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Mathematical Model Describes and Analyzes the State of Entity σ when Entering the Time Domain P - The Application Creates New Methods for Storing and Transmitting Information Data the Answer to the Big Question: "What is time?"

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Introduction

The time we perceive in everyday life is a normal concept but there is still no real answer to what is time? It is difficult for us to imagine that our minds and perceptions are placed in a universe with a huge amount of matter and extremely bustling events.

This research designs a fictitious but feasible λ closed universe model. In this universe everything seems very simple, there exists only one mathematical entity called the entity σ and there is absolutely nothing else besides this entity. All events occurring in the universe λ are caused by the behavior of entity σ. The signal diagram is a time axis to measure time in λ. When the entity σ exists at a time on the time axis, it is clear that the previous times are all past times of σ in λ and the time domain. This time is called the time domain P.

So let's assume entity σ can enter the time domain P on the signal diagram and then analyze how the state of λ will change. According to the butterfly effect, every small impact also creates big changes. The impacts of the entity σ in the time domain P, whether large or small, also create events that are different from the events that happened in λ, even the fact that σ exists in the time domain P is an impact. Because those event changes have created a different universe than the original universe, applying the multiverse theory, it can be said that σ entering the time domain P means σ entering a parallel universe.

But it is still not possible for σ to enter a parallel universe, but research has come up with a method called the λ synchronous method. Because of the special properties of the closed universe system λ and the entity σ, it is entirely possible to create another closed universe system exactly like the original system, then all the events in the original system λ are recreated in the new system λ and adjusted so that events in the new λ begin to occur a period of time later. At this time, let the entity σ jump to the new λ system and one thing has completely happened: the entity σ has entered its own past.

When using this method to let σ enter the time domain P, we can see that the time in the original λ system and the new λ system are events that occur in λ itself, when no events occur, or we can say when the entity σ is at rest, time is also considered to be standing still. Only when σ moves to create events can we feel the existence of what we call "time".

So when we gather all our minds and perceptions into such a simple closed system, we can envision two answers to two problems. Firstly, traveling to the past is just going into another parallel universe and wanting to go into another parallel universe is completely feasible but on an extremely small scale and simple until the present times. Second, time can simply be the movements that make up events. If we consider the entity σ as a bit of information, then the λ synchronous method of bringing σ into the time domain P can also be used to store and communicate information in a new way. One can imagine how exciting it would be to be able to project bits of information into one's own past and influence to change information that happened before.

This work was presented at the 49th Vietnam Conference on Theoretical Physics

Overview Concept and

Mathematical Model

Irreducible Closed Universe System

To make the computation and visualization as simple as possible, consider the following simulated universe λ°:

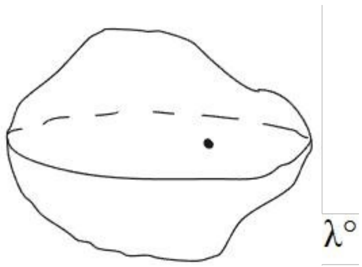


Figure 1:

Let's consider the above geometry as a universe because simply when we consider that in a 3-dimensional space, there is only one such geometric entity and nothing else exists outside of it. And call this the λ° universe.

In Figure 01 we can see some properties of this cosmic system:
+This is a universe with a profile that creates a
volume in 3-dimensional space.

+Inside the universe λ° is completely empty and only one particle point exists.
*To simplify the universe λ° there will be no other physical quantities.

The particle point that exists in the universe λ° is an entity with the following properties:
+No geometrical characteristics or physical properties.
+Can move in 3-dimensional coordinate axis.

*A particle point can be understood as a mathematical entity with a dimension of 0 and is a physical entity that can create movements and interactions, but the physical events that occur are not considered in a fundamental form of classical or quantum mechanics. The particle point entity in the universe λ° is assigned σ

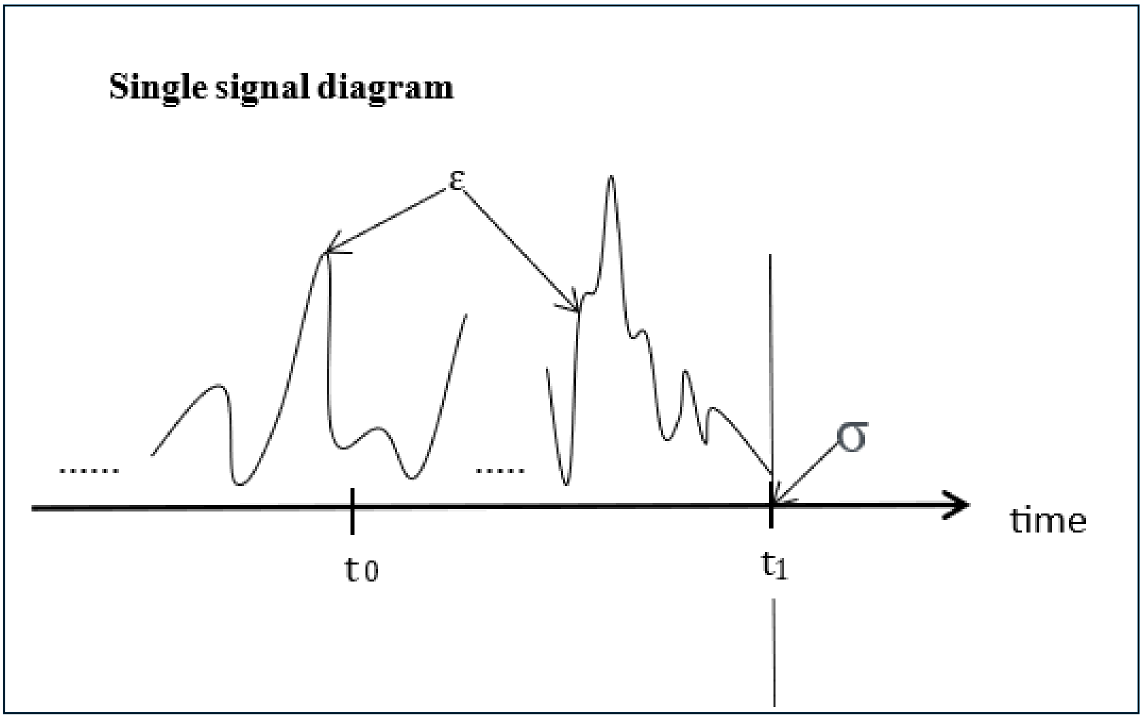


Figure 2

Signal diagram

The signal diagram consists of a continuous time axis of the universe λ and the upper plots represent the Event Set ε (in section 3).

t_1: Time to survey entity σ

t_0 : Any time running on the time axis before the time t_1

Time domain P on the signal diagram: set of all times in the interval <

* t_1 can later be viewed as the point at which the entity σ begins to enter the P domain.

n-stage signal diagram Choose universe λ° as the initial universe and multiple universes will be created from the source universe λ°.

