1 J g-1°C). They also exhibit only small volume changes during melting or solidification (example: melting dilatation is around 0.1-0.2 ml g-1). Because of the protected carboxyl group, fatty acids based PCMs are chemically, heat and colour stable, low corrosion activity and non-toxic.

PCM can be utilized as a single component or eutectic mixtures (binary mixtures that exhibit fixed melting/solidification points at a certain composition between two single components and act as single component).

d) Temperature Analysis of Lauric Acid

1) The temperature falls as the liquid cools. When the first crystals form, however, the temperature remains steady. As freezing takes place the temperature/time graph forms a plateau. After solidification is complete, the temperature drops quickly.
2) The initial, steep region involves the cooling of liquid. The average energy of the liquid molecules is lowered. During the horizontal portion of the curve, a phase change takes place. Solid forms as liquid freezes. Both the solid and liquid have the same average kinetic energy. The formation of bonds in the solid lattice requires the removal of energy (i.e., energy is released when these bonds form).
3) Once all of the liquid has frozen, the steep portion at the end of the curve involves reducing the average kinetic energy of the solid particles. The solid cools off.
4) The melting point of lauric acid 43 °C, so the material in the sample can be identified as lauric acid (not stearic acid, the other available choice). The material is liquid in the steep region at the left (early times) and solid in the steep region at the right (late times). Both liquid and solid coexist in the center, horizontal region.
5) Increasing the amount of unknown would not affect its melting point. (It would lengthen the plateau portion of the curve).
6) Energy absorbed by water = 150g x 4.2 J/g °C x 4.6 °C= 2.9x 10^3 J
7) DH (kJ/mol) = (2.9 x 10Ü kJ /17.98 g) x (204 g /mol = 3.3 x 10° J/mol
8) Increasing the amount of unknown would increase the amount of heat released to the water. It would not change the molar heat of fusion.

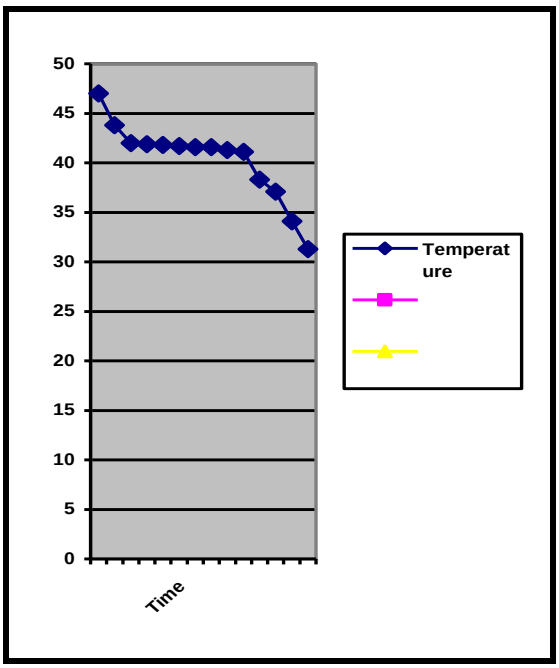


Fig 4.5 : temperature variation of Lauric acid

V. Performance Analysis

a) Average Energy Requirement For Cooking

- Calorific value of LPG = 45MJ/Kg
- Therefore, energy available in one cylinder (14.6kg) = 657MJ
- Assume a cylinder provides the energy for cooking for 35 days for a family of four.
- Energy requires to cook food for a family per day= 19MJ

b) Energy Received From Concentric Trough Collector

- Average solar insolation per day = 628.09 W/m²
- Energy received (8 hours of operation) = I × A = 628.09 × 1.07484 = 675.096 W
- Assuming the efficiency of the PTC to be 45%, net energy received = 303.793 W

c) Selection Of Pcm And Working Fluid

- After various studies, it was decided to use LAURIC ACID as the phase change material and SALINE WATER as the working fluid. LAURIC ACID was selected after analyzing its various properties. These were presented in the previous chapter. The thermal properties of SALINE WATER are provided. The thermal stability shown by SALINE WATER made it a suitable choice for the working fluid. The quantities required of each are calculated on the following page.

d) Total Mass Of Saline Water Required

- Specific heat capacity of saline water = 4.18 KJ/Kg/K
- Heat supplied to the saline water = 800.55KJ
- Hence total mass of saline water required = $m$saline water = 3.36Kg

e) Total Mass Of Lauric Acid Required

- Latent heat of fusion of Lauric acid = 182KJ/Kg
- Assume 30% of the heat is transferred from Saline water to Lauric acid = 240 KJ
- Heat supplied to Lauric acid = 240KJ
- Therefore, mass of Lauric acid required = 0.39Kg

f) Preliminary Test On Concentric Trough Collector

i. *Objective*

The objective of this analysis was to determine the maximum temperature attained by saline water and the temperature variation during the day of the working fluid under stagnant conditions in the Concentric Trough Collector.

