Time Hypothesis

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Introduction

Humans have always wondered about their surroundings: why are there clouds? Why is there day and night? And so on. But one question that many people have asked is: What is time? Many have explained that it's something fictitious, something that is a law, a dimension, and so on. In this work, I won't reveal what it is, but I will explain how it is managed and how time influences us.

The Decision

It's possible that no one will listen to me, or that they will consider this document fanciful, but this is my last resort, since very few scientists have been willing to listen to me, due to the idea that time has already passed, or what good would it do to know it. I'm leaving my entire idea of time for someone else to pursue, since I may no longer be able to, and I don't have the financial means or the education to continue alone. So, good luck, and I hope this can be useful. If you're wondering why this idea came about, it's very simple: it all came about when I was 12 years old, when I realized that the human brain, when it's pumped with adrenaline, can slow down time as it pleases.

1. Investigation

All this research arises from one question: why is quantum physics so random? I think it's the million-dollar question in this era of physics, and I didn't know how or why until I became obsessed with something: time differences. In relativity, there are different times due to the speeds of the systems. And why not in quantum physics, better yet? This is why it is so probabilistic, because it is a dynamical system with time 0. But before we get to that, let's see why I say it is in time 0.

2. Quantum time

The question is: how do the states $\triangle\, t = 0$ go to $\triangle\, t = 1$? and how is a dynamic object in $\triangle\, t = 0$? it's something strange but great, since the formalism exists and it is the wave function, let me explain, when we need to transform a quantum system to a classical one, what happens, the wave function gives a certain probability and from there it becomes classical by observation, and what does this have to do with time? let's see.

Having analyzed the particles, we can say that there is a time $\triangle\, t = 0$ on the outside of the particle and a time $\triangle\, t = 1$ inside. So: how would a $\triangle\, t = 1$ look like in $\triangle\, t = 0$? Simple, with an analogy:

We have a person who lived in a single city, a circular city like the following:

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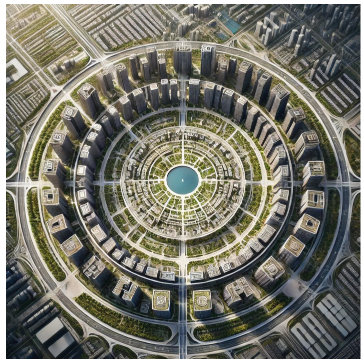

Figura 1: Round city simulating the location areas of the particular.

This person spends their entire life in this city, and their entire life goes by. Now let's think, what would happen if we moved this person's life from $\triangle\ t = 1$ to $\triangle\ t = 0$? This was a question I asked myself, and something came up, because in the end, their life is already over, so we would only have to see densities and locations (orbitals) of where the person was, like the following image:

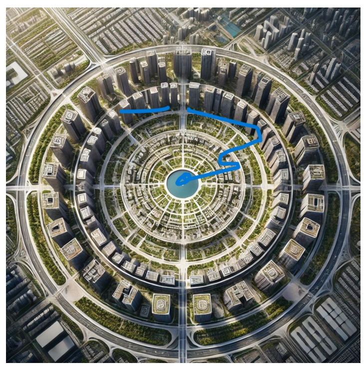

Figura 2: Beginning of the person's journey.

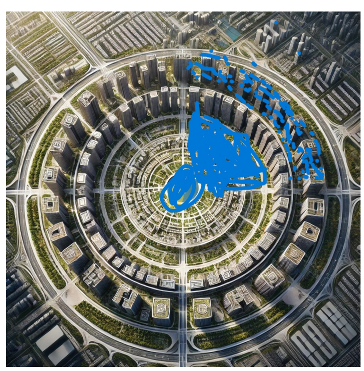

Figura 3: The path spent several years simulating the orbitals of a particle.

The point is, the more energy the system has, let's imagine money, the more the person will no longer pass through certain places to reduce their energy, or money, and be at a minimum energy. I think this analysis is showing where it's going; this is an example of an atom but as a person, where the person is the electron and the streets are the limits of the orbitals (s, p, d) where the atom can pass, thus obtaining that the probability of quantum mechanics is due to its temporal change.