Each single signal diagram will correspond to one universe λ_i.

Modeling the event set ε of the universe λ

When considering our real universe, any period of time will have events from the micro to the macro of everything.

Everything seems very chaotic and extremely bustling down to each subatomic particle, but no matter how complex or extremely large the collection of events in a universe is, when t_0 run on the time axis to create a specified time domain, there is only one and only one set of events.

Returning to the λ° universe, all events are. Created by entity σ

The set of events in λ is assigned as ε.

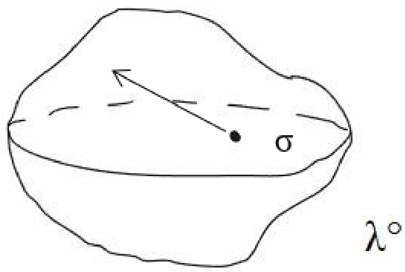


Figure 4:

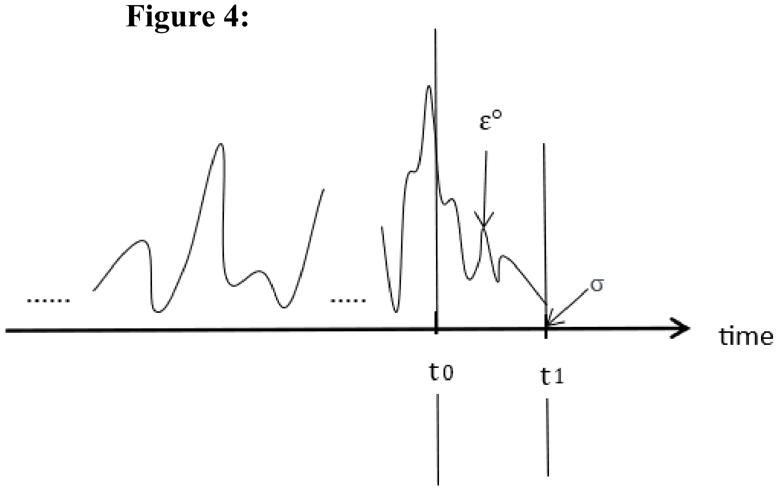


Figure 5:

Event ε° in λ°: σ moves a distance and appears
at a different location in λ° (figure 04). t_0: The moment σ starts moving. t_1

t_0: The moment σ starts moving.
t_1 : The moment when σ is in a new position after moving.

The event ε° is modeled as follows:
+Defined time domain: $[t_0;t_1]$

+A definite universe: λ°
+When ε° is created and runs in a specific time domain, ε° is unique to λ°.
+The graph of ε° in the domain $[t_0 ; t_1]$ is roughly sketched (Figure 05). When considering a specific problem, the graph will be examined absolutely.
Axiom ε: a set of events ε corresponding to a universe λ is unique.
Separation principle ε: an event can be considered as many separate events that are seamless together depending on the method of solving the problem.

ε = ε1 + ε2 +…+ εi +…+ εn= ni=1 εi

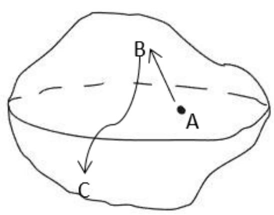


Figure:06

Examine the entity σ moving from A to C as above.
Event: σ moves from A to C

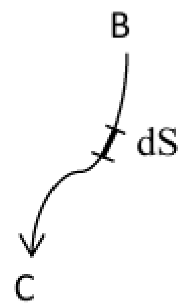
Apply the separation principle ε: $\varepsilon = \varepsilon 1 + \varepsilon 2$
In which event ε1: σ moves from A to B and event ε2: σ moves from B to C
We can even split it into more events. Consider the path from B to C, divide segment BC into many small segments ΔS and each segment corresponds to an event εi

Perform division n times on segment BC. When the division goes to infinity, then:
lim ΔS=dS n→∞ dS is the infinitely small length that σ can travel, so it can be considered a differential event dε. (approximately μ in section 5)
The separation principle can be written in terms of differential events:

$$\varepsilon = ? d\varepsilon^1 + ? d\varepsilon^2$$

General formula:

$$\varepsilon = ? d\varepsilon = ? d\varepsilon^1 + ? d\varepsilon^2 + \ldots + ? d\varepsilon^i + \ldots + ? d\varepsilon^n$$



Overall event ε : when applying the event separation principle, an event ε can be represented through many combinations of other smaller events. However, no matter how many small events εi are separated, there is only one overall event. According to the above case, ε is the event that entity σ moves from A to C.