ii. *Layout*

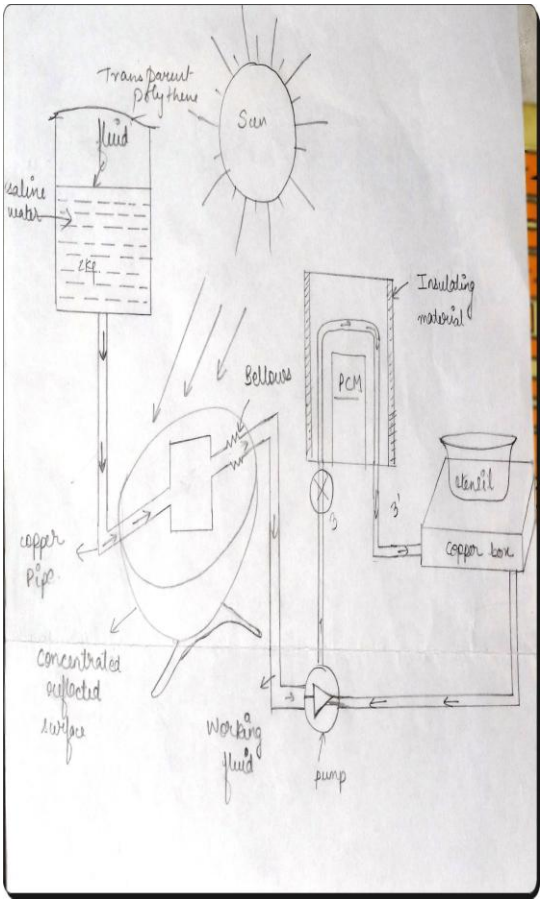


Figure 5.1 : The system shows the part of the experiment setup used for this analysis

- Thermometers were attached in either ends of the concentric collectors to measure the temperature of saline water residing in the concentric collector. T1 is taken as inlet temperature and T2 is taken as outlet temperature.

iii. *Readings*

Table 4.1 : Variation of T1 and T2 with time of day

Time of Day	T1 (inlet) (°C)	T2 (outlet) (°C)
10:00	28	28
10:30	29	45
11:00	31	56
11:30	32	66
12:00	33	75
12:30	35	82
1:00	37	87
1:30	38	92
2:00	38	95
2:30	38	94
3:00	38	87
3:30	38	82
4:00	37	78
4:30	35	75
5:00	34	72

5:30	33	68
6:00	33	66
6:30	32	64
7:00	31	62

iv. *Graph*

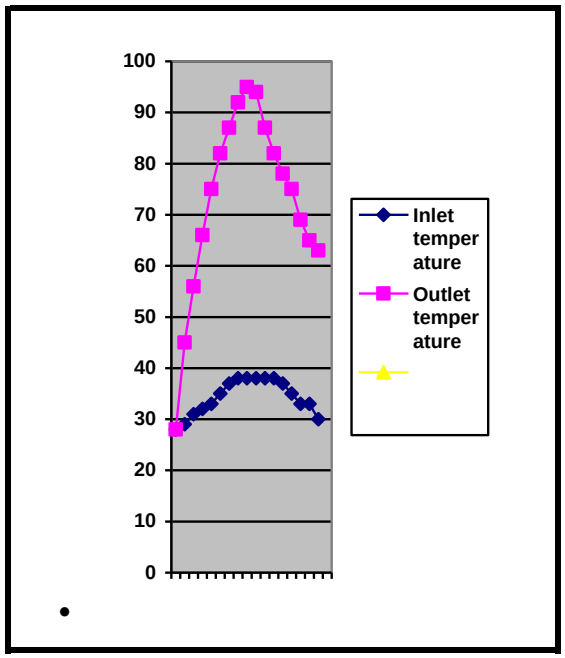


Figure 5.2 : Variation of T1 and T2 with time of day

v. *Observation and Inference*

- Maximum temperature achieved by Saline water = 95°C. From this it can be inferred that even while accounting for losses, the temperature attained by the Saline water by passing it through the CTC will be sufficient to heat the Lauric acid up to its melting point of around 42°C.

g) Modification of The Ctc

The performance analysis shown above corresponds to the CTC having a focal length of 16.411 cm. Before conducting the above analysis, the focal length of the PTC was 8 cm. With that focal length, the maximum temperature attained by saline water was found to be only 85°C as opposed to the 95°C obtained above. The calculations done below show that 16.411 cm is very nearly the optimum focal length of the CTC used in this project.

