

# Multiverse and the Time State

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Received: November 15, 2016 / Accepted: December 01, 2016/ Published: March 31, 2017.

**Abstract:** This article is not inspired by any religion or quantum many-worlds interpretation. The mathematics of multiverse is presented here. The mass operator was introduced earlier by Alnobani. This operator is used here to deduce the time state. It is found that time has four states and those four states are orthogonal. Time is the constitution of any verse. Time has direction. Every orthogonal direction of time belongs to a verse. Past and future belong to opposite directions of time and they are arbitrary. Other verses are there by their own and not a probabilities of any other verse and if any similarity it is only a coincidence. Among applications of this thesis is travelling through groups of galaxies, or more or less.

**Key words:** Time, mass, multiverse.

## Nomenclature

$A$	Constant
$c$	Speed of light = $2.99792458 \times 10^8$ m/s
$E$	Energy
$H$	Hamiltonian
$k$	Constant
$m$	Mass
$p$	Momentum
$q$	General coordinate system
$t$	Time
$T$	Kinetic energy
$U$	Potential energy field
$x$	Position
$\theta$	Angle
$\Psi$	Probability function
$\hbar$	Physical constant = $1.0546 \times 10^{-34}$ (J·s)
$\hat{M}$	Mass operator
$\omega$	Frequency
=	Mathematical operator (equal sign)

## Subscripts

$i$	Index
0	Initial value

## 1. Introduction

The hypothesis states there is a very large—perhaps infinite [1]—number of universes. In Dublin in 1952

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Erwin Schrödinger gave a lecture in which at one point he jocularly warned his audience that what he was about to say might “seem lunatic”. He went on to assert that when his Nobel equations seem to be describing several different histories, they are “not alternatives but all really happen simultaneously”. This is the earliest known reference to the many-worlds [2, 3]. The American philosopher and psychologist William James used the term multiverse in 1895, but in a different context [4]. Hugh Everett III (November 11, 1930-July 19, 1982) was an American physicist who first proposed the MWI (many-worlds interpretation) of quantum physics, which he termed his “relative state” formulation [5]. From dictionary the definition of time is: “1. Indefinite, unlimited duration in which things are considered as happening in the past, present, or future; every moment there has ever been or ever will be... a system of measuring duration; 2. The period between two events or during which something exists, happens, or acts; measured or measurable interval” [6]. We can see out of the references that time tell now is defined with words (past, present and future). The mathematical formulation presented here is essential to change our view of time. The winner has internal peace in his present. The basic components or constituents of a verse are time.

## 2. Methodology

Mathematics is the language universally used to express reality. A concrete mathematical derivation is used to reach the results. The method used in this paper does not take from any past experience or definition of time.

## 3. Discussion

From Alnobani [7]:

$$\vec{q}_i \cdot \vec{p}_i = 2\hbar$$

or

$$\vec{q}_i \times \vec{p}_i = 2\hbar$$

or

$$\vec{p}_i \times \vec{q}_i = 2\hbar$$

or

$$\vec{q}_i : \vec{p}_i = 2\hbar$$

or

$$\vec{p}_i : \vec{q}_i = 2\hbar$$

This is the mathematics of multiverses. Although the previous formulations are all possible each one has its own meaning, use and application. Taking into consideration that the ratio of a circle's circumference to its diameter, speed of light or Plank's constant may change from verse to verse or within the structure of the same verse. The dot product is for universe. The cross product is for double verse or transferring from a universe to another universe. The tensor product is for concentric verses.

Let us take the simplest case in a universe or:

$$\langle q_i | p_i \rangle = 2\hbar \quad (1)$$

When considering the vector-state of a system. The magnitude and sign of the vector is irrelevant. The direction of the vector is relevant.

$$|0\rangle = \text{vacuum} \quad (2)$$

This is the state of organisms (cycle with time as working fluid [7]).

$|p\rangle =$ , one particle with momentum vector  $p$ .