*When choosing the universe λ° as the normalized base universe, the set of events created in λ° can never change or ε °= const

The σ morphology enters the P time domain and the Butterfly Effect
Suppose that σ can enter the region P.
Monitor σ on the signal diagram:

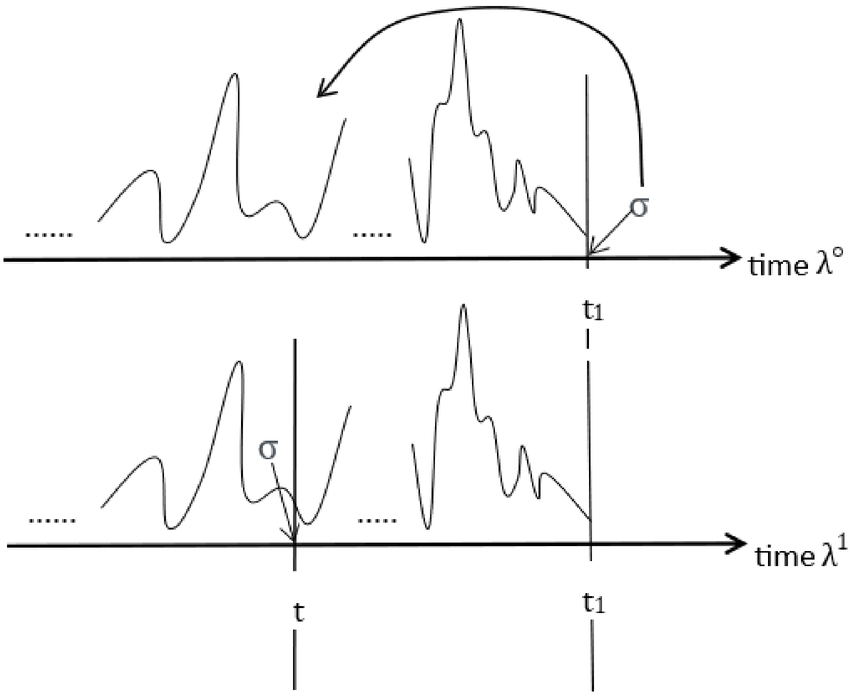


Figure 7:

t1: the moment σ begins to enter the P domain
tσ: the moment σ appear and exist in domain P

The existence of σ in the P domain now changes the initial ε° event of the λ° universe. Specifically, in the original event set ε of λ° just has only ε° that now added an event εσ (εσ: the event of the appearance of entity σ). Or in general, the fact that σ at the time t^1 and enter the < domain (P domain) and σ actually exists in the < domain turns ε° into ε^1:
$\varepsilon 1 = \varepsilon^\circ + \varepsilon\sigma$
According to the ε axiom, the transformation from ε° to ε^1 corresponds to the creation of a λ^1 universe.

*In the real universe, the butterfly effect shows us that even the smallest impact can create a huge change. Here the change is looked at by ε and the impact is created by σ.

Apply Multiverse Theory and µDifference

According to the multiverse theory, countless universes exist superimposed on each other along the flow of time. So λ° and λ1 exist along the same time axis but the events of both in the following case are completely different.

Now σ has actually passed through the universe created from the original parent universe λ° with the flow time1 . Clearly it is the existence of σ in the P domain of λ° that creates a λ^1 universe.
So λ^1only differs from λ° by having an entity σ at time t_σ.

Quantity

Consider σ as an entity that can only classically move in 3-dimensional space. σ : the impact of σ in λ
For the event ε° in λ°: σ moves a distance and appears at another location in λ° (figure 04), here σ represents the length, shape in which σ moved, velocity, …

However, when σ enters the P domain, it will immediately appear εσ and the existence of σ in 3-dimensional space is called the primary impact of σ: σ^0

From the characteristics of σ, when calculating σ^0 , only consider the position coordinates (x,y,z).

At a later tσ , σ can create many other impacts, so there is a general formula for the impact of σ when entering the P domain as follows:

$$\sigma = \sigma^0 + \quad \sigma i$$

Ignore σ^0 quantity for simplicity when solving specific problems and if solving using the λ synchronous method(chapter II), we can also calculate σ^0 .

*The impact of σ creates event ε or event ε describes the impact behavior of σ.

*The event set ε shows information about all entities in λ and σ shows information about entity σ when entering domain P.

Independent and Dependent

σ independent: when σ is in P domain and creates internal impacts in λ^i but those impacts do not directly or indirectly change the initial event of λ^i .

Consider λ^i universe with an initial event ε°: σ of λ^i moves along curve C

The impact |σ| of σ after enters the domain P: moves along curve S

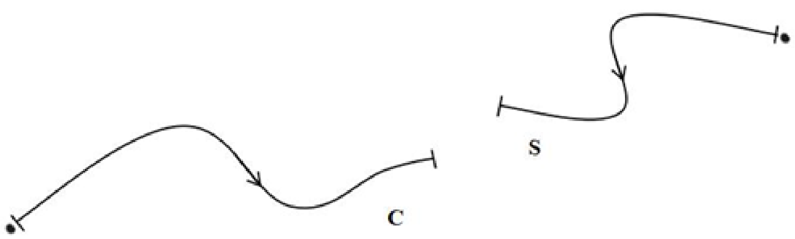


Figure 8:

After the ε° event, the impact σ occurs and ends, the ε° event is still preserved even though there is an impact σ in the universe, so the impact is independent and denoted $|\sigma|_{in}$ |σ| dependent: impacts that directly or indirectly cause change to the initial event's

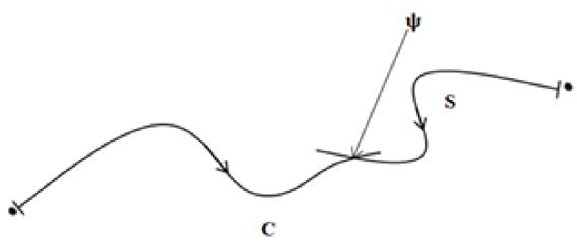


Figure 9:

In this case, Event ε° remains unchanged but the impact |σ| is different. After entering the domain P, the S path directly intersects the C path in λ_i , causing the ε° event to completely change.

σ in λi did not finish the S path as shown in figure 08

The impact |σ| directly causes a change in the event ε° and denoted $|\sigma|_{de}$

*If suppose to assign 2 σmass, this will be a collision problem in classical mechanics.