- It is known that the diameter of the PTC is 98 cm and the depth is 36.575 cm. The focal length can then be calculated using the formula (4.1) on the following page.
- If *f*= focal length, *D*= diameter and c= height of the CTC, then we have,
- $f = D^2/16c$ (4.1)
- Substituting the known values, we get, *f* = 16.411cm.

Figure 5.3 on the following page shows the various parameters used to ascertain the focal length of the PTC.

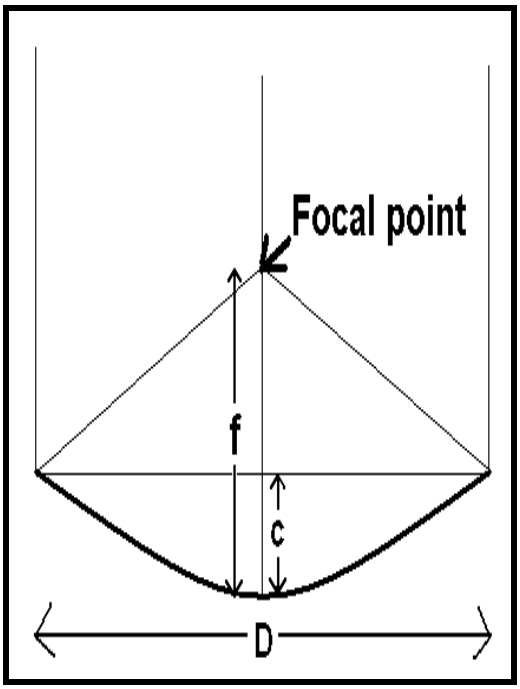


Figure 5.3 : This schematic shows the various parameters of the CTC

c and *D* were used to determine *f* as shown above Consequently, increasing the focal length resulted in better CTC performance as evidenced by the result of the performance analysis of the CTC.

VI. Results and Discussion

The performance of the concentric trough collector and the phase change material were analyzed after performing the experiment. This chapter explains how the experiment was conducted followed by the results obtained. The results are then interpreted, thus leading to the conclusion.

a) Methodology

The experiment was conducted over a period of three days. On the first day, the Saline water was heated using the concentric trough collector. The heat transferred to the Saline water was then passed on to the Lauric acid in the charging process. The experiment started at 10:000 a.m. and continued till 7:00 p.m. The temperature of the Saline water increased from 28°C to 95°C. This saw the close of experimentation on day 1.

Day 2, on day 1 the Saline water temperature recorded 95°C. Following this, the discharging of the Lauric acid and the drop in temperature of Saline water was observed and a water boiling test was conducted on the flat plate cooking unit.

b) PCM Tank Heat Loss Co-Efficient

Before conducting the charging and discharging experiments, it was essential to determine the heat loss co-efficient of the insulated PCM tank, insulated placing it in a thermocol box of 15mm thickness. During the experiment, the temperature of saline water was heated to 95°C. The total time during which the heat loss was observed was 9 hours. The graph of Temperature drop versus time is shown in figure 5.1. The temperature drop values recorded are shown in table 5.1.

At the start, the temperature of the saline water was 95°C and after 9 hours, it was found to be 62°C. Thus the temperature loss was obtained as

Rate of temperature drop = (95-62)/9 = **3.666°C/h**

Table 6.3 : Variation of temperature drop of Saline water with time

Time(hours)	Temperature (°C)
1	95
2	94
3	87
4	82
5	78
6	75
7	72
8	68
9	66

c) Graph

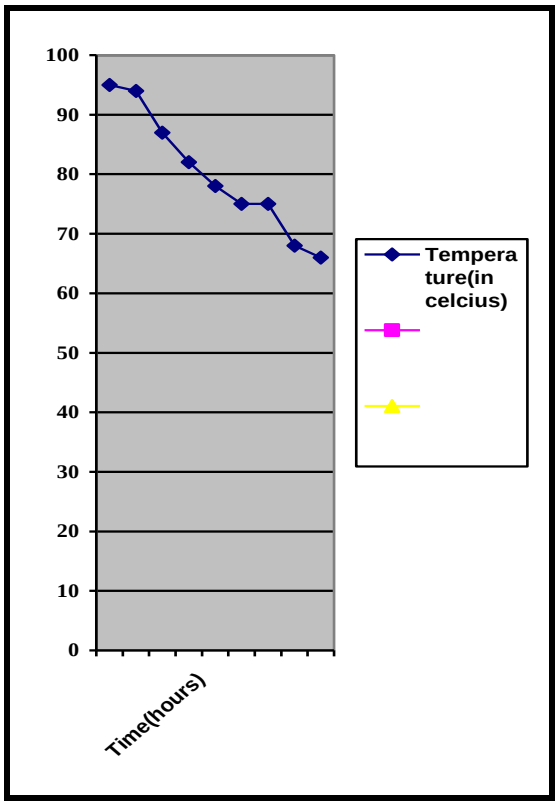


Figure 5.4 : Variation of temperature drop of Saline water with time

The total amount of working fluid in the experimental setup is 18 kg. Assuming that 30% is located in the pipes, amount of working fluid in the PCM tank will be 1.5 kg. Hence, Energy lost from Saline water in 9 hours = 18 × 4.18× (95-66) = 2181.96 KJ