While the position of the particle could be deduced from:

$$\langle q_i | p_i \rangle = 2\hbar \quad (3)$$

The mass operator [7]:

$$\hat{M} = \frac{1}{m - m_0} \left(\frac{\hbar}{c}\right)^2 \left(\frac{\partial}{\partial q_i}\right)^2 \quad (4)$$

As all information is contained in the wave function  $\Psi$ :

$$\hat{M}\Psi = \frac{1}{m - m_0} \left(\frac{\hbar}{c}\right)^2 \left(\frac{\partial}{\partial q_i}\right)^2 \Psi \quad (5)$$

$$\hat{M}\Psi = \frac{1}{m - m_0} \left(\frac{\hbar}{c}\right)^2 \left(\frac{\partial \Psi^{1/2}}{\partial q_i}\right)^2 \quad (6)$$

A wave travelling along x-axis can be represented by Eq. (7) [8]:

$$\Psi(x, t) = A e^{-i(\omega t - kx)} \quad (7)$$

For this wave:

$$\begin{aligned} \hat{M}\Psi &= \frac{1}{m - m_0} \left(\frac{\hbar}{c}\right)^2 \frac{k^2}{4} A e^{-i(\omega t - kx)} \\ &= \frac{k^2 A}{4(m - m_0)} \left(\frac{\hbar}{c}\right)^2 e^{-i(\omega t - kx)} \end{aligned} \quad (8)$$

At  $x = 0$ :

$$\hat{M}\Psi = \frac{k^2 A}{4(m - m_0)} \left(\frac{\hbar}{c}\right)^2 e^{-i\omega t} \quad (9)$$

Using Euler's formula:

$$\begin{aligned} \hat{M}\Psi &= \frac{k^2 A}{4(m - m_0)} \left(\frac{\hbar}{c}\right)^2 [\cos -\omega t \\ &\quad + i \sin -\omega t] \end{aligned} \quad (10)$$

As:

$$\sin(-\theta) = -\sin \theta$$

and

$$\cos(-\theta) = \cos \theta$$

$$\hat{M}\Psi = \frac{k^2 A}{4(m - m_0)} \left(\frac{\hbar}{c}\right)^2 [-\cos \omega t + i \sin \omega t] \quad (11)$$

where,  $m$ : observable mass;  $m_0$ : initial mass;  $t$ : time mass.

$$2(m^2 - mm_0) = k^2 A \left(\frac{\hbar}{c}\right)^2 [-\cos \omega t + i \sin \omega t]$$

At rest  $m = m_0$ :

$$[-\cos \omega t + i \sin \omega t] = 0$$

$$\sin^2 \omega t + \cos^2 \omega t = 0$$

The previous equation suggests that the (sin) and (cos) trigonometric functions angles (Fig. 1) are not the same so, as time passes it changes while  $\omega$  is arbitrary and after normalization:

Time is a state vector:

$$t = (0 \ \pi \ \frac{\pi}{2} \ \frac{2\pi}{3})$$

It is apparent that time is a four dimensional vector.

It is suggested that at the same  $\Psi$  (at the same space which is occupied by  $\Psi$ ) there are more than one angle (direction or arrow) of time. This implies the presence of verses that are not disconnected regions in space-time.

Hamilton's Principle: Of all possible paths along which a dynamical system may move from one point to another within a specified time interval (consistent with any constraints), the actual path followed is that which minimizes the time integral of the difference between the kinetic and potential energy. In terms of calculus of variations:

$$\delta \int_{t_1}^{t_2} (T - U) dt = 0$$

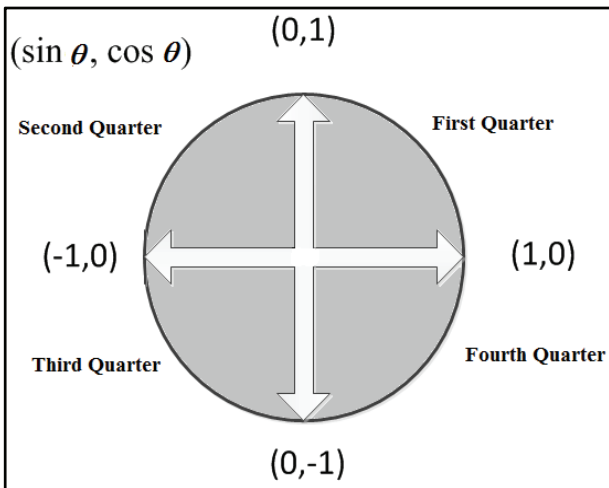


Fig. 1 Time states quarters.

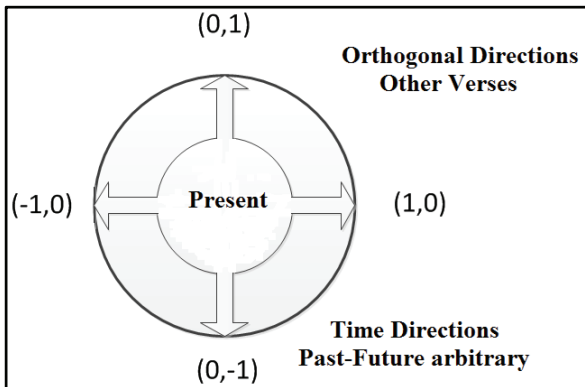


Fig. 2 Time directions.

The  $\delta$  is a shorthand notation which represents a variation. Define the difference of  $T$  and  $U$  as the Lagrange function or Lagrangian of the particle.

$$\delta \int_0^{\pi/2} (T - U) dt = 0$$

$L$  is a function of  $q_i$  and  $\frac{dq_i}{dt}$  but not  $t$  explicitly (when time is symmetrical), then:

$$\delta(T - U) = 0$$

or

$$T = U$$

### 4. Results

Time is a four dimensional state with Eigen values at  $(0, \pi/2, \pi, 2/3 \pi)$ .

Changing the orthogonal state of time means changing the verse currently found in.

In the same verse, time could have two directions simultaneously. Either the direction of future or past (names arbitrary).

If the events sequence happens in more than one verse the time is not symmetrical.

A time working fluid engine [7], although characterized by Eq. (2) could have three possible directions in time (past, future or present). An ethical procedure (may be rituals) could switch between these directions.

A verse is characterized by its ethical systems and matrix of values (numeric or moral).

A change is an invariant property of the observable present, it is not a consequence of an arrow of time.

### 5. Conclusions

$$\frac{dp}{dt} = - \frac{\partial H}{\partial q}$$

and

$$\frac{dq}{dt} = + \frac{\partial H}{\partial p}$$

A moving mass direction in time should be specified (future, past or present). The difference in directions (Fig. 2) of time is with the intersections of coming events in present (probabilities).

Time in different forms constitute the whole verses. Time have direction. Every orthogonal direction of time belongs to other verse. In the sense that existence changes independently according to our choices, it is not a choice to which verse you could transfer, this might seem to be wrong at some time to come but that will be extreme illusions. Energy is the exchange of two different concentrations of time in different verses, verses get power from each other MVCP (multi-verse-conflict principle). To travel through groups of galaxies or, more or less, just step into other verse and return to your verse in another place.

It should be noted that a direct result of the derivation, all verses (including ours) are found in the same place but at different time. To transfer from verse to verse an orthogonal translation of time is required because with these directions other verses (not related to past or future in the current verse combination) appear.

The implementation of knowledge presented in this paper does not require a machine to bend time ninety degrees, for that the effect will not be more than

bending a piece of paper because it is also a form of time. An application would need a know-how experience to open new verses. The simplest form of transferring from verse to verse is passing from past worlds to future worlds in the same context of a verse.

## References

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