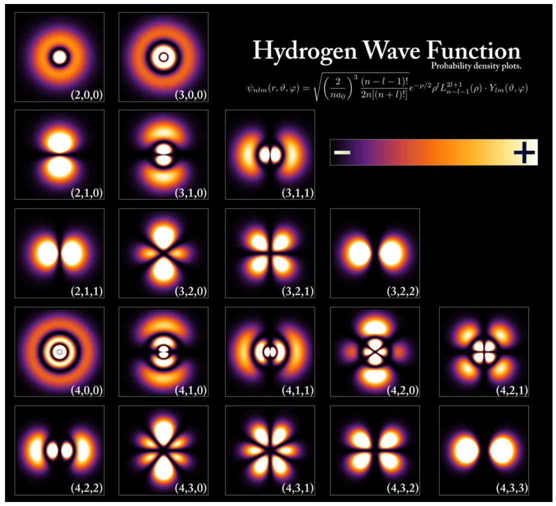

Figura 4: Interpretation of the hydrogen wave function.

Note: The time of the wave function is the time of the system past our time, while the time I give from 0 is the time of the field. Now, we have this, but what about uncertainty and its decoherence?

2.1. Uncertainty

Here a question arises: if quantum time is $\triangle\ t = 0$, then what would happen to uncertainty? Let us remember that the uncertainty equation is:
Space-Time Uncertainty.

$$\triangle\ E \triangle\ t \geq \frac{\hbar}{2} \tag{1}$$

Now, looking at the equation if we put a quantum time $\triangle\ t^Q = 0$ there would be no longer any uncertainty, since the equation would be equal to 0, but that would be bad, right? The question is, when we analyze this uncertainty, we do it from a time $\triangle\ t^{cl}_{v_0} = 1$, with this we can even demonstrate that this uncertainty exists in our time, also if we analyze the equation at 0, we have something, that neither time nor energy is random in the quantum world, therefore we can know these values with certainty, but they are related, so when one grows the other decreases. Which does not happen with the uncertainty of position and momentum.

$$\triangle\ x \triangle\ \rho \geq \frac{\hbar}{2} \tag{2}$$

Where we cannot know the position or the moment with certainty, only the probabilities of these same probabilities, but even with a relationship like the Space-Time uncertainty.

2.2. Decoherence

Decoherence is the transition from a final time to an initial time if the necessary energy, and a way to maintain it, are not obtained for its temporal passage. Example: We have a bit, we transform it into a quantum bit, but to be quantum it needs, as seen in the previous analysis, that the energy be 0 or time 0. Since it is not possible to have 0 energy, because the system would not exist, we try to have a time 0. The thing is that due to various external forces, this time 0 is tiny to be able to maintain it and decohere.
Now, if this exists, there must be a formula, like a wave function, that can calculate this decoherence, but it should also be dependent on the system due to the topology, energy, and particle or particles used, in addition to being dependent on the energy and geometry of the system as a whole.

2.3. Relativistic Time

While I was thinking about how to combat uncertainty, an idea came to me: try to stretch the system's time so that it can hold on on its own while we wait for the wave function to collapse. But if I remembered correctly, the only way to do this was with relativistic time dilation, so with the help of the photon, let's calculate the dilation in quantum mechanics:

The basic equation for time dilation is:

$$\triangle\ t' = \frac{\triangle\ t}{\sqrt{1-\frac{v^2}{c^2}}} \tag{3}$$

Where:
$\triangle\ t'$ is the change in time measured by the observer moving at velocity v relative to the observer at rest.
$\triangle\ t$ is the time measured by the observer at rest (also known as proper time).
v is the velocity of the moving object relative to the observer at rest.
c is the speed of light in vacuum.