The mass of Lauric acid used in the PCM tank was 1.5 kg. Hence, Energy lost from Saline water in 9 hours = 1.5× 2.4 × (95-66) = 104.4KJ

From this we have,

$U \times A \times LMTD = [(2181.96 + 104.4) \times 1000] / (9 \times 3600) = 70.56W$

However, assuming ambient temperature to be 28°C,

$LMTD = (95-66) / \ln (95/66) = 79.62°C$

$\therefore U = 70.56/ (\pi dl \times 79.62) = 8.983\ W/m^2\ K$

d) Charging Process

The charging process of the experiment was conducted in one day. One that day charging was done using the energy obtained from the CTC.

i. *Day 1*

Table 5.2 on the following page shows the temperature of Saline water at different times of the day during the charging process. Figure 5.2 shows the corresponding graph.

Time (in Celsius)	Temperature
10:00 am	28
10:30 am	45
11:00 am	56
11:30 am	66
12:00 pm	75
12:30 pm	82
1:00 pm	87
1:30 pm	92
2:00 pm	94
2:30 pm	95

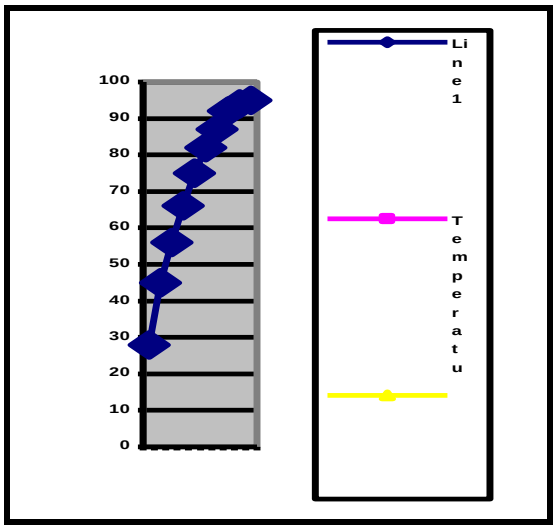


Figure 5.5 : Variation of temperature of Saline water

e) Water Boiling Test

The water boiling test was conducted to determine whether or not the heat generated at the cooking unit was sufficient to boil water during the discharging process. It was conducted by keeping a vessel with half liters of water at room temperature on the flat plate cooking unit. The temperature of the water mass was monitored at regular intervals. Fig 5.3 shows the cooking unit plate temperature and water temperature as a function of time. It is observed from the figure that the water temperature reaches 85°C after 4.5hours.

Table 5.3 : Water boiling test

Time (in minutes)	Water Temperature	Plate Temperature
0	28	27
30	37	34.5
60	46.5	41.5
90	54.5	48.5
120	61.7	55.3
150	68.7	61.7
180	75.6	68.3
210	87	74.9
270	92	80.8
300	95	86.5

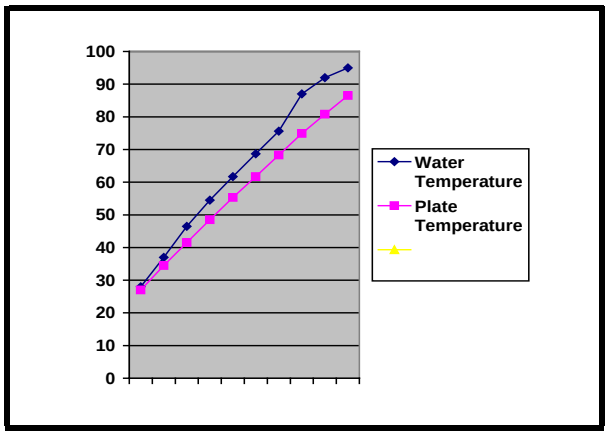


Figure 5.6 : Cooking unit plate temperature and water temperature versus time

VII. Advantages, Limitations & Applications

a) Advantages

The advantages of the night cooking solar cooker can be summed up as below:

1. Cooking beyond sunshine hours.
2. Indoor cooking facility.
3. Ease of availability of component materials and cost effectiveness of the same.
4. Eco-friendly and no health hazards on the user.
5. The water condensed, provides a source of clean drinking water or can be reused.

