

On the Nature of Time and Energy

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ABSTRACT

The work of the Russian scientist Nikolai A. Kozyrev, in experiments he conducted on causality, found evidence of an energy to time, that has no momentum and appears everywhere at once, no matter what the distance. And this phenomena may be related to quantum non-local effects. That this energy of time may be inversely proportional to the square of the distance, that this relation might be found in other phenomena, specifically on quantum effects found in the wheeler and Feynman absorber theory for retarded and advanced fields. And further suggests an experiment that might produce advanced fields that don't self-cancel out, in a cavity in a SQUID superconductor. Also that energy of an advanced field or a body travelling into the past may be conserved from considerations of the German Mathematician Emmy Noether's (1918) theorem. That the relation of time times energy of Planck's constant, $tE=h$, might be related fundamentally to the time energy leaking into our 3-dimensional space from the 4th-dimension, producing what we call vacuum energy (and might be a way of using the energy of time to do work), and be a way of uniting the time dimension of relativity to quantum theory. And also this vacuum energy can be seen as the dark energy as the cosmological constant, being the energy of the 4th-dimension causing the accelerated expansion of the universe.

Keywords: advanced fields; energy; inertia; gyroscope; wheeler-feynman absorber theory.

INTRODUCTION

In a paper by the Russian scientist [1] Nikolai A. Kozyrev, from theory and experiments with gyroscopes, on considering the causal pattern in time, Kozyrev came to the conclusion that time has an energy. In my correspondence with Japanese scientist Takaaki Musha [7][4], he refers to a paper that he wrote as a student (never published), were he theoretically considered time as an energy wave, which lead me to write a paper on this[4], of the consideration that one might use the energy of time to do work, to manipulate time. Kozyrev came to the conclusion that time does not have momentum, but possesses energy.

In my treatment of Kozyrev's work, I go over each of his conclusions in this paper. Kozyrev also comes to the conclusion that time energy is not propagated but appears immediately everywhere at once, in the causal pattern of cause and effect, and discovering its related to the law of inverse proportionality of the first power of the distance. I find in another paper, the Wheeler and Feynman Absorber theory [2] that retarded fields causally passing points in the process of cause and effect, falls off by the law of inverse proportionality of the first power of the distance, and I speculate if there is a relation here?

From this I consider from the paper of Wheeler and Feynman Absorber theory[2] of an possible experiment of producing advanced fields in a cavity in a SQUID superconductor, from the work of Bajlo[3] who first detected advanced waves, where by, if one minimizes the size of the absorber (cavity) from the source particle in the centre of the cavity, that advanced fields produced there could be made not to self-cancel.

I go on to consider the nature of energy conservation of Emmy Noether's theorem, that energy is conserved for advanced and retarded fields, for energy travelling into the past.

I also come to the conclusion that an entropy state may not exist for a photon, from its relativistic frame. And this is due to the fact that a photon dose not experience time, or that time is frozen for a photon. So that a photon can never decay, and that entropy for a photon does not exist.

Lastly, I consider the relation of time times energy of Planck's constant, $tE=h$. That the energy of time might leak energy from the 4th dimension into our 3-dimensional space and appear as vacuum energy, that Planck's constant being fundamentally related to all quantum processes, that then the relation of time and energy is related to the nature of this time energy fundamentally to all quantum processes. As an example, Kozyrev concludes that the time energy appears everywhere all at once across the universe in an instant moment of causality, but does not have momentum. And I speculate if quantum non-local effects are influenced by this time energy, in that non-local effects of particles, when one particles spin say is measured, the other particles spin is effected immediately, irrespective of the distance.

I consider the nature of the ZPF field or vacuum energy in relation to it being a cause of inertia in accelerating body's, and that this is how one might unify quantum theory and Relativity, and further suggest one could unite the time dimension of Relativity to quantum theory. Because I know the reason, they can't unify Relativity with quantum theory, is that gravity can't be quantized. Of course, what I have suggested is speculative in nature. I finish with considerations of Einstein's field equations of the cosmological constant, and wonder if the vacuum energy having leaked into our dimension from the 4th dimension is in fact the dark energy, that is causing the accelerated expansion of the universe.

EXPERIEMENTS ON CAUSAL PATTEN OF TIME

In a paper by a Russian scientist[1] Nikolai A. Kozyrev, from an English translation from Kozyrev's Book: Causal or unsymmetrical Mechanics in linear approximation, Pulkovo Observatory 1958 (In Russian), based on work done more than 50 years ago, is unique in the archives because it contains both theoretical and experimental results that bear on the causality principle. Kozyrev did a set of experiments with an measurements on the motions of various arrangements of aircraft navigation gyroscope suspended from a torsion pendulum. He got ratios essentially equal to the ratio of the time - retarded transverse component to the radial component of the Earths gravitational field, and more interestingly found that time has a energy.

I discuss here aspects of interest in this paper. In their experiments they consider examining time by the process of causality from the cause to the effect by the speed of light, being the speed of causality between events from cause to the effect. They use the relation,

$$\frac{\delta x}{\delta t} = c^2$$

One thought that occurs to me about this relation is that light is the speed of causality and of time in the above simple relation, yet paradoxically at the speed of light, from the frame of a photon, time does not exist for that photon. One way of getting around this paradox is to liken it in analogy of an observer in free fall, from this observers frame where gravity has disappeared and can be regarded at rest. Do we get a similar effect for a photon, dose the time field disappear at the speed of causality, a frozen instant for a photon?