I know there are more, but I tried to bring almost all the time variables into a single, viable one to see how it is affected by all systems. This gives us:

$$\triangle\ t' = \triangle\ tA_t \tag{4}$$

Where A_t are the variables of each dilation equation.

$$A_t = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} = \frac{1}{\sqrt{1+\frac{ad}{c^2}}} = \sqrt{1-\frac{2GM}{rc^2}}$$

If we calculate by joining all the variables A_t.

$$\frac{A_t}{A_tA_t} = \frac{\sqrt{1+\frac{ad}{c^2}}}{\sqrt{1-\frac{v^2}{c^2}}\sqrt{1-\frac{2GM}{rc^2}}}$$

$$\frac{1}{A_t} = \sqrt{\frac{(1-\frac{v^2}{c^2})(1-\frac{2Gm}{rc^2})}{1+\frac{ad}{c^2}}}$$

$$\frac{1}{A_t} = \sqrt{\frac{\frac{1}{c^2}(c^2-v^2)(1-\frac{2Gm}{rc^2})}{\frac{1}{c^2}(c^2+ad)}}$$

If we say that the system has $v = cte$ (then $a = 0$)

$$\frac{1}{A_t} = \sqrt{c^2 - \frac{2Gm}{r} - v^2 + \frac{2Gmv^2}{rc^2}}$$

taking into account that our system is a photon system $v = c$

$$\frac{1}{A_t} = 0$$

With this we have that $\triangle\ t' =?$ and $\triangle\ t = 0$, giving that in any system quantum systems are seen in probabilities but that it is a zero time where these same probabilities are governed.

3. Times

In my paper, I've named the times $\triangle\ t = 0$ and $\triangle\ t = 1$, but what are they? And why do I name them that way? Now it's time to talk about time and its reference frames, thus better explaining what has been said about quantum time.

3.1. Because the universe has $t = 1$ as a global reference.

The base time of the universe is $\triangle\ t = 1$, one second every second, and this, in addition to being verified with calculations, can be verified with an analogy: let's imagine the same problem as Einstein's train with light, where the train is moving, but this movement does not affect the state of rest of the objects inside it, except for the light. So with this, let's change to the objects of the universe. Although there is acceleration throughout the universe, systems get used to having a change time of one second per second, at rest or at speed 0, depending on the reference frame, obtaining a time of $\triangle\ t = 1$, while light, having the same speed as light, does not affect external velocities of the universe, giving a time $\triangle\ t = \frac{1}{0}$.

1. **From General Relativity (FLRW Metric)**
   In cosmology, cosmic time $t = c$ is the time measured by an observer at rest with respect to the expansion of the universe.
   This time is the same for all observers moving with the flow of the universe (i.e., with the cosmic expansion).
   In the Friedman-Lemaître-Robertson-Walker (FLRW) metric, cosmic time is used as the universal reference.
   This means that we can naturally define it as $t = 1$ to describe the evolution of the universe.

2. **From the Thermodynamics of the Universe**
   The second law of thermodynamics states that the entropy of the universe always increases.
   We can take cosmic time as $t = 1$ because everything in the universe evolves according to this time, since entropy defines a clear direction of time.
   If the effective time of a system is different, when interacting with the universe it will tend to adjust to the time of the environment through thermodynamic processes.

3. **From Relativistic Quantum Mechanics**
   In the Dirac equation and other relativistic quantum theories, time is a universal coordinate of Minkowski spacetime.
   If we want to define a reference time where physical processes are more stable, then cosmic time $t = 1$ is a good choice.

3.2. Reference Frame

First, we will handle reference frames with velocity. Why use velocity as a reference frame? Simple, time is measured by momentum, and velocity is the closest to being a minimal unit, like seconds and so on. In addition, Einstein's time dilation equation requires velocity. Now, knowing this, let's begin to understand how to visualize this time transition. The idea is, using velocity as the reference frame and using the expansion of the universe, we could return particles with a velocity $v = c$, giving a limit of 0, making the particle reach the speed of light and making it quantum, as shown in the following image:

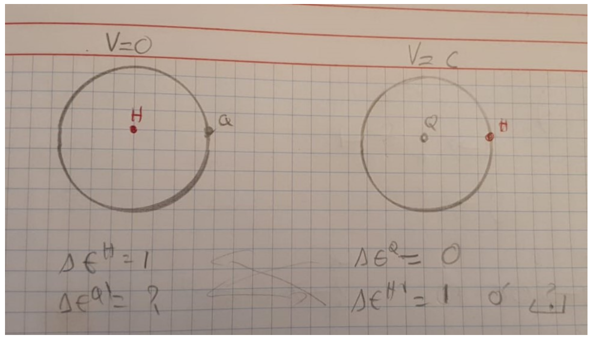

Figura 5: Reference frame with different speed for the same object of study, making it a different reference center of the system, where $v = 0$ is the natural parameter, which will dictate the universal calculation, and $v = c$ is the object in the quantum system..

Where:
$\triangle\ t_v^S$ is the time in the system and the velocity.
Note: S is the system that is immersed in a time, v is the velocity that marks that time as a type of temporal reference frame.

Here I am giving 2 topics, one that times change depending on the reference frame thanks to its speed in which it is measured. And that the base time of the universe, therefore classical time, is $\triangle\ t_v^{cl} = 1$, also that the base quantum systems must be in $\triangle\ t_v^Q = 0$.

We can see in the image that the time of each system depends on the location in the temporal plane (this with the help of the speed of the system) where the quantum system is created by the speed of light, where in the frame with speed $v = c$ it has a time of $\triangle\ t_c^Q = 0$ but in our frame of speed of 0 it has a time of $\triangle\ t_{v0}^Q =?$, while in the human system, which is the same time as the universe/classical, the times do not change $\triangle\ t_{v0}^H = 1$, this is because, although it is affected by the expansion of the universe, being in systems of systems together and with the help of gravity a base time is obtained. Furthermore, observing these time frames we can see the change from a normal system to a probabilistic one, if it comes directly from a quantum system we say that it starts at a time $\triangle\ t_c^Q = 0$ we move it to a probabilistic time $\triangle\ t_{v0}^Q =?$, where the temporal location of the particle is unknown, and from there it decays to a time $\triangle\ t_{v0}^U = \triangle\ t_{v0}cl = 1$, but if we take the other path of making a classical system into a quantum system we have several problems, the mass, the speed and so on, but in addition to them we have the time, since we start from a time $\triangle\ t_{v0}^H = 1$ from there we go to a time $\triangle\ t_c^H = 1$ but at the speed of light, consequently it must be transformed to a time at $\triangle\ t_c^Q = 0$ which requires zero interaction with a system, but the system must also remain dynamic. You can see an image here:

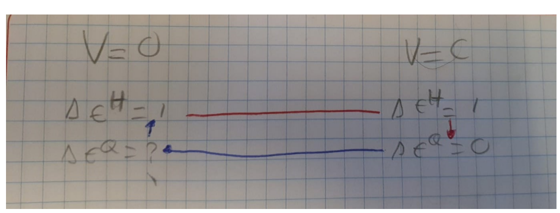

Figura 6: The blue path is the transformation from a quantum system to a classical one and the red path is the transformation from a classical system to a quantum one.

Here we see the two paths their temporal transformations take, as well as the direction of each path.
Reminder: We take the speed of the photon as the quantum basis and from there we transform each particle into a quantum system with its particle speed plus the speed of the expansion of the universe, which gives a total speed to that of light. Returning to Figure 1, you may get another idea:

Decoherence: In $\triangle\ t_{v0}^{Q} =?$, it is not that time does not exist, but rather it is the quantum system adjusting to our time system $\triangle\ t_{v0}^{H} = 1$.
With this in mind, let's look at the time parameters we have left.