Within the given constraints, making a solar cooker that too with traditional means is no easy task. This design though may face greater practical difficulties when enacted but it will be robust enough in principle. Even if it's not a complete solution to the problem of Energy efficiency but the design does add to this cause.

b) Limitations

The limitations of night cooking solar cooker can be summed up as below:

1. Set up is costly.
2. Unavailability of the Phase Change Material.
3. Depends upon the weather conditions.

c) Applications

Following are the various applications of night cooking solar cooker:

A. Number of other applications besides cooking, such as process heating and so on.
B. The lauric acid used as the Phase Change Material is also used as excipient and diluents for solids and liquids in pharmaceuticals.
C. In making artificial resins and plasticizers.
D. In analytical chemistry for boron determinations.

VIII. Conclusion

An exhaustive literature survey was done on the various applications of PCMs. Storage of thermal energy using PCM was studied. The PCM tank was then designed as per the energy requirement to cook for an average family. The experimental setup was then completed by using various valves, nipples, hoses, T-joints etc. The temperature drop from the system was calculated. The charging and discharging characteristics of the PCM was studied in detail.

From the results obtained by the experiment, we were able to conclude that the parabolic trough collector was able to deliver Saline water at a high temperature. The heat passed on to the PCM from the Saline water was sufficient to melt the PCM thereby enabling latent heat storage. This process was called the charging process. In the discharging process, the heat released by the PCM to the Saline water was found to be sufficient to boil water as evidenced by the results of the water boiling test.

In order to improve the performance of the system, a phase change material having a higher heat capacity and melting point can be used. Additionally, based on the cooking range being used, the design of the cooking units can be modified. Moreover, this idea can be extended for use in a number of other applications besides cooking, such as process heating and so on. In a way this Latest Heat Storage System

acts as Panacea to Address, to some extent, Energy Needs of a country like India.

IX. Future Scope

Presently, cooking at night is achieved primarily by burning fuels such as LPG or, in some cases, by utilizing electricity to run, say, a microwave oven. However, LPG is not renewable and its cost is likely to increase as time goes by. Looking at alternative sources of fuel, solar energy might be a plausible solution. The success of this project implies that although solar energy is effectively available for about eight hours at a given place, the same can be utilized throughout the day and partly at night. On the long run, it will be relatively inexpensive when compared to conventional energy sources, it will not pose a threat to the environment or cause its deterioration in any way and its availability will not be a concern to mankind. The scope is positive.

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Global Journal of Science Frontier Research
Physics and Space Science
Volume 13 Issue 5 Version 1.0 Year 2013
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Information Rheology: Information Cannot Test Truth

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Abstract - The statement about the property of some definite thing is not usually the only one. The difference between the stated property and the property of such a definite thing is one type of information rheology. Its origin is that the interaction of a definite thing with other things is incomplete. Based on the definition of customarily-called information and its mathematical expression, this paper points out that information rheology certainly exists. It gives us a caution that information is not necessarily conclusive, and not likely to correspond to definite things. Information is not the criterion, but practice is the sole one for testing truth. It is certain that to study customarily-named information by bringing it to the height of ontology is not promising. Also, the attempt to justify information is hard to be realized.

Keywords : information, information rheology, property of a thing, criterion of truth, ontology.

GJSFR-A Classification : FOR Code: 090408

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Information Rheology: Information Cannot Test Truth

Qiao Tian-qing

Abstract - The statement about the property of some definite thing is not usually the only one. The difference between the stated property and the property of such a definite thing is one type of information rheology. Its origin is that the interaction of a definite thing with other things is incomplete. Based on the definition of customarily-called information and its mathematical expression, this paper points out that information rheology certainly exists. It gives us a caution that information is not necessarily conclusive, and not likely to correspond to definite things. Information is not the criterion, but practice is the sole one for testing truth. It is certain that to study customarily-named information by bringing it to the height of ontology is not promising. Also, the attempt to justify information is hard to be realized.

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I. Starting with the Blind Men and the Elephant

The fable "the blind men and the elephant" in Buddhist Sutra says, there were four blind men by an elephant. The man who felt the elephant's trunk said it was like a pipe. The man who touched the elephant's leg said it was like a pillar. The man who felt its side said it was like a wall. And the man who felt the elephant's tail said it was like a rope. For the same elephant, the four men had different descriptions, ie, different customarily-called information. Likewise, for the same rainbow after a rain, what a man, a cow, a dog or a bee sees is different light bands; while in a spectrum analysis instrument, the rainbow appears another sight. Information does not seem to correspond to certain things, maybe is more likely to have nothing to do with objects. Besides there are contrary examples, ie., the customarily-called information is same but the objects are different: a group of digitals represents a telephone, a landmark, a student, a commodity, the name of a plan, or the amount of a product; a color can express prohibition or pass, connection or disconnection, opening or closing, a man or a woman, being qualified or defective. Similar cases are different persons with same names, cars with fake license tags,.