In regard to the relation,

$$\frac{\delta x}{\delta t} = c^2$$

They explain the relation of light considering the causal pattern in vector from, having signified by i , the unit vector of the direction of the causal resultant relationship,

$$c^2(i\delta t) = \delta x$$

They go further saying, in using gyroscopes for their experiment considering the reaction force R (or inertia),

$$R^o = -ic^2 \frac{\delta p^2}{\delta x}$$

Where R^o = Reaction force
and δp^2 = Causal point

This, the third Newtonian law proves to be the direct result of the properties of causality and pattern of time. The effect and counter effect comprise two facts of the identical phenomenon, and between them a time discontinuity cannot exist. Kozyrev explains how time has energy, in the paper they say time enters a system through the cause to the effect. The rotation (of a gyroscope) alters the possibility of this inflow, (of time), and as a result, the time pattern can create additional stresses in the system. From this it follows that time has energy. Since the additional forces are directed oppositely, the pulse (momentum) of the system does not vary (in gyroscope). This signifies that time does not have a pulse (momentum), although it possesses energy.

The question I ask here is, could there be a way of making work out of the energy of time, as the time pattern can create additional stresses in the system, and instead of

using a gyroscope, to produce the same effect by using a superconductor with electromagnetic fields, (the whole system set up like a gyroscope), to produce these additional stresses in the superconductor's electromagnetic fields?

In their experiments with gyroscope's, they find that the weight of the gyroscope increases and decreases due to the direction of the spin by the rotation of the Earth. They say further that time not only has energy, but also rotational moment which it can transmit to the system. They talk also in their experiment that there exists a variable property which can be called the density of time. But I ask what does this mean? It can only make sense if time has a energy.

They point out, because of this, that in late Autumn and in the first half of Winter all the tests could be easily managed, but in Summer their experiments became difficult to do, to such an extent that many of them could not be completed. In one of their experiments with a pendulum and raising and lowering of 10kg weight suspended through a unit distance, they had effects(force effects), that after repeated and careful measurements, demonstrated that this effect diminishes not inversely proportional to the square of the distance, as in the case of force fields, but inversely proportional to the first power of the distance.

They give the view from their experiments on time, that the transmission of energy of time, without momentum, (pulse) should still have the following very important property: Such a transmission: i.e. it cannot be propagating because the transmission of the pulse (momentum) is associated with propagation. This circumstance follows from the most general concepts concerning time. Time in the universe is not propagated but appears immediately everywhere. On a time, axis, the entire universe is projected by one point. Therefore, the altered properties of a given second will appear everywhere at once, diminishing according to the law of inverse proportionality of the first power of the distance. It seems to them, (Kozyrev and his team) such a possibility of the instantaneous transfer of information through time. But I think, can't this also mean the instantaneous transfer of the time energy making up the causal pattern in nature.

This causal process of instantaneous effect of the energy of time everywhere, that we term causality through the points, $ax^1, ax^2, ax^3, \dots \dots ax^n$ could be considered in terms of Takaaki Musha's[7] idea of time as a energy wave[4]. (Takaaki Musha's idea of time as a energy wave was suggested to me by him, in his correspondence, to which I wrote a paper [4] on how one could make this energy of time do work.) This instantaneous effect of the energy of time, this process might also take place in the quantum non-local effects of two particles separated by a large distance, where a measurement of one particle instantaneously effects the other particle. Not only would the energy wave of time take place causing the present now instantaneously, that we call now, but also the past and the future. Perhaps this can explain how a photon can go through two slits in a quantum diffraction experiment at the same time. Although the particles in non-local effects have momentum in our space dimension, the energy of time might be involved in causing this instantaneous non-local effect of these particles? I have also considered the possibility of how one could use the energy of time [4] to do work, to manipulate time?

They found in these experiments with vibrations of the mounting point of a pendulum, additional forces of the time pattern which developed, did not disappear immediately with the stoppage of the vibrations, but remained in the system for a considerable period. Their relaxation, does not depend on the mass of the body, but its density.

In this manner they found that t° , may be inversely proportional to the square root of the body's density, not its mass. From this the thought occurred to me, when a pulsed field oppose, when electromagnetic fields oppose each other, there is no net field vector, yet the stress on the fabric of space (or the stress-energy tensor of general relativity) increases. This could be done with a SQUID (Acronym for superconducting quantum interference device, typically 0.5cm or so across. The whole system behaves like a single quantum particle 0.5cm across.). Other superconductors could be used, but the point is, would the stress - energy of opposed electromagnetic fields set up in such a system, oppose to create an density to see if additional forces of the time pattern that developed in an pendulum, also appear in a superconductor, that develops there and does not disappear immediately?

EXPERIMENT OF PRODUCING ADVANCED WAVES IN A CAVITY IN A SUPERCONDUCTOR [2]

In Wheeler and Feynman's classic Absorber theory of advanced and retarded waves, it occurred to me of doing an experiment of getting these advanced waves in a SQUID superconductor, so that the advanced waves do not cancel out. The way to do this, is in the way Bajlo[3] did it in detecting for the first time advanced waves, using radio transmitters, so that they do not cancel out. But here instead of a radio transmitter, one is using a cavity in a superconductor, the sort of cavity illustrated in Wheeler and Feynman's paper on Absorber theory, Fig 1 p173[2], where the appearance of advanced effects is unavoidable in the case of a system which is an incomplete absorber.

So that the advanced waves don't cancel out in the cavity, is to have some part of the cavity, or absorber smaller than the emitter or radiating particle in the centre of the cavity. As Bajlo says [9], the solution to this measurement problem is to minimize the influence of the measuring instrument on the phenomenon being measured, where its advanced waves cannot completely cancel out advanced waves of the emitter. This is how Bajlo was the first person to detect advanced waves with radio transmitters and why no one had before this, detected advanced waves before, but his experiments were based on the Wheeler and Feynman Absorber theory and experimentally confirm this.