ψ point: indicates information when the event starts to change such as:

- Time
- Location
- Property

The μ quantity and the equation representing the relationship μ - |⍰|

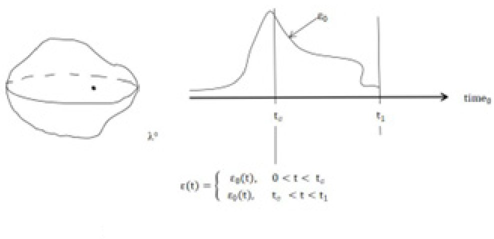


Figure 10

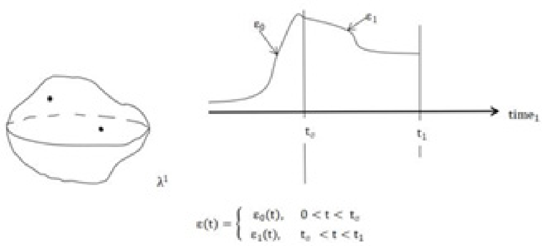


Figure 11

The μ quantity represents the difference of λ° and λ^1

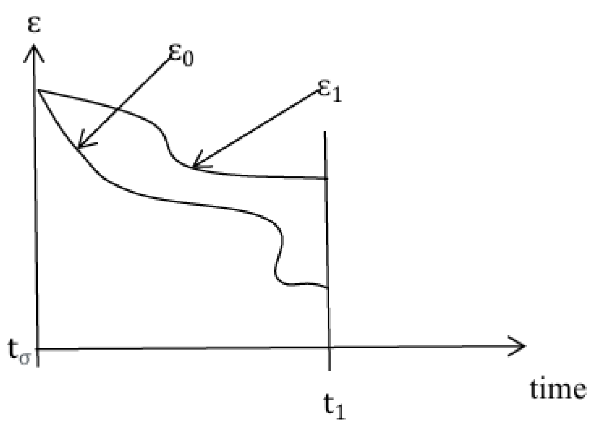


Figure 12

In the case being considered, μ will be calculated as follows:
$\mu = \varepsilon_1(t) - \varepsilon_0(t)$

Event is considered a name to assign to the function which mapping σ from time domain.

So, it can still be written in the form: $\mu = |\sigma|_1(t) - |\sigma|_0(t)$

When σ enters the domain P and appears at tσ, we haven't considered spacial variables of σ.

*According to the properties of the σ point particle, the two σ point particles in λ^1 can be considered the same or we can say they are one.
*The graphs depicted ε are relative so that we can have a visual view of the difference.
*The difference μ depends on σ , the larger σ is, the larger μ is and vice versa or λ^1 is more different than λ°.

Boundary conditions of μ
The μ quantity sometimes only be evident within a certain range. Here the scope in λ include:
-Space
-Time (t_σ)

-Event set (ε)
This is the main boundary condition of the μ quantity considered.

* Suppose in our real world, when an entity enters domain P and it is a conscious biological entity, we need to consider the 4th boundary condition which is awareness or consciousness, mind, thinking of entity if considering a specific event.

The fourth boundary condition is an extremely complex condition that is highly relative. This may be what makes our perception feel that returning to the past creates contradictory paradoxes.

Expanded signal diagram for n λ variables
Continuous n-layer signal diagram
In the first context, a problem arises after the entity σ entering the domain P and transforming λ° into λ_1 , then σ enters the domain P, that is, σ continues to transform λ_1 into λ_2.

And when the entity σ enters the domain P (n 1) times, it creates n different universes (including the original universe λ°). To analyze the state of entity σ when entering domain P in this extended case, we will not use a single signal diagram but use the n-layer signal diagram (Figure 03).

To simplify the n-layer signal diagram, we use the irreducible n-layer signal diagram

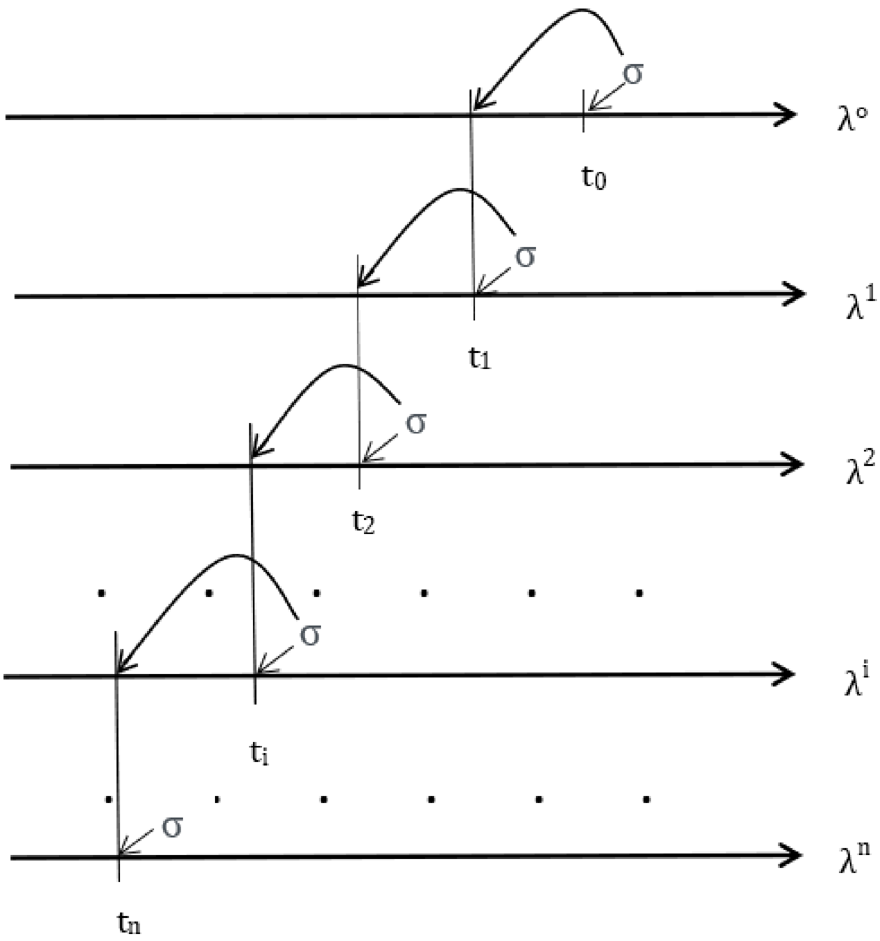


Figure 13

The signal diagrams for each λ differ in the event set ε and time for each of λ synchronously runs.