There may appear more complicated cases such as mispronouncing or misreading massage for message, etc. More example is: the instructions of hackers' invasions can lead to call a maid by a married name, so that to destroy enemy's campaign command system, or steal your bank's deposit.

Usually, the statement about the properties of a certain thing is not the only one. The difference between the stated property of a certain thing and its property is a kind of information rheology. Therefore, the certain, conclusive existence, in point of it being described, is not necessarily the sole one, and not likely to be certain, and even can be unpredictable. And in turn the description of a certain thing with its corresponding one is not likely the sole one. Only such kind of information rheology is enough to give us a caution that customarily-called information is unnecessarily conclusive, and is unlikely to correspond to certain things. It is obvious that customarily-called information cannot become the criterion for testing truth.

Lie, perjury, hypothesis, guess, trial manufacturing, isunderstanding, credulity, illusion, analogy, putting on a play, oral stunt, etc., all of these generate different types of information rheology.

Customarily-called information is general in the social field and nature, so are all kinds of information rheology.

II. Theoretical Analysis of the Source of Information Rheology

In the story of the blind men and the elephant, the elephant touched by the four men can be expressed as follows:

An elephant is said to be a pipe by the first man in Word 1;
The elephant is said to be a pillar by the second man in Word 2;
The elephant is said to be a wall by the third man in Word 3;
The elephant is said to be a rope by the fourth man in Word 4;

Expressing in the following arrays, four pieces of information can be written as:

$Info_1$ = (elephant pipe word 1)
$Info_2$ = (elephant pillar word 2)
$Info_3$ = (elephant wall word 3)
$Info_4$ = (elephant rope word 4)

The above arrays clearly express the same elephant, but the opinions and the words of the four blind men about the elephant are different. Although the

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elements included in the above arrays are different, the formats of information are the same.

Generally speaking, all customarily–called information can be written as the arrays with the above three elements.

Information is the collection of three kinds of properties. It is composed of three parts: the first part is the properties of things themselves, which are based on facts, such as an elephant. The properties of physics, chemistry, biology and society, etc., are conclusive and independent, have nothing to do with any spoken and written language. The second part is the properties of things which are compatible with, responsive to, and simulant of other things. For instance, animals get their claws into their images in mirrors; animals are cheated by other animals' camouflages and die; there are black, white and grey in the eyes of cows, sheep, horses, dogs and cats; dogs are near-sighted; man is unable to see ultraviolet rays and hear ultrasonic waves; reed warblers hatch eggs instead of cuckoos without nests; the probability events occur, Murphy's Law[1] is proved to be correct. More example is, the properties of things that people subjectively think are people's inner thoughts, or those that people express in spoken and written languages or computer programs. Some of the properties of things that people subjectively consider may accord with the properties of the conclusive things, but some may not. Another example is the properties of simulant things that people make by copying conclusive things. The third part is the properties of tools with which other things react the property of a thing, which mainly are the people's inner ideation when they express the properties of things that they consider or the properties of the spoken and written languages, ie., the state of the brain's neurons of a message publisher, or the style of the lines of letters used in the message publication, or the frequency and intensity of sound vibration, etc., or the language and the state of circuit devices (bit) of a computer, and so on.

If we represent the first properties of information definition as X_{jk}, the second part as X'_{jk}, and the third part as X'_{nlfbjk}, and set Info to information, we can formulate the information of things with the following array:

Info= (X_{jk}, X'_{jk} X'_{nlfbjk}) (see the appendix)

Information of anything can be expressed with the array including the above three elements, which is called the general formula of information.

The above exceptional definition of information can contain any information in the universe, and there would be no discrepancy and logical paradox. The array can abstractly express any information in the universe.

[1] Murphy's Law : If there are two or more ways to do something,and one of those ways can result in a catastrophe,then someone will do it..