3.3. Times in parameter $\triangle\ t_{v0}^{H} = 1 = \triangle\ t_{cl}$

Having the parameter as an observer of $\triangle\ t_{v0}^{H} = 1$ (one second every second) we can observe the consequences that other systems have due to our observation:
If we go to classical systems the temporal issue does not change, because classical systems have a time $\triangle\ t_{cl} = 1$, which is equal to that of the observer.
In relativistic systems it is easy to see, already looking at the images we can detail that it has a range of $0 < \triangle\ t_{re} < \infty$.
Now in quantum systems it is another problem, because this has 2 times due to the reference frames, where at time 1, which is the base time of all particles, the quantum time is $\triangle\ t_{qu} = 0$ for the observer, but when we influence observing the quantum systems it is determined at a time $\triangle\ t_{qu} =?$, this Because the system selects certain times to transform its time into the time $\triangle\ t_{v0}^{H} = 1$, which is the observer.

Let's pause to better understand this whole idea.

4. Action

As we are taught in classical mechanics, the Lagrangian and the Hamiltonian come from the base equation of the action, which is:

$$S_A = mvd = \int_{t1}^{t2} Ldt \tag{5}$$

We will return to this equation in a moment, but remembering that the Lagrangian has as its equation, in this case, $L = K + U$ and it also completes the Hamiltonian in its equation, where the Hamiltonian is:

$$H(p, q, t) = \sum_i p_i \dot{q}_i - L(q, \dot{q}, t) \tag{6}$$

With this in mind, we can see that the Lagrangian is important in the Hamiltonian. Because of this, we will analyze the Lagrangian in more detail, in addition to the action.

Let's take an example of the action to analyze it in detail. This example will be done with the most commonly used particle in entanglement, the photon, and its energies according to each branch of physics.

With the photon, the action is divided depending on the branch of physics, where the results are:

$$S_{rel} = 0 = \int \frac{E}{C} ds \ \textbf{;}\ ds = 0$$

$$S_{cla} = \int -mc^2 \sqrt{1 - \frac{v^2}{c^2}} = \int -mc^2 \frac{\triangle t'}{\triangle t} \ \textbf{;}\ m = 0$$

$$S_{qua} = \hbar(kx - wt)$$

Where:
S_{rel} is the relativistic action. It is 0 because for a photon the space-time interval is zero.
S_{qua} is the quantum action. This result is due to the fact that quantum action is related to the phase of the wave function.
S_{cla} is the classical action, and it has a value of 0 because it has zero mass.

We'll pause here for a moment. Something very interesting emerges: time, but also something else: external time, which we can interpret as the observer's time. With all this, we can understand that time is highly subject to relativistic and classical systems (observer and system), but what about quantum time? Looking at it another way, we see in equation 1 that, on the central side (mvd), energy is constant, but time varies, while on the right side, energy is variable, but time is constant.

4.1. The chicken or the egg

Observing all this we realize that time is a special ingredient that makes relativistic systems become quantum, where if:

$$\frac{\triangle t'}{\triangle t} = 1$$

it's classic

$$\frac{\triangle t'}{\triangle t} = 0$$

It is quantum and

$$0 < \frac{\triangle t'}{\triangle t} < \infty$$

is relativistic.
Where:
$\triangle t'$ is the system time.
$\triangle t$ is the observer time.

With this, I give an answer and a question. The answer is that, in the end, what gives location and time to objects is due to gravity, so depending on the system, we can observe different times and strange phenomena. The question is, if we think about it, time must give space, and space gives time. So, if there are timeless objects, there are also spaceless ones. Furthermore, if you give it a space-time (energy given externally to give a time like that of our system or internally through the expulsion of energy to equalize it), you will give it a space and time similar to the observer's system. Another answer is entanglement, because it arises in a time 0, causing the information not to pass faster than the speed of light, but rather it was already there before the moment the information was given to the entangled system, but it gets complicated when we introduce classical tactics in quantum times.

Therefore, if time, space is dubious, arises spontaneously, there should be gravity in each element, in information, quantum systems, and in the photon, of lower average or 0 in some cases, but it should exist. Another question is, what would happen if the measurement of time is different from that of the observer? In this case, the observable time we have is $t = 1$, but what would happen with each measurement is in different times, for example: entanglement is a phenomenon because the two elements are in time 0 interacting with each other, and therefore we do not understand those phenomena at $t = 1$.

