

Time Equivalent of Energy

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Abstract: This paper, deriving from previous works, obtains a time equivalent of energy. It builds on previous work to represent a new way of understanding of time, space, physics, and everything around us within a single universe. Merely changing time changes energy (energy is a function of time), basically energy is time in the future within a universe. Changes of work (applying force) or entropy, changes physical properties. Change of time is a reversible process. Within a universe the changes are mechanical and time changes are not mechanical (time change must be separated from changes within). Time is not a continuous axis; it has an oscillating state.

Key words: Time, energy, universe, risk.

Nomenclature

c	Speed of light = 2.99792458×10^8 m/s
E	Total energy
F	Force
i	Imaginary number
m	original mass
v	current velocity
H	Hamilton
L	Lagrange
m	Mass
p	Momentum
q	General coordinate system
t	Time
∇	differential operator
h	physical constant
Ψ	probability function
v	velocity
U	Potential energy field
θ	Angle
∞	Infinity
h	Physical constant = 1.0546×10^{-34} J s
$=$	Mathematical operator
	Subscripts
i	Index
0	initial

1. Introduction

Within the context of this research there is no

chronological order as past, present and future. They are arbitrarily ordered, forward or backward. In time assessment considerations, there is no tense, so the sequence of events is arbitrary. What is the probability of a sequence of events that will lead to uncontrollable internal energy?

Failure could be thought of as a result or a start for its premises. There is a totally different way of thinking about failure. Theoretically when a failure occurs, it could be going to the past events and correct it, this is bounded to the fact that reversing chronological order is morally impossible. Future, present, and past, should be separated from chronological order.

The assessment is tied to a scenario [1].

$$dU = c^2 \left(\frac{\ln q}{\cos \theta} + \frac{1}{2} \right) dm - c^2 \left(\frac{\ln q}{\cos \theta} + \frac{1}{2} \right) dm_0 + \frac{c^2(m - m_0)}{\cos \theta} d \ln q - \frac{c^2(m - m_0)(\ln q) \sin \theta}{(\cos \theta)^2} d\theta + 2c(m - m_0) \left(\frac{\ln q}{\cos \theta} + 1 \right) dc \quad (1)$$

As the interest is in single current universe where the velocity of light is constant, the last term in Eq. (1)

$2c(m - m_0) \left(\frac{\ln q}{\cos \theta} + 1 \right) dc$ equals zero. Because the

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concern is within a single event with a certain time path from $t = 0$.

The starting mass is considered constant: $m_0 = \text{constant}$.

Eq. (1) becomes:

$$dU = c^2 \left(\frac{\ln q}{\cos \theta} + \frac{1}{2} \right) dm + \frac{c^2(m - m_0)}{\cos \theta} d \ln q - \frac{c^2(m - m_0)(\ln q) \sin \theta}{(\cos \theta)^2} d\theta$$

The energy affecting variables are: m —the change of mass according to velocity; q —the position, and θ —the angle between momentum and its resulting distance. Usually within a single verse $\theta = 0$.

It is worth to note that time is not an axis for change; hence the mere passing of time without any physical change does not add or subtract energy from the system.

This equation is continuous; it does not represent quantized energy. Quantized energy is represented in the differential form of this equation, which means that not all changes are possible depending on the mode of energy in practice.

Recall that time t [2]:

$$t = \frac{q p \cos \theta}{c^2 (m_0 - m)} \quad (2)$$

The scenario is an event beginning at time zero this means:

$$c^2 (m_0 - m) = \infty$$

which means that the differential energy is infinite.

As c^2 is finite then:

$$(m_0 - m) = \infty$$

As m_0 is finite:

$$-m = \infty$$

Or

$$m = -\infty$$

So

$$v = -c$$

This equation suggests that time proceeds in reverse order and that we are proceeding to the beginning of time. Currently the universe is proceeding to time zero or to its time origin. One can think that every sequence of events imagined is pre-fabricated.

Time is a state and the distance is a state. They are related through Eq. (3):

$$q = e^{t \cos \theta} \quad (3)$$

Note that a state variable is needed to reproduce the system. It is apparent that this is not the relation of speed which relates distance with time.