The information array of the pure natural phenomena, based on things, is as follows:

$$\text{Info}= (X_{jk} \quad 0 \quad 0)$$

The information array of pure lies or historical records without any identification is expressed as:

$$\text{Info}= (0 \quad X'_{jk} \quad X'_{nlfbjk})$$

The information expression of written languages to illiterates, as well as abstract art and animals' sound for the majority of people is:

$$\text{Info}= (0 \quad 0 \quad X'_{nlfbjk})$$

Or written languages, abstract art and animals' sound themselves are conveyed as:

$$\text{Info}= (X_{jk} \quad 0 \quad 0)$$

The array of hidden, disappeared historical events, such as the information of the height, weight, appearance and characters, etc. of some earthman's ancestor 500 years ago, is:

$$\text{Info}= (0 \quad 0 \quad 0)$$

When something does not exist, the approximate coefficient does not make any sense, for example, a lie or a perjury, etc., is still represented as:

$$\text{Info}= (0 \quad X'_{jk} \quad X'_{nlfbjk})$$

Customarily–called information is the collection of three kinds of properties of things, in which some are relatively stable while some are unstable. In the first kind, the relatively-fixed properties of things are as the freezing, melting and boiling points of water, the composition of most chemical elements and compounds, and so on. But events happened in ancient, modern and present-day societies, or just now, may hardly be confirmed entirely. The second kind is mainly related to man. Because of varied individuals, the properties which people think and copy are usually unstable or hard to be perfect. In other words, the interactions of certain things with other things are often incomplete and incompatible. Therefore, the second kind is variable. The third kind is the properties of tools used in expressing the properties of things, which is related to man, and even more with the factors of time and region, etc. For instance, for the same thing, Chinese ancient language, modern language, network language, pictographs, oracle bone inscriptions, traditional characters and simplified forms, are different. In the world there are more than 4200 oral languages and about 500 written languages. The instruments used in the early computers vary from the present ones. Different schools of art have different representations. So, the third kind of tool properties is diversified. All sorts of information rheology formed by all the above variations undoubtedly warn us that customarily-named

information is not completely reliable, and we must not have information superstitions. Therefore, information cannot become the primary principle point.

Info= $(X_{jk},\ X'_{jk}\ X'_{nlfbjk})$, the mathematical expression of customarily-named information, can perfectly interpret any complicated information and is flawless, hence, is called the general formula of information. It is the theoretical foundation to explain the inevitable exist of information rheology.

III. About Wiener's Information Maze

In 1948, Norbert Wiener (1894-1964), the founder of cybernetics, said: "Information is information, not matter or energy. No materialism which does not admit this can survive at the present day." As a result, he introduced the conception of information in the theory of communication into philosophy, and built an "information maze". Consequently, philosophical research workers have been participating in the study of defining the connotation of information for 60 years. People fell into the perplexity, which is similar to searching for the medium propagating electromagnetic waves, and the verification of "Ether" hypothesis at the end of 19th century. The academic circles have been arguing about the definition of information for several decades. Statistics show there were 130 definitions of information until 1980s. Even Shannon (C. E. Shannon 1916-2001), the founder of information theory, issued a statement that a single conception of information could hardly be expected to be satisfactorily responsible for various possible applications in the general fields.[2] The definition of information and its general formula of mathematics given in the paper is helpful to finish the decades' philosophical exploration about the conception of information, and thereby find out our way out of Wiena's information maze.

The inevitable occurrence of information rheology stipulates that information is necessarily variable, and it certainly cannot test truth. The criterion for testing truth is the complete and close practice, and the essence of this practice is exactly to show or verify the properties of things. To study customarily-named information by bringing it to the height of ontology is not promising. It needs a difficult process to justify information.

Appendix

We can use the following arrays to interpret the above customarily-named information:

$$\text{info}_1=\begin{pmatrix} P_{11} & P_{12} & .... & P_{1n} & P'_{11} & P'_{12} & .... & P'_{1n} & P'_{nlfb11} & P'_{nlfb12} & .... & P'_{nlfb1n} \\ C_{11} & C_{12} & .... & C_{1n} & C'_{11} & C'_{12} & .... & C'_{1n} & C'_{nlfb11} & C'_{nlfb12} & .... & C'_{nlfb1n} \\ B_{11} & B_{12} & .... & B_{1n} & B'_{11} & B'_{12} & .... & B'_{1n} & B'_{nlfb11} & B'_{nlfb12} & .... & B'_{nlfb1n} \\ .... & .... & .... & .... & .... & .... & .... & .... & .... & .... & .... & .... \\ S_{11} & S_{12} & .... & S_{1n} & S'_{11} & S'_{12} & .... & S'_{1n} & S'_{nlfb11} & S'_{nlfb12} & .... & S'_{nlfb1n} \end{pmatrix}$$

$$\text{info}_2=\begin{pmatrix} P_{21} & P_{22} & .... & P_{2n} & P'_{21} & P'_{22} & .... & P'_{2n} & P'_{nlfb21} & P'_{nlfb22} & .... & P'_{nlfb2n} \\ C_{21} & C_{22} & .... & C_{2n} & C'_{21} & C'_{22} & .... & C'_{2n} & C'_{nlfb21} & C'_{nlfb22} & .... & C'_{nlfb2n} \\ B_{21} & B_{22} & .... & B_{2n} & B'_{21} & B'_{22} & .... & B'_{2n} & B'_{nlfb21} & B'_{nlfb22} & .... & B'_{nlfb2n} \\ .... & .... & .... & .... & .... & .... & .... & .... & .... & .... & .... & .... \\ S_{21} & S_{22} & .... & S_{2n} & S'_{21} & S'_{22} & .... & S'_{2n} & S'_{nlfb21} & S'_{nlfb22} & .... & S'_{nlfb2n} \end{pmatrix}$$