4.2. Improved Action

If we think about it, the action gives the derivative of the Lagragian, which, in addition to its different equations, is $L = K + U$, thus giving energy. But what if the action can filter all energies? Let's see.
We know that there are several energies, from relativity to quantum, but none of these are related to each other, and that's good. Let me explain. In the end, the system must have a total energy and complementary energies, where each energy is limited by something, which in this case could be time. Time influences each branch differently. This is why there are energies in each case, eliminating or increasing the importance of some energies over others. With this in mind, let's see how the action would look with these modifications:

$$S = \int LM(E, g)dt =$$

$$= \int L(E_{relatividad}m_{rev} + E_{qa}m_{rev} + E_{gravitatoria}m_{grv} + E_{campo}m_{camp})$$

where the functions m_x are formed by

$$m_x = \frac{\triangle t_x}{\triangle t_{observer}}$$

where:
$\triangle t_x$ is the system time.
$\triangle t_{observer}$ is the observer time.

With this, each system will be determined by a time in the system. Depending on whether or not time exists, the energies eliminated from the system will be determined. This equation would be an idea, since everything must be clearly stated, including how time can influence it.

5. The New Time and Its Consequences

With these ideas we must come up with a new concept of time, this is because when 2 times interact there must be an average time, which we will call effective, which balances the 2 times and gives a common time to the 2 systems, and this is the idea of the equation in general form:

$$T_{effective} = \frac{t_1 t_2 ... t_n}{t_1 + t_2 + ... + t_n} \tag{7}$$

Where:
$T_{effective}$ is the effective time.
t_1 is the time of system 1.
t_2 is the time of system 2.
t_n is the observer's time.

Note: These must be systems on equal footing.

With these ideas, we can see consequences, such as the existence of timeless and/or spaceless objects. Furthermore, it solves many mysteries and only creates one new one:

6. Solved Mysteries

6.1. Spaceless and/or Timeless Objects

Note: Objects at $t_0 = 0$ are not the same as timeless objects. Furthermore, timeless objects are not the same as objects at $t =?$ because the latter has a dynamic time, unlike static objects (it is known that they have time and can also transform their time to that of the observer).

In this case, I return to the previous note: there are four cases: objects at $t_0 = 0$ that are dynamic, timeless objects but with space, spaceless objects but with time, and spaceless and timeless objects. Let's analyze the four cases in more depth.

6.2. Quantum Objects

As I previously stated, quantum objects are in a time $t = 0$ on the outside, but inside they are dynamic objects, so they become probabilistic systems and from there a state is selected and the states are changed until they reach our time, giving the random result that we see. This is because, initially, since they have no mass (or negligible mass in some cases), they do not deform spacetime, so we can determine their time at $t = 0$, but by making them classical, we force it to be determined in our world and flow at our time. However, because they are so small, they are forced to go to a time $t = 1$. In addition to magnetic fields, thanks to this phenomenon, we all have a time date, because each one is linked to the other's time, from there to the Earth, from there to the galaxy, and finally to the universe, giving that the temporal speed of the universe is naturally $t = 1$.

6.3. Dark Matter and Dark Energy

Dark matter and dark energy are timeless but not spaceless objects. They exist in space, but their time is nonexistent, due to:

Dark matter:
It interacts gravitationally, meaning it exists in space, but has no temporal evolution in our frame of reference.
It neither emits nor absorbs light, which could be explained by its lack of internal time.
It behaves like a quantum fluid, suggesting that its internal dynamics are different from ordinary matter.
If dark matter has already undergone its entire evolution in its own internal time, that would explain why it appears "frozen.[a]nd stable on cosmic scales.

Dark energy:
The universe is expanding "within.[a] timeless state that acts as a background field with a spatial structure but no temporal evolution.
The effective time of the universe may be accelerating due to its interaction with this timeless state.