2. New Energy Concept (Energy Management at Quanta Scale)

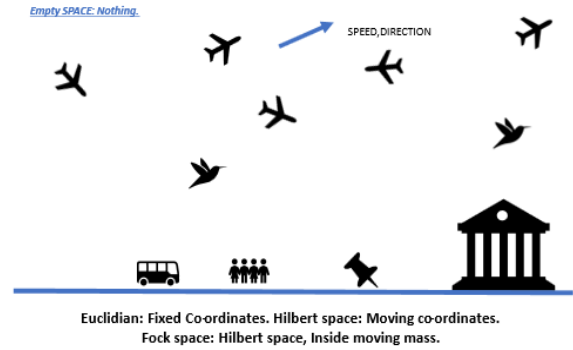


Fig. 1 Euclidian, Hilbert and Fock spaces. A moving body in Hilbert space is a point.

$$m = m_0 / \sqrt{1 - v^2/c^2}$$

Where

$$\text{Substituting: } p = -i\hbar \nabla / c = mv$$

Then mass operator:

$$\hat{m} = \pm \hbar \nabla / c = \pm 3.5178 \times 10^{-43} \nabla$$

$$E = mc^2 = \pm \hbar c \nabla$$

with m_0 negligible compared to m , because m_0 do not appear within the significant figures when representing m (or it is not JUST to subtract it) this operator operates on the wave function.

The meaning of this operator taking into consideration the extremely small scaling factor and that it is a vector:

- (1) $\nabla \Psi$: Directional derivative; direction of mass change. Euclidian space.
- (2) $\nabla \cdot \Psi$: Divergence; inhalation or creation, speed change Hilbert space.
- (3) $\nabla \times \Psi$: Curl; rotation characteristics. Fock space.

Fig. 1 shows different kinds of modelling spaces, while Euclidian space is useful in three-dimensional space (buses, people and fixed monuments), Hilbert

space is for moving objects which is modelled with a point in Hilbert space (bird and airplanes). Fock space is Hilbert space occupied by matter.

The Hilbert space as a state space give information about the position, configuration and motion of constituents within it. The meaning of the operator depends on the type of physical state within the system of consideration. These equations help in defining the direction of deferential change in mass or energy. The mass operator when applied to probability function leads to energy equivalent of mass (this is beyond the scope of this paper).

It is worth to note that the mass or energy operator is a differential operator not an integral operator which means that there is no constant of integration which means that there is no bias line i.e. no reference value for mass or energy evaluation.

Energy is an exchange between two different concentrations, the concentration of time in space outside what we call matter and the concentration of time in matter space which is the matter itself. the concept of motion for energy is replaced by time space interactions with time taken as solid matter. Motion enhances the exchange between the mass and its surrounding time in space, annihilation and creation are special forms of this exchange. During the motion of a mass, it increases as a result of this dissolution.

The challenge is to proof that the wave function which is the probability of finding some matter somewhere, has a direction, this is achieved by considering that the wave function is a tensor.

The new concept of energy depends on energy operator above.

3. Results and Discussion

The presence of the position coordinate variable in a logarithmic function suggests that it could never has a negative or zero value, it could be thought that going back in chronological order or remaining still is not allowed or possible within the systems of physics. It could be assumed conveniently that any changes in

position add to the system energy not subtract from it. The energy is cautiously increased in the view of changing position. What consumes energy is changing direction or changing speed combined in one term as velocity.

Assuming:

- Constant speed of light,
- Motion in a single verse $\theta = 0$ and,
- Constant starting mass m_0 .

Then $\cos \theta = 1$,

$$\begin{aligned} dU &= c^2 \left(\frac{\ln q}{1} + \frac{1}{2} \right) dm - c^2 \left(\frac{\ln q}{1} + \frac{1}{2} \right) dm_0 \\ &\quad + \frac{c^2(m - m_0)}{1} d \ln q \\ &\quad - \frac{c^2(m - m_0)(\ln q) \sin \theta}{(1)^2} d\theta \\ &\quad + 2c(m - m_0) \left(\frac{\ln q}{1} + 1 \right) dc \end{aligned}$$

And,

$$\begin{aligned} dU &= c^2 \left(\frac{\ln q}{1} + \frac{1}{2} \right) dm + \frac{c^2(m - m_0)}{1} d \ln(q) \\ dU &= c^2 dm \left[\ln(q) + \frac{1}{2} + d \ln(q) \right] \\ dU &= c^2 dm \ln(q) \left[1 + \frac{1}{2 \ln(q)} + d \ln(q) \right] \\ &= c^2 dm \ln(q) \left[1 + \frac{1}{2 \ln(q)} + \ln(q) \right] \\ &= c^2 dm \ln(q) \left[\frac{1}{\ln(q)} + \frac{1}{2} + 1 \right] \\ &= c^2 dm \ln(q) \left[\frac{1}{\ln(q)} + \frac{3}{2} \right] \\ dU &= c^2 dm \left[1 + \frac{3}{2} \ln(q) \right] \\ U &= c^2 dm + \frac{3}{2} c^2 dm \ln(q) \end{aligned}$$

where

$$q = \frac{2\hbar}{mv} = e^{t \cos \theta}$$

as shown in Fig. 2.

then

$$\ln\left(\frac{2\hbar}{mv}\right) = \ln(e^{t \cos \theta}) = t \cos \theta$$

In physics, mass-energy equivalence is the relationship between mass and energy in a system's rest frame, where the two values differ only by a constant and the units of measurement. The principle is described by the physicist Albert Einstein's famous formula: $E = mc^2$.