Such an experiment could be done in a SQUID or any other superconductor, obviously in this paper by Wheeler and Feynman is talking of a cavity and a point source particle in the centre of the cavity, where its interacting with the absorber (the cavity wall) that produces advanced and retarded fields that self-cancel and only leave retarded field left[9]. But my suggestion here after Bajlo is to minimize some part of the size of the absorber, that is the cavity, so that the advanced fields produced there, do not cancel out. How would such advanced field behave in a superconductor, there be travelling into the past. Of course, one could feed advanced waves into a superconductor after the manner that Bajlo did it. Such an experiment could be done in Takaaki Musha's Honda experiment[5] where it was found he got weight reduction in a dielectric by feeding an electrical field into a capacitor, and where I suggested to him an experiment[12] of feeding advanced waves into a capacitor after Bajlo to see if the weight reduction or mass shift of the dielectric is shifted into the past. But perhaps one could try this experiment also with a superconductor? How would the advanced waves or fields behave in a superconductor, because there be travelling into the past.

ON THE NATURE OF ENERGY OF TIME AND CAUSAL NATURE OF ENERGY IN OUR DIMENSTION

In Wheeler and Feynman Absorber theory [2] on p167 of

the paper, he talks of effects that fall off at large distances of a retarded field that's inversely as the first power of separation. This effect is also described and found in the same effect in the paper by Nikolal A. Kozyrev [1] that has already been mentioned at the beginning of this paper on the experimental study of the properties of time, or causal pattern of time. Considering both effects of this power law, were found in both papers, I wonder if there is a deeper relation here?

On page 167 of Wheeler and Feynman Absorber theory [2] they say; thus, the retarded field of (*am* a similar space-time coordinate of a typical point on the world line of the *ath* particle) is found to be given by the expression,

$$R_{mn} = e(\dot{a}\mu x a^u)^{-2}(\ddot{a}m x a n - a n x a m) + e(1 + \ddot{a}\mu x a^u)^{-3}(-\dot{a}m x a n + a n x a m)$$

All terms in this expression fall off at large distances inversely as the first power of the separations *xa*. This is how the retarded field is found to fall off (as said above). I notice in the other paper [1] by Kozyrev, the same relation, they say, tests with pendulum, the effect depends only on the distance (spacing) inversely proportional to the first power of the distance. Else- where in this paper, they say on a time axis, the entire universe is projected by one point. Therefore, the altered properties of a given second will appear everywhere at once, diminishing according to the law of inverse proportionality of the first power of the distance.

The above relations of inverse proportionality of the first power in a retarded field, and pendulum and a second, may hint that the time pattern or time energy or wave effect is responsible here, and not only for retarded fields but also for advanced fields.

This can be considered in the equation of Wheeler and Feynman Absorber theory;

$$\left[\frac{1}{2} F_{ret} - \frac{1}{2} F_{adv} \right] mn = \left(\frac{2e_a}{3} \right) (a m \ddot{a} n - \ddot{a} m a n)$$

Fret = retarded field, *Fadv* = advanced field

This equation describes a field completely determined by the motion of a particle itself; denoted as the radiation field, by Dirac, accounts for the normal force of radiative reaction. The relation of inverse proportionality of the first power in retarded *Fret*, and advanced *Fadv* fields falling off with distance, of points on a world line, $ax^1, ax^2, ax^3, \dots ax^n$, may hint that the causal pattern of time applies at each point everywhere in the present causal moment of the time energy wave, takes place, not only in advanced and retarded fields, but all other causal events in nature, that is in the future and the past.

The retarded field of *xa*, a point along the time line of advanced and retarded fields or radiation in Wheeler and Feynman Absorber theory [2]. taken place according to the law of inverse proportionality of the first power of the distance in radiative damping (inertia). This is the normal causality of time.

$$\sum_{k \neq a} F_{ret}^{(k)} + \left(\frac{1}{2} F_{ret}^{(a)} - \frac{1}{2} F_{adv}^{(a)} \right) - \sum_{all k} \left(\frac{1}{2} F_{ret}^{(k)} - \frac{1}{2} F_{adv}^{(k)} \right)$$

Of these terms the 3rd has been shown (In Wheeler and Feynman's paper) to vanish for a complete absorber. The 2rd gives rise to the phenomenon of radiative damping (inertia).

(This is what I said could take place in my paper [6], Is Abraham damping constant and inertia in matter a consequent echo of its future state).

All the points, $xa^1, xa^2, xa^3, \dots \dots \dots xa^n$, in retarded field diminishing to the first power of the distance, the effects will appear everywhere at once in the causal pattern of time in the present moment, that time dose not propagate through these events with momentum,(even if the events do), but appear immediately everywhere at each point xa^n , in the present moment. Is this how the time energy wave travels in the process of cause and effect, from the present to the future and the past.

In regard to a paper I wrote [4] to time having an energy or energy wave, and first thought of by Takaaki Musha [7] as a student, how does this relate to the normal movement and transfer of energy in physics. That is normal energy in our 3-dimensions, propagate with momentum, kinetic energy, etc., through time, in a causal pattern. But the time energy dose not propagate with momentum in our dimension, but instantly everywhere through points, $xa^1, xa^2, xa^3, \dots \dots \dots xa^n$. How does the energy of time relate or assist the normal causal transfer of energy in our dimension, from the time 4th dimension x^4 .

We can regard it as assisting the causal transfer of energy everywhere in the present moment now and into the present, future and past. Obviously in all of this, the conservation of energy must apply and along with considerations on how to use this energy of time to do work, to manipulate time? The conservation laws of energy might be deeply connected to this time energy, because of such laws, energy does not change, it is conserved.