Multi λ jump principle: when σ enters the domain P, it will never be able to return to the λ where σ existed before. Suppose σ is in λ° and begins to enter domain P, then immediately σ exists in λ_1 . At this moment, it becomes the original universe of σ. If σ enters domain F, it still exists in λ_1 , and if σ enters domain P, it exists in λ_2 .

*σ makes the ith jump, it will not be possible to return to λ^k (k= 0 | i-1)
*Time domain F on the signal diagram:
collection of all times in the interval $t_0 > t_1$

Discontinuous n-layer signal diagram Similar to the first context, we have a second context where a multiverse λ exists and uses the irreducible n-layer signal diagram to describe it, but the starting point of the second context is different.

Entity σ can impact to change the event of λ and that creates another λ . And it is that difference depending on the impact |σ| that shows |σ| in the domain P is possible to finetune to create the desired λ.

There are infinite possibilities λ that exist and whether one of them appears or not depends on |σ|, which can also be said in other words, |σ| will lead σ to exist in some λ

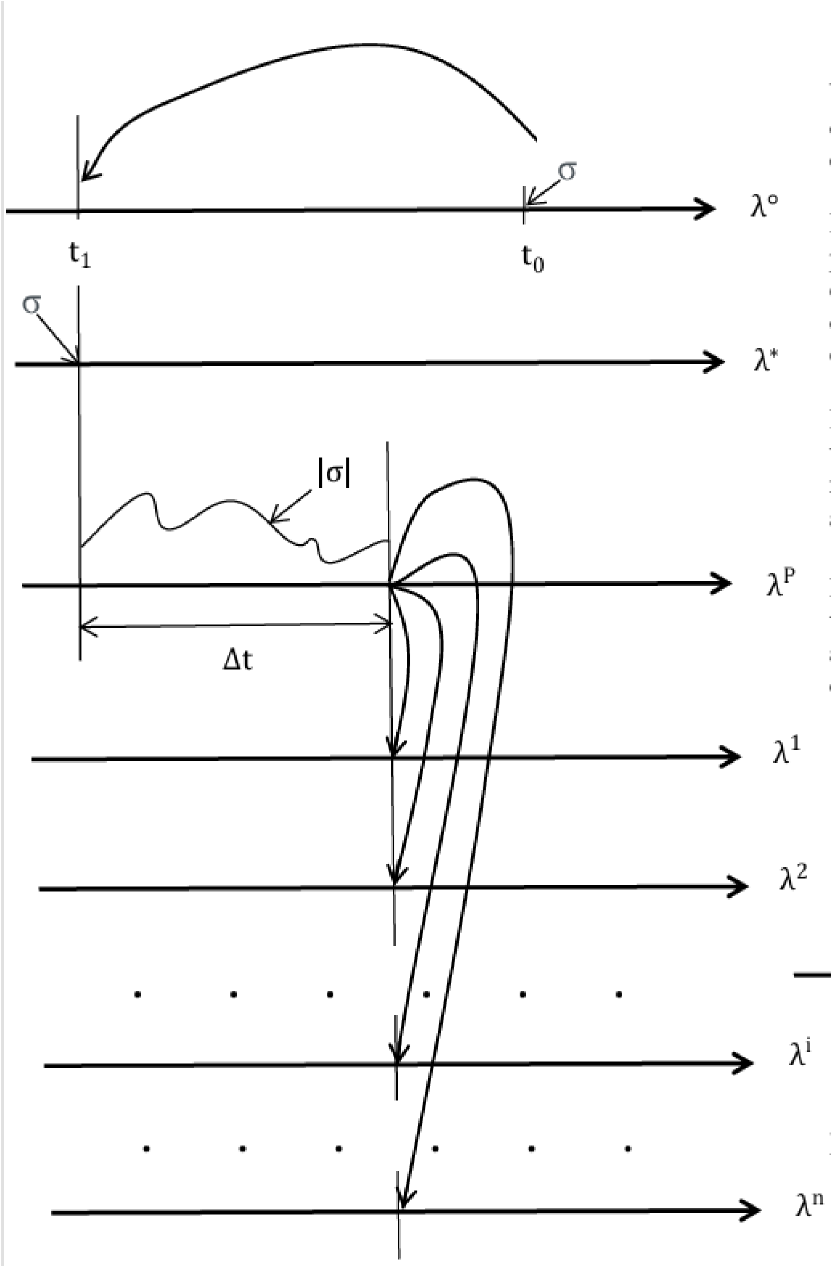


Figure 14

λ^* : an universe when σ has just entered the domain P
Δ^t: time period while σ performing the impact
λ^P : intermediate universe or probability universe
λ^1 , λ^2 , …, λ^i ,…,λ^n : universes in which it is possible that entity σ will exist. However, σ only appear one of the above.

The probability that σ exists at any λ or the probability that σ creates any λ depends on σ and the resistance factors in λ

Loop Signal Diagram

When σ begins to enter the domain P from t^1 to t^0 , then from t^0 σ entering the domain F back to t^1 and the whole process is carried out and completed in only one universe λ, it is called loop signal diagram.

However, according to the analysis in the previous sections, it is clearly stated that σ entering the domain P has caused σ to be in a different λ , so the loop signal diagram only exists under ideal conditions.

Ideal conditions for entering the domain P: when the difference μ is approximately 0 or λ newly created and the original λ has almost absolute similarity.

$$\left|\lambda^1 - \lambda^{\circ}\right| \approx 0 \iff \lambda^1 \approx \lambda^{\circ}$$

From here we can consider that after σ enters the domain P, σ is still in the original universe and it is possible to create a loop signal diagram (a closed time travel loop).