6.4. Mystery of Nothingness

This is an example of a timeless and spaceless object. If we analyze nothingness, it has neither time nor space, but it exists because there is energy in it. This would mean that objects exist in nothingness, but since it has neither space nor time, we cannot calculate them separately. It would also be very difficult to calculate them because we would have to give them precise energies (or gravity) to be able to see them in individual components, and we would transfer them to our space-time field.
So, what does this mean for nothingness?
Nothingness would be a state where there are no differences in energy, space, or time.
Something like the quantum uncertainty principle could cause time and space to emerge spontaneously.
If time does not exist in the base, but emerges when there is energy/gravity, nothingness is never truly empty, but in a potentially unstable quantum state.

6.5. Black Holes and Their Singularity

Black holes are an interesting phenomenon because they have 3 out of 4 systems: a space system, time 0, and the observer's time, so we'll analyze this in more depth.

Exterior of the Black Hole:
Time from our external perspective slows down more and more as we approach the event horizon.
But inside the horizon, the situation changes drastically. Space collapses almost completely (spaceless), but the system would retain an internal time $t \approx 0$.

Quantum Singularity Inside: The singularity is no longer a point without defined properties, but a quantum system with evaluable internal time $t = 0$.
This could be the key to avoiding the classical "singularity paradox.[a]nd explaining why information might not be completely lost.

Disappearing Black Holes (Evaporation and Quantum Time)
If black holes emit Hawking radiation and evaporate, we could consider that, as they lose mass and their event horizon decreases, the effective time inside them ceases to be $t \approx 0$ and begins to increase again toward classical values $t > 0$.

How could this be explained?
During evaporation: The black hole would lose mass and the quantum singularity would destabilizing, cea-

sing to be in the $t = 0$ time regime.
At the end of evaporation: The system could release all the information accumulated at the event horizon, resolving the information paradox.
This implies that a disappearing black hole could simply have had a quantum time decoupled from the outside and, upon evaporation, reconnect its internal time with the external universe, allowing the recovery of information that seemed lost.

Implications of Quantum Time for Black Holes and Singularities.
The singularity is not completely spaceless and timeless, but rather spaceless but with an evaluable internal time $t \approx 0$.
The event horizon acts as a temporal boundary, where external time appears to stop, but the interior could have an evolving quantum time that stores information.
Evaporation and Temporal Reconnection: During evaporation, the black hole's internal time could "synchronize.[a]gain with external time, a type of decoherence, which would explain how information can be released at the end of the process.
This distinguishes it from completely spaceless and timeless objects (such as absolute "nothingness"), since the singularity would have a defined temporal evolution, although from our external perspective, time appears to stop due to extreme gravitational dilation.

6.6. Voids and Nothingness

Let's change the concept a bit. If nothingness is an object where time and space do not exist, then the void is the minimum energy in each case, for example:

Redefining the vacuum according to time and space systems:

Vacuum at $t = 1$ (our classical time):
This corresponds to the conventional quantum vacuum.
There are quantum fluctuations and minimum energy fields.

Vacuum at $t = 0$ (quantum systems):
Here, proper time is zero, so fluctuations could appear as "instantaneous" or spatially distributed.
This might explain why quantum systems seem "delocalized."

Vacuum in atemporal but spatial objects (dark matter):
If these objects have space but no time interacting with us, their vacuum would exhibit spatial fluctuations but no temporal ones.
This could explain why dark matter does not interact electromagnetically, only gravitationally.

Vacuum in aspatial but temporal objects:
If such entities exist (perhaps something related to dark energy), their vacuum would be a fluctuation of time without a defined spatial structure.
This might connect to the accelerated expansion of the universe, as if dark energy were a kind of "temporal vacuum."

Definition of nothingness:
Nothingness is both atemporal and aspatial.
It has no energy or fluctuations, as there is no framework in which they could exist.
It is not a vacuum, because a vacuum still relies on structures dependent on time and space.
One could see it as the "starting point" before time and space interact to generate the universe.
Therefore, nothingness is the atemporal and aspatial vacuum.

Vacuum as a structure dependent on time and space:

In each system, the vacuum represents the minimum allowed energy.
Nothingness would be the absolute limit, where not even a minimum energy exists.