Time is frozen at the speed of light, like the principle of equivalence where the gravitational field disappears from the frame of an observer in free fall, who can regard himself at rest, do we then assume an similar effect where from the frame of a photon the time field disappears, does not exist for that photon, but paradoxically the speed of time, or causality is at the speed of light from our frame. Is this not a frozen instant, a causal moment frozen, which is an instant for the frame of a photon, even if it has travelled 10,000 light years, but from our frame 10,000 years has past.

How to get the energy of time to do work, to manipulate time. In the paper by Kozyrev [1], where he talked at the beginning, where stresses to the gyroscope, where they concluded that it means time has an energy, might be a clue to accessing this energy. If time had a energy it might be infinite in the 4th dimension, it would have to be infinite, and in the paper by Kozyrev[1] he says that up to now physics has been inadequate in giving an explanation of what time actually is, for time in physics is merely represented only as a duration of a set of coordinate's.

ON THE NATURE OF ENERGY CONSERVATION AND OF TIME

I think we need to consider the nature of energy in our dimension, and consider how time helps the transfer of energy in the causal process in the present and the past and future. The German Mathematician (1918), Emmy Noether proved the following fundamental connection, that every continuous symmetry of a physical system corresponds to a conservation law. There must be a corresponding physical quantity that does not change over time, and therefore referred to as a conserved quantity. For the translation symmetry in space, this conserved quantity is simply e.g, the total momentum of the solar system, that the conservation of momentum is a consequence of the translation symmetry of our world, (no change of momentum), this exactly is the principle of inertia, but the

time energy does not have momentum.

The proof of Noether's theorem is due to the principle of least action, but for time to have an energy, it is not propagated, does not have momentum in our dimension, but appears everywhere instantly in the causal present. The principle of least action describes the motion of a ball, that will move in a parabola when thrown. This is the principle of least action, it's the way energy is conserved for the ball, it will take the quickest or shortest way to travel. The same with the nature of light and refraction and reflection. This is the way energy behaves in our dimension and for light to take the shortest path or go through 2 slits in a diffraction experiment, in quantum physics, and in the nature of inertia, is all to do with the conservation of energy in our 3-dimensional reality.

Regarding the equation of Wheeler and Feynman in Absorber theory'

$$\sum_{k \neq a} F_{ret}^{(k)} + \left(\frac{1}{2} F_{ret}^{(a)} - \frac{1}{2} F_{adv}^{(a)} \right) - \sum_{all\ k} \left(\frac{1}{2} F_{ret}^{(k)} - \frac{1}{2} F_{adv}^{(k)} \right)$$

of these terms the 3rd has been shown to vanish for a complete absorber. The 2rd gives rise to the phenomenon of radiative damping, this is inertia created by advanced F_{adv} , and retarded F_{ret} , fields which are said above, has to do with the conservation of energy, and inertia is a process of the echo in a body of its own future (F_{adv}) state in resistance to the force of acceleration.

The fact that equations don't change is called time invariance, there is a reason why energy is conserved, it's because of time invariance, we assume then that energy must be conserved both in the past, present and the future, and for advanced F_{adv} and retarded F_{ret} fields, and energy or mass travelling into the past is conserved, and that this must apply to the advanced waves that Bajlo detected [3] travelling into the past.

Do we assume that the energy of time is conserved, also such an energy has to be infinite in the 4th-dimension. Are there paradoxes here with the notion of infinite energy? Nothing is known about the 4th-dimension of time, its energy would have to be infinite for the whole universal pattern of causality throughout the whole universe. On the one hand an infinite universe may lead to the paradox of infinite energy, would it be conserved globally? But time if it is energy would be infinite, but this is a subject that no one up to the present has any idea about or knows?

Energy times time $tE = h$, has to have the dimension of Planck's constant h, (I be coming back to this later in this paper) energy does not change in time, it is conserved. In the paper by Kozyrev [1]'Possibilities of experimental study of the properties of time, in page 199 he says for the formulation of experiments, it is important to have a foreknowledge of the value of the expected effects which depend upon the value $c^2 = 0$. They estimate the numerical value of $c^2 = 0$, using atomic mechanics and proceeding from dimensionality concepts. They use the universal constant of Planck's constant h.

To calculate the causal pattern in time and are able to derive that time has an energy in their experiments using,

$$c^2 = \frac{\alpha e^2}{h} = \alpha X350km/sec$$

At such a value for c^2 , $10^{-4}, 10^{-5}$, the forces of the time pattern can easily be revealed in the simplest experiments, and it follows from the above that energy times time, being Planck's constant h, must play a fundamental role here,

that energy does not change in time, it is conserved. I will go back to the role of h , later in this paper in relation to the nature of time.

Take the example of a roller coaster, the conserved energy is as usual the kinetic energy, plus the potential energy. A system that has energy in a state of low entropy is one whose energy you can use to create macroscopic changes, for example, the driving of a turbine. If energy in a system is related to high entropy, the energy is useless, what physicists call heat, and heat cannot do work. An expanding universe is not time - translation invariant, so Noether's theorem does not apply, does not mean energy is not conserved, it means that energy cannot be defined. Energy of light in an expanding universe is not conserved in general relativity, what physicists call free energy, is in general not conserved because of entropy increase. According to Takaaki Musha's idea[7] of time as a energy wave that helps the motion of matter and energy, the causality of energy in our dimension, I am thinking perhaps such energy of time has low entropy, and be infinite energy, but here I could be mistaken because time as an energy does not have momentum in our dimension but appears everywhere at one instant, perhaps it does not have entropy an state?

What is the entropy state of a photon? Time is frozen at the speed of light, is the speed of the causal pattern in our dimension, so is the energy of time at the speed of light frozen? But lights wavelength in a expanding universe gets stretched and loses energy. But what makes light then always travel at c ? Is light fundamentally connected to time in some special way, are all the constants of nature so connected?