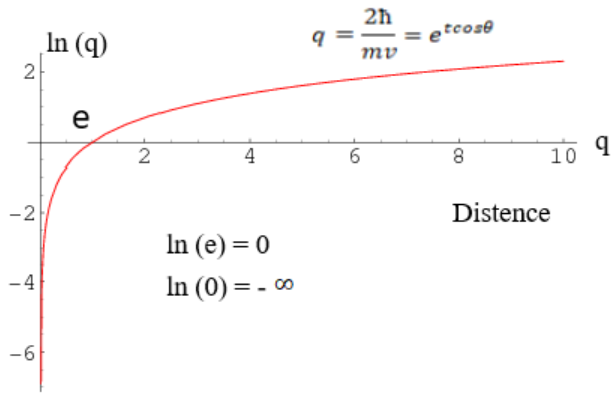


Fig. 2 $\ln(q)$ vs. distance.

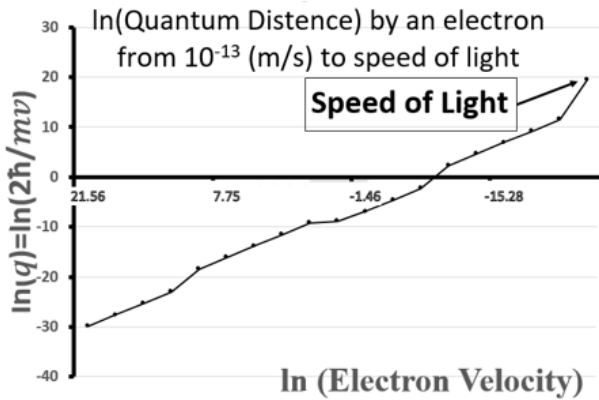


Fig. 3 Quantum distance.

Fig. 3 quantum distance is a fundamental property of the quantum scale because it appears in the final form of the derivation.

$$\hat{K} = \frac{c^2}{2} (m_0 - m) = \frac{\hbar^2}{2m} \left(\frac{\partial}{\partial q_i} \right)^2$$

$$U = 2K + \frac{3}{2} c^2 dm \ln(q)$$

$$U - K = K + \frac{3}{2} c^2 dm \ln(q)$$

$$L = U - K = \frac{c^2}{2} (m_0 - m) + \frac{3}{2} c^2 dm \ln(q)$$

or

$$H = U + K = 3K + \frac{3}{2} c^2 dm \ln(q)$$

$$H = U + K = 3K + \frac{3}{2} c^2 dm (t \cos(\theta))$$

where $\cos(\theta) = 1$.

$$H = U + K = 3K + t \frac{3}{2} c^2 dm = 3 \frac{c^2}{2} (m_0 - m) + t \frac{3}{2} c^2 dm = \frac{3}{2} dm c^2 (1 + t)$$

For a unit mass $dm = 1$: and time state [2]:

$$H = \frac{3}{2} c^2 (1 + t)$$

$$H = \frac{3}{2} c^2 \left[1 \pi + 1 \frac{\pi}{2} + 1 \frac{3\pi}{2} + 1 \right] = \frac{3}{2} c^2 (3\pi + 1)$$

4. Conclusion

Statements given here without proof are considered true by definition (Axioms).

Within the framework of the multiverse there are no reference frames for anything (velocities, masses, etc.) because change is the basis.

Note that the Hamiltonian does not include internal energy thus it is not total energy resulted from conversion of mass or time into energy.

Neglecting the stretching parameter in the H, t equation:

$$H = 1 + t$$

The Hamiltonian has energy dimensions while time is continuous non-dimensional quantity since it is a substitution from logarithmic function. The energy and time is considered tensors of the same rank.

And it is concluded that the total energy is time shifted one unit forward i.e. future time. The risk of time is found in the future. For the present time energy could be stored in three forms: potential, kinetic and internal energy [4] but in the future time heat and work could be stored. As there is mass-energy equivalence there is a time energy equivalence [5].

The time energy is different from nuclear energy [6]. The energy is derived when TIME between two-time states of different or multi verses is subtracted [7], and

this happen while travelling between verses. Different verses or sub verses are found at different times.

Recall that statistical Mechanics is the right method to derive properties of systems [8].

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