$$\cdots\cdots\text{info}_m=\begin{pmatrix} P_{m1} & P_{m2} & .... & P_{mn} & P'_{m1} & P'_{m2} & .... & P'_{mn} & P'_{nlfbm1} & P'_{nlfbm2} & .... & P'_{nlfbmn} \\ C_{m1} & C_{m2} & .... & C_{mn} & C'_{m1} & C'_{m2} & .... & C'_{mn} & C'_{nlfbm1} & C'_{nlfbm2} & .... & C'_{nlfbmn} \\ B_{m1} & B_{m2} & .... & B_{mn} & B'_{m1} & B'_{m2} & .... & B'_{mn} & B'_{nlfbm1} & B'_{nlfbm2} & .... & B'_{nlfbmn} \\ .... & .... & .... & .... & .... & .... & .... & .... & .... & .... & .... & .... \\ S_{m1} & S_{m2} & .... & S_{mn} & S'_{m1} & S'_{m2} & .... & S'_{mn} & S'_{nlfbm1} & S'_{nlfbm2} & .... & S'_{nlfbmn} \end{pmatrix}$$

[2] Shannon C. E. (1993), Collected Papers Ed. by N. J. A. Sloane & A. D. Wyner (Los Alamos, Ca: IEEE Computer Society Press), p.180.

In the formulas, P expresses the attribute of physics, indicates the attribute of chemistry, B deputies the attribute of biology … and S substitutes for the attribute of society, etc. instead of X, every property of information expressions in the paper; m is the number of categories of the sub-systematic things in some systematic thing, m=1, 2, 3…; and n is the number of the different attributes of every sub-systematic thing, n=1, 2, 3…

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Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than 1.4 × 10-3 m3, or 4 mm somewhat than 4 × 10-3 m. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

Structure

All manuscripts submitted to Global Journals Inc. (US), ought to include:

Title: The title page must carry an instructive title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) wherever the work was carried out. The full postal address in addition with the e-mail address of related author must be given. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining and indexing.

Abstract, used in Original Papers and Reviews:

Optimizing Abstract for Search Engines

Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:

- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

The Editorial Board and Global Journals Inc. (US) recommend that, citation of online-published papers and other material should be done via a DOI (digital object identifier). If an author cites anything, which does not have a DOI, they run the risk of the cited material not being noticeable.

The Editorial Board and Global Journals Inc. (US) recommend the use of a tool such as Reference Manager for reference management and formatting.

Tables, Figures and Figure Legends

Tables: Tables should be few in number, cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g. Table 4, a self-explanatory caption and be on a separate sheet. Vertical lines should not be used.

Figures: Figures are supposed to be submitted as separate files. Always take in a citation in the text for each figure using Arabic numbers, e.g. Fig. 4. Artwork must be submitted online in electronic form by e-mailing them.

Preparation of Electronic Figures for Publication

Even though low quality images are sufficient for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit (or e-mail) EPS (line art) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings) in relation to the imitation size. Please give the data for figures in black and white or submit a Color Work Agreement Form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution (at final image size) ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs) : >350 dpi; figures containing both halftone and line images: >650 dpi.

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Figure Legends: Self-explanatory legends of all figures should be incorporated separately under the heading 'Legends to Figures'. In the full-text online edition of the journal, figure legends may possibly be truncated in abbreviated links to the full screen version. Therefore, the first 100 characters of any legend should notify the reader, about the key aspects of the figure.

6. AFTER ACCEPTANCE

Upon approval of a paper for publication, the manuscript will be forwarded to the dean, who is responsible for the publication of the Global Journals Inc. (US).

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The corresponding author will receive an e-mail alert containing a link to a website or will be attached. A working e-mail address must therefore be provided for the related author.

Acrobat Reader will be required in order to read this file. This software can be downloaded

(Free of charge) from the following website:

www.adobe.com/products/acrobat/readstep2.html. This will facilitate the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof.

Proofs must be returned to the dean at dean@globaljournals.org within three days of receipt.

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Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. Evaluators are human: First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. Ask your Guides: If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. Pick a good study spot: To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

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- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

Criterion for Grading a Research Paper (Compilation) by Global Journals Inc. (US)

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Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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ISSN 9755896