Strange thing to think of what the entropy state is of light of a photon, but a photon is frozen at light speed, where time is frozen, such a photon in this frame has no entropy? because time does not exist for a photon. And especially in quantum physics, where a photon goes through two slits in a quantum diffraction experiment at the same time, or in non-local effects instantly no matter what the distance. Then we can ask what is the entropy state of an advanced wave travelling into the past? Again, an advanced wave is a electromagnetic wave, has photons, therefore time does not exist for the photons of an advanced electromagnetic wave. There must be no change, no entropy, no time for a change in entropy. This is perhaps why light is a constant. But the paradox of all this is that photons do have momentum, electromagnetic waves do travel, but the energy of course is conserved. This explains why for a photon from travelling say 10,000 light years, is but an instant for that photon, but for us 10,000 years has past. If entropy operated here, the photon might decay, may not make those 10,000 years, but it does make it, and entropy must not exist for a photon.

Well we know because of Emmy Noether theorem that energy is conserved for energy or mass of an object travelling into the past. One can say this of advanced waves, that Bajlo detected, yes but what is an object of mass's entropy state travelling into the past? Because an object with mass is not a photon. Now this is a odd state of affairs, because normally increase of entropy in our dimension seems to imply the forward causal direction from the present to the future and past. But the entropy state of an object travelling into the past? And there is no clue as to what the true energy state is of time in the 4th - dimension? There is the corresponding physical quantity that does not change over time, and is therefore referred to as a conserved quantity, this is momentum and energy. I am beginning to think that the nature of energy and of light photon's nature must be fundamentally connected to

the energy of time, for energy to do work, and travel through the causal pattern, and that conserved quantity's like energy, that does not change through time, might have something fundamentally connected to the energy of time, perhaps all the conservation laws are?

As you know the Hamiltonian, is the sum of the systems kinetic (velocity dependent) and potential (potential - dependent) has the ability to do work, refer to the potential energy. So if we want to use the energy of time, it might have to be in the form of its potential energy to do work, to manipulate time. But we can only measure differences in energy, one can't measure potential energy. And again it must be said that the energy of time must be fundamentally connected to how energy in our dimension, is transferred to do work and be transformed into other types of energy in the causal pattern, $ax^1, ax^2, ax^3, \dots \dots ax^n$, of events of cause and effect in the present moment of now, and also in the process of where things become the present, the future and the past. Again because of Emmy Noether's theorem, we know that energy is conserved in the past, present and future, for advanced waves travelling into the past, that the energy of advanced waves is conserved. Einstein believed the past (and the future) are real places, real realities, (that one could visit), that energy of the past world in this view must also be conserved and from the frame of someone in the past or the future, will be there present now from their own experience, and that the energy of the time pattern, of causality must operate just as it does for us. Of course, this also begs the question how is the past and future fixed as realities that one could visit. As I said earlier, I outlined in a paper [12] a possible experiment, of feeding advanced waves into a capacitor to see if the mass shift of a dielectric is shifted into the past?

And also concerning the nature of energy, we can say in the present now, energy is transferred, but how is it fixed in the past, so that if we were to visit that past, the energy would then be transferred as when it was in the present. So if the past does exist as a reality as well as the future, how is it fixed in the past and in the future. Michael Lockwood expresses in his book [8], *The labyrinth of Time*, Einstein's view of the past existing as a reality, p53-54;

"Relativity, as Einstein saw it, supports a tensless conception of time. From this perspective, a person who is not living now, but did or will live at other times, exists in just as substantial a sense as someone who does not live here, but only at some other place. If Einstein is right, the terms, 'past', 'present', and 'future', do not express objective differences between times, any more than, 'to the west', 'here', and 'to the east', express objective differences between places. Living in the early sixteenth century, from the standpoint of the early twenty-first century, should accordingly be thought of as analogous to living in Bangalore, from the standpoint of Oxford. Regarded in this light, death is not the deletion of a person's existence. It is an event, merely, that marks the outer limit of that persons extension in one (timelike) spatio-temporal direction. The concept of space-time, as understood by Einstein, makes this more than just a metaphor. Einstein is urging us to regard those living in times past, like those living in foreign parts, as equally out there in space-time, enjoying the same flesh-and -blood existence as ourselves. It is simply that they and we inhabit different regions of the continuum". He says further, p54;

"If our loved ones are to be thought of as being out there in space-time, as real as ourselves, then so are Hitler, Jack the ripper, and Atilla the Hun! So also, are the old unhappy, far-off things, and battles long ago, of which Wordsworth speaks.

What really gives us pause, however is the reflection that the same way of thinking that, as applied to the past, may, when applied to the future, to imply a denial of free will. For the conception of time that Einstein is promoting, clearly implies that the future objects and events, including therefore, our own future actions, are likewise out there in space-time, as real as present or past actions".

But does this make sense in regard to the concept of a flow of time. The flow of time is one of the most mysterious concepts. The standard theories of physics do not currently address the issue. This has led some physicists to state that time does not flow, we only think it does. The equations of physics that uses to make calculations don't address the flow of time. Since the flow is not part of current physical theory, some regard it must not exist. I consider that logic to be ridiculous, the role of physics is to account for reality not to deny it. Einstein tried but failed to account for the flow of time. In Einstein's theory that in any coordinate system, you can stand still, that to have zero coordinate velocity, but you can't stand still in time, that is the mystery. Time is a different kind of dimension. But if you travel at the speed of light, like a photon, time for that photon does not exist, and you then could stand still in time, here time stops, is frozen, does not exist for you in that frame, and paradoxically the speed of time, is the speed of causality at the speed of light.