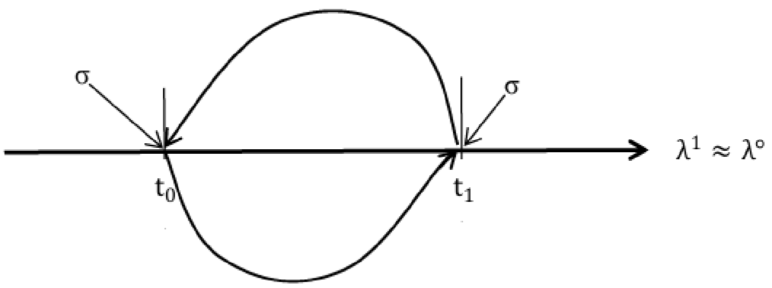


Figure 15:

The quantity E and the differential dE - Problem of matter between universes λ
Quantity E: the amount of all matter (everything) that exists in a λ

According to the properties of a closed universe system λ, the quantity E must always be conserved no matter how the events in λ develop.

E= const

When σ exists in λ° and enters the domain P, σ is already in another universe λ^1. Visually, we can see that this process causes λ° to lose an amount of matter and λ^1 gains an amount of matter. The amount of matter lost and added at λ° and λ^1 exactly equal and equal to the entity σ (assuming here the entity σ exists in the form of matter) is called the differential dE or symbol dE.

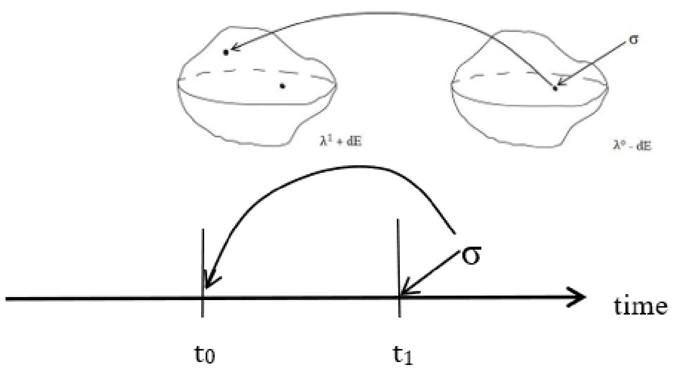


Figure 16

Fundamental and the λ Synchronous Method For σ Enters the Time Domain P

Method summary: The problem of matter between universes λ makes the process σ entering the time domain P impossible.

To solve the problem we can use the λ synchronous method:
+Create a closed universe system λ that is independent and similar to the original universe λ° denoted λ_{syn}
+ All events happening inside λ° are recreated inside λ_{syn}
+Events in λ_{syn} take place more slowly than events in λ° a period of time
*λ_{syn} and λ° use the same time axis

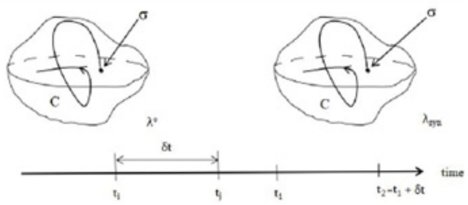


Figure 17

Event ε in λ°: entity σ moves along curve C ti: the time the event ε start happening in λ°

t^j: the time the event ε start happening in λ^{syn}

t^1: the time the event ε in λ° ends

t^2: the time the event ε in λ^{syn} ends

*The entity σ in λ° and the entity σ in λ_{syn} are two different entities, however due to the properties of the entity σ (Chapter 1, section 1) we can consider two entities σ in λ° and λ_{syn} to be unique or we can say σ in λ_{syn} is σ in λ° and vice versa.

Describe the process of σ entering the time domain P using the λ synchronous method

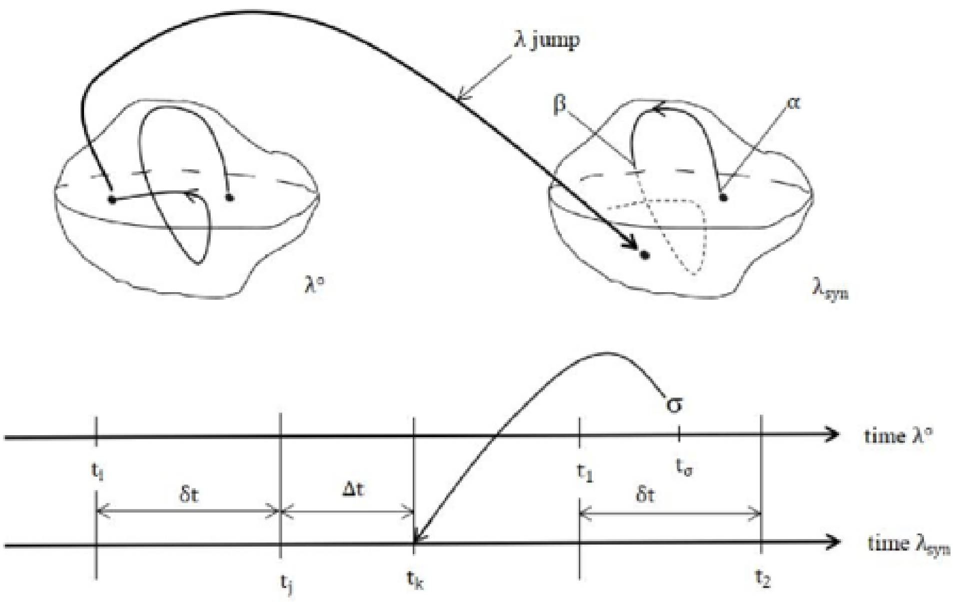


Figure 18

*If σ enters the domain P within the time period (t_i , t_1), then σ will not continue to complete the event of moving along the curve C, so to be normalized, we only consider the case where σ enters the domain P after complete the event ($t > t_1$).