ON THE RELATION TIME TIMES ENERGY AND PLANCK'S CONSTANT

In regard to the notion that time has energy, according to this Russian scientist's Nikolai A. Kozyrev, that the causal pattern of cause and effect of energy transfer in our 3-dimensions, must be influenced by this time energy wave in the normal causal pattern of time, to everything in our world and the whole universe. We can see that the relation of time times energy, $tE = h$, is equal to Planck's constant h , a fundamental constant in all quantum processes. Therefore, the energy of time must operate in this causal pattern, (and lead to the paradoxes of quantum theory) of such energy to the behaviour of all quantum processes at a fundamental level.

The dimension of Planck's constant is the product of time multiplied by energy, is related to such things as the quantization of light and matter. h is also related mass to frequency. Time times energy, $tE = h$ has the dimension of Planck's constant, that energy does not change in time, it is conserved. We can look at Heisenberg's uncertainty principle for energy and time'

$$\Delta E \times \Delta t = \frac{h}{2\pi}$$

This says the shorter the time interval, the greater the energy uncertainty ΔE must be in order to ensure that the product of ΔE and Δt is equal to $\frac{h}{2\pi}$

Any uncertainty in the energy of a physical system can be attributed to an uncertainty, Δm in the mass. Thus,

$$\Delta E = \Delta m \times c^2$$

Combining this expression, we obtain Heisenberg's uncertainty for mass and time,

$$\Delta m \times \Delta t = \frac{h}{2\pi c^2}$$

This means that over a very brief interval Δt of time, we cannot be sure how much matter there is in a particular location in empty space. During this brief moment, matter can spontaneously appear and then disappear,

$$\Delta t = \frac{1}{\Delta m} \frac{h}{2\pi c^2}$$

So this means that for very brief interval Δt of time in a causal pattern, a process of causality by the time energy, matter or energy can spontaneously appear and then disappear across the whole universe everywhere. But the time energy has no momentum, and appears everywhere at once throughout the whole universe. Does this imply then, that the energy of time somehow shadows this process of matter or energy spontaneously appearing and disappearing. So, for short amounts of time, energy can appear from no- where. How is this process related to the time energy? But this energy from no- where is known as vacuum energy.

Moray B. King, in his Book [10] 'Tapping the zero-point energy, p13, has argued that the zero-point energy may arise from an orthogonal electric flux from the 4th-dimension. In other words, he is saying this energy from nothing, vacuum energy, comes from the time dimension, that this energy might be the energy of time coming or leaking into our 3-dimensional space.

Planck's constant h , plays a fundamental role in all quantum processes. So vacuum energy may be the energy of time leaking into our 3-dimensional space. In a letter to me by Takaaki Musha, a Japanese scientist, about his ideas on time as a energy wave, he pointed out that physics and physical cosmology, Planck units are a set of units of measurement defined exclusively in terms of four universal physical constants. The Planck mass in the fundamental unit of mass in the system of Planck units. If we let $m = m_p = 2.18 \times 10^{-8}(kg)$, where m_p is a Planck mass, then $\frac{m_p c^2}{\eta} = 1.86 \times 10^{43}(Hz)$

Which is almost equal to the cut-off frequency of the zero-point field in the vacuum. This he suggests that the time (energy) wave is related to the zero-point field in the vacuum. After what I have been considering of time having a energy, and the vacuum energy connected to the time energy, I believe that Takaaki Musha might be right, and this may mean that vacuum energy or ZPF is energy of the 4th-dimension that has leaked into our 3-dimensional space. Of course, if it's true, it's not new, that many people have considered making use of vacuum energy to do work, really is how to make the energy of time to do work.

The nature of time energy might enter quantum physics through the relation of Planck' constant, $tE = h$. In this way quantum physics and relativity might be compatible and united in one theory. I know that this sounds too obvious and maybe my point is ridiculous, but the nature of h and t time times energy has been staring in the face of physicists all the time, and they missed it. If I were a theorist, I would start with the relation of Planck's constant $tE = h$. For h describes all quantum behaviour. Its a way of introducing the time of the 4th dimension of relativity into quantum physics. This could be a way of uniting quantum physics with relativity, time times energy $tE = h$ is a causal relation of time to energy, a fundamental constant of nature, behind of which the time energy pattern may bare an influence in all quantum processes, if it's true of course as suggested by the Russian scientist Kozyrev's experiments that time has an energy, that appears everywhere all at once, no matter what the distance, may be exhibited in quantum effects, such as non-local effects. Where two particles separated by a large distance, influence each other when a measurement is made on one particle, immediately no matter what the distance. This might support my argument, that the time energy of the 4th dimension is tied up with all quantum processes at a fundamental level.

On page 219 of the paper[1] 'possibility of experimental study of the properties of time, by the Russian scientist Kozynev that we dealt with at the beginning of this paper, said, that the relaxation time after other vibrations, which was shown not to depend on the mass of the body, but upon its density. That it is possible that t° is inversely proportional to the square root of the body's density. When considering the energy density of vacuum energy or ZPF, that t° may be inversely proportional to the square root of the energy density of vacuum energy.

But as said before the energy of time must be infinite, what is the value of its energy density? And as time energy has no momentum and appears everywhere at once, dose not this vacuum energy do so across the whole universe everywhere at once, leaking through from the 4th dimension into our 3-dimensional space.

Boyer [11] derives the spectrum of the zero-point energy by requiring it to be Lorentz invariant. The zero-point spectral density function is,

$$\rho(\omega) = \frac{\hbar\omega^3}{2\omega^2 c^2}$$

The energy content approaches infinity as the frequencies approaches infinity. That the vacuum energy density is on the order of 10^{94} grams/cm³. That this energy normally is unobserved because it self-cancels by destructive interference. Such a high energy density of the vacuum that self-cancels all the time, that t° may be inversely proportional to the square root of this energy density of the ZPF or vacuum energy, and would be very great.

They say we can only measure differences in energy, but not potential energy, but potential energy is the energy that you can use to do work, but they can't measure potential energy. But time if it has an energy in the form of potential energy in the 4th dimension (not the energy of ZPF that leaks into our 3-dimensional space), it might be used to do work, to manipulate time. But in the form of potential energy it can't be measured.

But with the notion that time has an energy, that's leaking into our 3-dimensions in the form of vacuum energy or ZPF, this means one might be able to use this energy to do work? They have measured this energy in laboratory's, it can have force effects such as the Casimir effect, where there is a force effect of pushing two metal plates together. In regard to,

$$\rho(\omega) = \frac{\hbar\omega^3}{2\pi c^2}$$

There is a similar relation,

$$m = \frac{\Gamma\hbar\omega^2}{2\pi c^2}$$

The inertial mass of elementary particles induced by ZPF field, where Γ is the radiation reaction damping constant defining the interaction of charged elementary particles with electromagnetic radiation field. Is not this the electromagnetic radiation field, the ZPF field of the vacuum, the time energy leaking into our 3-dimensional space causing inertia Γ mass in elementary particles. We can extend this above relation of the two equations to a 3rd,

$$m_g = m_i = \frac{\Gamma\hbar\omega^2}{2\pi c^2}$$

So, this energy of time leaking from the 4th dimension into our 3-dimensional space in the form of ZPF or vacuum energy may be responsible for inertial m_i and gravitational m_g force.

Marchs principle requires that, $\frac{GM}{Rc^2} = 1$ or $\frac{1}{G} = \frac{M}{Rc^2}$ Since R is a function of time, it would seem to follow that G should also be a function of time. If G is a function of time one can apply it to the equation,

$$m = \frac{\Gamma c^3}{G}$$

Making G the subject,

$$G = \frac{\Gamma c^3}{m}$$

If G is a function of time one could replace G with t in the expression,

$$t = \frac{\Gamma c^3}{m}$$

That inertial force Γ or zitterbewegung of ZPF would be a product of time. Of course this jitter or zitterbewegung of particles in a body, which according to Wheeler and Feynman theory leads to inertia by the interaction of advanced and retarded fields (as considered in there absorber theory) But also the ZPF or vacuum energy (a quantum effect) interacting with a body under acceleration contributing also to zitterbewegung or jitter of the particles that make up the body, that this ZPF or vacuum energy might be the time energy that has leaked into our 3-dimensional space from the 4th dimension, which I will come to a little further in this paper.

But in the a paper by Takaaki Musha[13] has considered the gravitational constant G can be experssed as a function of quantum energy density, as said if G is a function of time we can then write,

$$\rho = t = G = \frac{\Gamma c^3}{m}$$

There is no proof as yet that ZPF is the energy of time leaking from the 4th dimension into our 3-dimensional world, only the suggestion made by Moray B. King in his book,[10], but from the experiments of the Russian scientist, Kozyrev , who was lead to the conclusion that time dose have an energy, so one can consider such a view. I went on earlier saying quantum theory and relativity could be united through the relation of the nature of the time energy, through the relation of time multiplied the energy, leading to Planck's constant, $tE = h$. That through the constant h, all the quantum processes are exhibited a fundamental level. That this vacuum energy is leaked through the 4th dimension into our 3-dimensional space and is from the energy of time, leading to all quantum processes, so that the relativistic value of time of the 4th dimension can be united with quantum theory. This is how the nature of time and energy the constant h is involved at a quantum level, from that 4th dimension.

What I left out saying was gravity or the problem of quantum gravity. The process of promoting quantities to such noncommuting entities is done using fairly rigorous mathematics. This is what is referred to as quantization, experiment after experiment, shows that nature works according to the rules of quantum physics; that when we quantize the harmonic oscillator, we find that it has a minimum energy that's not zero. Quantizing classical mechanics gives quantum mechanics. The trick is to break the field down into a sum of harmonic oscillations, which we do by way of a Fourier-transform. These oscillations can then be quantized. A potential obstacle is that there are infinitely many of them, each with a nonzero ground state energy. The sum of these would be infinite. Fortunately, we are only interested in differences in energy between different states, and those remain finite.

That's how we can go from Maxwells classic theory to quantum electrodynamics, the problem is that this nice, clean prescription fails for gravity, because those infinite sums refuse to go away, refuse to leave us with only manageable finite differences. This is why we are not able to develop a satisfactory theory of quantum gravity.

But one way to consider this is through the relation,

$m_g = m_i = \frac{\Gamma h \omega^3 c}{2\pi c^2}$ Here one can see the relation of m_g and m_i to \hbar , is this relation showing the relation of gravity to planck's constant \hbar . If one wants to unite gravity to the quantum world, is not the above relation not a way to consider this?

Now let's further consider this vacuum energy and still going along with the suggestion that such vacuum energy is the energy of time, that's leaked through the 4th dimension into our 3-dimensional space. One does not measure potential energy, one can only measure energy differences as long as one ignores gravity, because all kinds of energy have gravitational pull and for that gravitational pull its the absolute energy that matters, not the relative one.