λ jump: entity σ moves spatially from one closed universe system to another closed universe system

Event ε in λ_{syn}: σ has been executing the event ε for a period of time Δt or σ has traveled a distance from α to β on curve C.

tσ: time of entity σ

When σ is in λ_{syn}:
+The space of the universe does not change (λ° and λsyn is independent and the same) + σ inside λsyn before is also σ just enters (particle point property σ) +The event recreated by σ in λsyn is exactly the same as the event that σ created in λ°

*Indeed, when viewed from another perspective, the entity σ after entering λsyn , was able to see the past and was actually in its own past. The entity σ returns to the past a period of time calculated by the formula:

Event time λ° - Event time λ_{syn}

Consider t_k: $(\delta t + \Delta t) - \Delta t = \delta t$

*For the λ synchronous method, σ entering the time domain P is essentially the process of σ moving in space not moving on the time axis.

In a closed universe λ, time only begins to run when event occurs in λ , and when no event occurs or σ remains stationary, time is considered to stop.

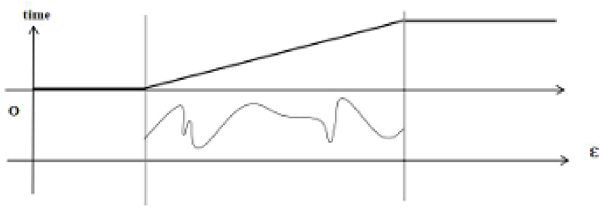


Figure 19

σ Enters the Time Domain P Specific Problem Apply the λ Synchronous Method

Assign entity σ a physical form. Here, the nature of the closed universe system λ is a classical mechanical system, so the entity σ has mass.

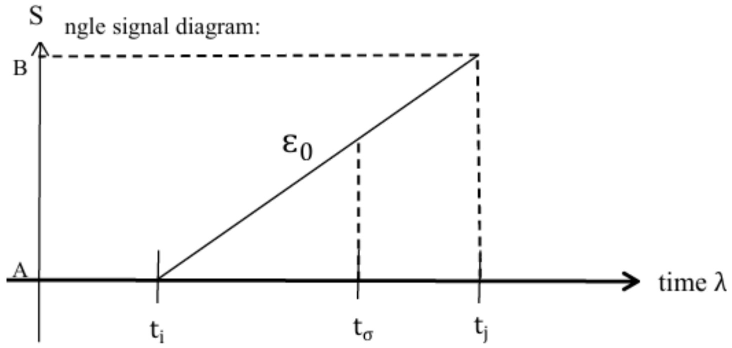
Event set ε_0 : Entity σ moves a distance from point $A(x_0, y_0, z_0)$ to point $B(x_2, y_2, z_2)$ in the universe λ° with speed v from t_i to t_j

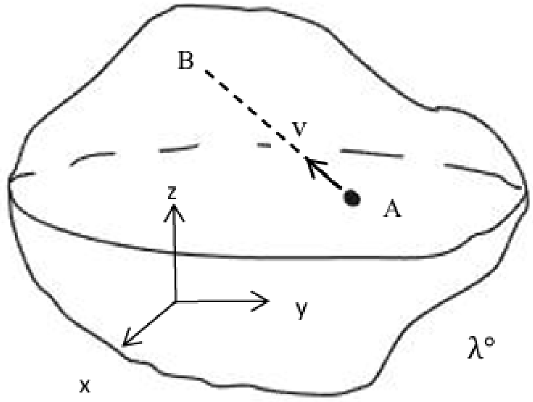
At any position in segment AB, entity σ has coordinates I(x,y,z) and at that time is t_σ
Length σ moved in a period of time Δt= tσ - ti :

$$S = v.\Delta t$$

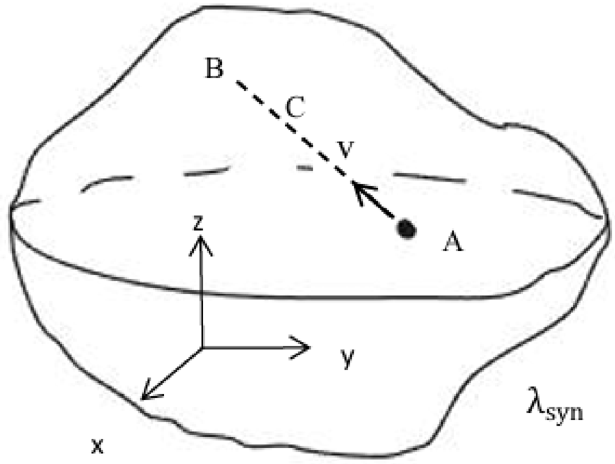
$$\Longleftrightarrow \sqrt{(\square - \square_0)^2 + (\square - \square_0)^2 + (\square - \square_0)^2} = v.(t_\sigma - t_i)$$

The length σ moves is a first-order function signal diagram:





Using the λ synchronous method helps the entity σ enter the time domain P a period of time δt before (entity σ travels through the past a period of time δt)

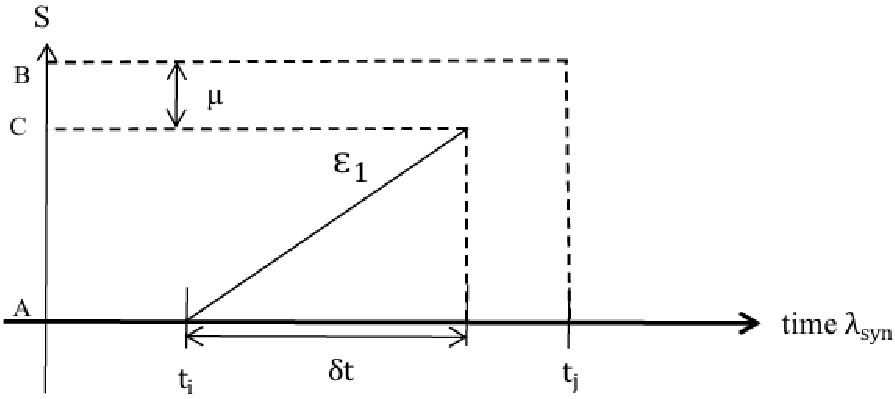


Consider the universe λ_{syn}:
Length S the entity σ moves in the time interval δt and the entity σ is at position $C(x_1, y_1, z_1)$

$$S = v.\delta t$$
$$\Leftrightarrow \sqrt{(x_1 - x_0)^2 + (y_1 - y_0)^2 + (z_1 - z_0)^2} = v.(t_\sigma - t_i)$$

Right now the entity σ makes a λ jump into λ_{syn} , we ignore the primary impact quantity $|\sigma^0|$ and the case the entity σ creates an independent impact quantity $|\sigma|_{in}$

When the entity σ enters and collides with the entity σ inside λ_{syn}, causing it to stop at C, an event ε_0 is not created in λ_{syn} but another event is created. That is the event ε_1: entity σ goes from A to C.