In general relativity we measure the vacuum. Einstein's field equations contain two constants,

$$R_{\mu\nu} - \frac{1}{2} g_{\mu\nu} R = 8\pi G T_{\mu\nu} - \Lambda g_{\mu\nu}$$

These constants have the same value at every point in space at every moment in time. That is G and Λ . The lambda Λ is called the cosmological constant. The R here quantify the curvature of space-time. And this term with the $T_{\mu\nu}$ contains all the other kinds of energies, particles and radiation. This means we set the T term to zero, we have empty space,

$$R_{\mu\nu} - \frac{1}{2} g_{\mu\nu} R = -\Lambda g_{\mu\nu}$$

You therefore interpret Lambda Λ as the energy density of the vacuum. Not the entire energy but the energy per volume. This vacuum energy - density dose not dilute if the universe expands, because it's a property of space - time. That makes it different from all other kinds of energy density's that we know, e.g. for matter or radiation all dilute with the expansion of the universe. The vacuum energy does not.

What does the energy density of the vacuum have to do with the acceleration of the universe. If we want to know about the whole universe, we introduce what's called the scale-factor a , it tells you how distances change with time, $a(t)$. If the universe expands, a increases, if the universe decreases, a decreases. You plug this into Einstein's equations, and then one of the equations say the second time derivative of the scale factor, so that's the acceleration of the expansion of the universe, as a contribution that is propositional to the cosmological constant, $a(t) \propto +\Lambda$. A positive lambda Λ makes the expansion speed up, $\Lambda > 0$. We cannot calculate the measurable vacuum energy-density which appears in general relativity, it's a constant that we infer from observation. (But it has been measured in the Casimir effect).

So then, dark energy or vacuum energy density may be the energy of time, leaking into our 3-dimensional space from the 4th dimension and causing the acceleration expansion of the universe. Also, this dark energy or vacuum energy is a form of negative gravity, is repulsive on large scales of the universe. This gravitational repulsion of the vacuum apparently stems from the fact that the vacuum pressure is

negative, and participates in the gravitational interaction, as Einstein's theory shows, on a par with the energy density. And lambda Λ would be the energy density, of the vacuum that's leaked from the 4th dimension into our 3-dimensional space, being the energy of time, known as the cosmological constant.

CONCLUSIONS

Time might have an energy, if Kozyrev's experiments could be repeated, but in what form this energy appears, one might be able to make it do work, to manipulate time, as I also suggested. Speculating that vacuum energy might be the time energy that has leaked from the 4th dimension into our 3-dimensional space. That energy of advanced fields or energy or a body of mass travelling into the past is conserved. That there is a possibility to do an experiment with a cavity in a superconductor, that some part, the absorber part (cavity wall) be minimised after Bajlo's suggestion from his experiments, so that advanced fields do not self - cancel out, producing advanced fields in a superconductor.

That the relation of Planck's constant of time times energy, leading to all fundamental quantum processes, where energy of time might shadow such quantum processes, (such as non-local effects) and be responsible for the causal pattern of energy through time, and that this vacuum energy being leaked energy of time, from the 4th dimension into our 3-dimensional space, may be the dark energy that is causing the accelerated expansion of the universe.

REFERENCES

- [1] Nikolai A. Kozyrev, 'Possibility of experimental study of the properties of time'. Pulkovo Astronomical observatory, Leningrad, USSR, September 1967. The manuscript for this translation is stored in the Arlington Archive, (Joint publications research service #452.38, Arlington VA, May 2, 1968). Submitted for publication in the Abraham zelmanov Journal by Patrick I. Ivers, noraivers@juno.com, on January 13th, 2013.
- [2] John A. Wheeler and Richard P. Feynman, 'Interaction with the Absorber as the mechanism of radiation'. Reviewers of modern physics, Volume 17, Numbers 2 and 3, April-July (1945) pp157-181.
- [3] Bajlo D. 'Measurement of advanced electromagnetic radiation'. Zenodo dai: 10,5281/zenodo. 247283. (2017).
- [4] Anthony Maccini. 'Notes: Time as and energy wave'. International Journal of scientific advances, ISSN: 2708-7972, Volume: 2/issue: 6/ Nov - Dec (2021) Available online: www.ijscia.com. DOI: 10.51542/ijscia.vsi6.16.
- [5] Takaaki Musha. 'Explanation of dynamical Biefeld-Brown effect from the standpoint of ZPF field', JBIS, Vol.61, pp. 379-384, (2008).
- [6] Anthony Maccini. 'Notes: Is Abraham damping constant and inertia in matter a consequent echo of its future state?'. International Journal of scientific advances, ISSN: 2708-7972, Volume: 2/issue: 4/ Jul - Sep (2021) Available online: www'ijscia.com. DOI: 10.51542/ijscia, v2i4.28.
- [7] Dr. Takaaki Musha obtained his doctoral degree from shinshu university. Formerly he worked as a senior research scientist at the technical Research & development institute of MoD in Japan. Presently, he is a director of Advanced Science - technology research organization. (private correspondence).

- [8] Michael Lockwood. 'Book: The labyrinth of time'. P53-54 first published (2005).
- [9] Bajlo D. 'The hidden arrow of electromagnetic radiation: Unmasking advanced waves'. (September 2017).
- [10] Moray B. King. 'Book: Tapping the zero-point energy'. p41, (Published 2002).
- [11] T.H. Boyer, "Derivation of the blackbody radiation spectrum without quantum assumptions". Phys. Rev. 182, No.5, 1375 (1969).
- [12] Anthony Maccini. 'Notes: The possibility of mass shift into the past'. International Journal of scientific advances. ISSN: 2708 - 7972, Volume: 2/issue: 2/ Mar - Apr (2021) Available online: www.ijscia.com. DOI: 10.51542/ijscia.v2i2.4.
- [13] Luigi Caligiuri, Takaaki Musha. 'Quantum vacuum energy, gravity manipulation and the force generated by the interaction between high - potential electric fields and zero-point - field'. International Journal of astrophysics and space science. Published online, October, 07 (2014) (<http://www.sciencepublishinggroup.com/j/ijass>) doi: 10.11648/j.ijass.s.2014020601.11.