Difference μ between λ° and λ_{syn} :

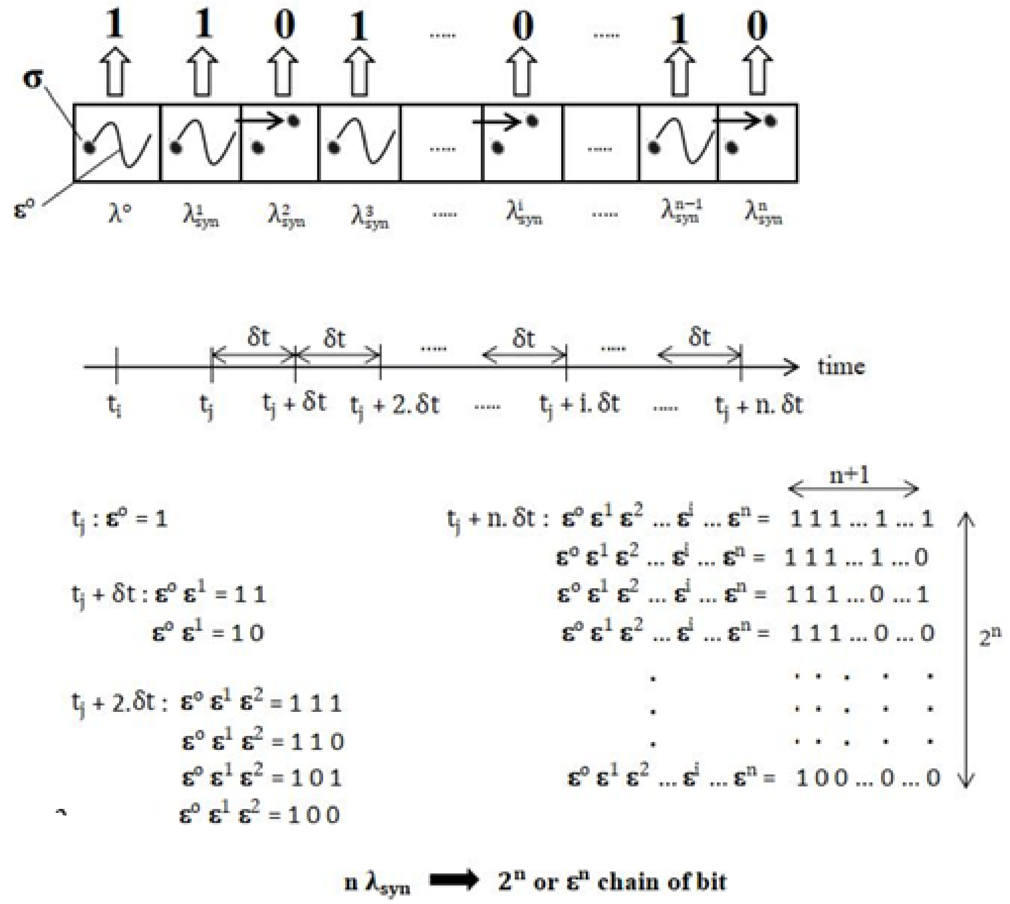
$$\mu = \varepsilon_1 - \varepsilon_0 = AC - AB = -BC = -\sqrt{(\square_1 - \square_0)^2 + (\square_1 - \square_0)^2 + (\square_1 - \square_0)^2}$$

Because the event ε is expressed through the length S that the entity σ can go, the minus sign here of the quantity μ represents the decrease in the length that σ can go, or it can be called the reduction of the event ε0

During the process of entity σ entering the domain P using the λ synchronous method, a difference μ will be created, the difference being large or small depending on the quantity $|\sigma|$. Normally, the purpose of entering the domain P is able to bring the entity σ back to its own past, so the universe that σ enters is as similar to the original universe as possible, or the quantity μ is approximately 0.

*For the problem of σ entering the domain P, we need to calculate the quantity μ and devise methods to approximate μ

New Process Design Application for Data Storage and Transmission



Design an engineering model of the operating principle using a λ synchronous method There are n+1 universe cells in which the first cell is the original universe, the remaining cells are the synchronous universe and inside each cell contains an entity σ that creates a event with an information value is 1

From left to right, entity σ in the second cell creates an event later than the first cell a period of time δt, and entity σ in the third cell creates an event later than the second cell a period of time δt, and so on until n+1 th cell From the second cell onwards, the process of creating an event, if no entity σ of the adjacent cell on the left enters, the information value is still 1 and vice versa, the information value is 0.

At the time tj the entity σ in the first cell creates a event εo with an information value is 1

At the time $t_j + \delta_t$ the second cell there are two possibilities, so the event ε_1 can have an information value is 1 or 0.

Continuing to the time t_j + n. δt we get the 2^n possible information chains

*For model that the σ entity creates events with ε different information values and has a total of n+1 universe cells, there will be εn information chains and when the process is completed, only 1 information chain appears in εn possible information chains.

Conclusion

"The distinction between past, present and future is only a stubbornly persistent illusion" - Albert Einstein.

This article will give us a more realistic view of the sense of time that we see and experience every day and every hour. When that view exists, we will see a difficult and mysterious problem: going back on the time axis. When that problem is analyzed in detail, it will tell us how feasible and impossible it is.

Suppose that at some point in the future humanity will begin to invest financial resources in creating time travel technology or have created a technology that can help us move forward or stepping back on the axis of time, it is necessary to know the true nature of time.

Time is considered all movement in the universe.

The process of entering the time domain P is essentially entering another universe.

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