An interesting consequence:
If the universe emerged from nothingness, there must have been a mechanism for time and space to arise. This suggests that nothingness is not stable, but rather a state that "collapsed" into realities with time and space.

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6.7. Entropy

Entropy in Systems with Interactive Times
If two systems with different times interact, the effective time would determine the evolution of entropy.
For classical systems, entropy continues to increase in effective time.
In quantum systems with $t = 0$, entropy could remain constant until it interacts with another time, at which point it could be converted into information.
Therefore, information and entropy must be related. I am not including the calculations because I signed a confidentiality agreement, although they are not as sophisticated as expected.

6.8. Matter-Antimatter Asymmetry and CPT Theory

If antimatter has a time t_ant slightly different from the matter time t_mat , then the interaction between the two times could have favored the survival of matter over antimatter in the early Universe.
This introduces a natural symmetry violation mechanism without the need to arbitrarily adjust the Standard Model constants.

Large-Scale CPT Symmetry Violation: CPT symmetry states that a universe mirrored in Charge (C), Parity (P), and Time (T) should behave the same as ours.
However, if time $t_{relative}$ is not absolute and emerges from the interaction of systems, CPT symmetry might not be exact on large scales.
In this case, antimatter could have evolved in a slightly different time than matter, generating a natural imbalance.

Cosmological Implications:
If Antimatter has a different relationship with internal time, so it is possible that some antimatter still exists in regions where internal time has not interacted with ours. This could explain the apparent absence of antimatter in the observable universe, but without the need for all of it to have been annihilated.

6.9. Antiparticles and $t < 0$

In standard theory, antiparticles can be viewed in two ways:
As particles traveling backward in time (Feynman-Stueckelberg).
As states with negative energy in certain relativistic solutions.

That is, if a normal particle has an internal time $t_{particle} = t$, its antiparticle would have an internal time $t_{antiparticle} = -t$.
Let's give an example of this using equation 7, with one antiparticle and one particle (with $t_1 = 1$ and $t_2 = -1$):

$$T_{effective} = \frac{1(-1)}{1-1} = \frac{-1}{0}$$

This suggests that the effective time of their interaction is divergent, which could explain why antiparticles annihilate with their particles: upon interaction, their combined time becomes indefinite, which collapses the system. Antiparticles exist in our time $t = 1$, but with an opposite temporal evolution in their internal state. When a particle and an antiparticle meet, their internal times cancel out, causing the interaction to destroy them.

Let's go further, giving two examples to give the final context. Example 1:
If $t_1 = 2$ and $t_2 = -1$

$$T_{effective} = \frac{2(-1)}{2-1} = -2$$

The resulting system still has negative time, suggesting that it is still evolving in the opposite direction of time to ours.
This means that the interaction doesn't annihilate the systems, but rather leaves them in a state where time continues in the negative direction.

Example 2:
If $t_1 = 1$ and $t_2 = -2$

$$T_{effective} = \frac{1(-2)}{1-2} = 2$$

The resulting system now has $T_{effective} = 2$, meaning it has shifted to a positive state.
This suggests that the interaction can "flip"the system's time depending on the relationship between the t values.

With these calculations we can see that if the systems have a time greater than the value of the positive system by -1, it means that the system will become relativistic, so the antiparticles become particles, and if we remember that the base time of the universe is $t = 1$, then:
For the antiparticles to exist, there must be a time greater than $t = -1$, this is because the base time of the universe is $t = 1$, in addition to not being able to be $t = 0$, because the system would become quantum, then giving that antimatter can only exist in $1 < t < 0$.
If gravity affected both matter and antimatter, these systems would inevitably have attracted and collided. As we mentioned before, for a system with $t < 0$ to remain in that condition, it would need a very specific and stable configuration. However, in the early universe, matter and antimatter would have formed together. But:
Gravity naturally attracted them, leading to their annihilation.
Collisions could only keep $t < 0$ within a very small range, between $1 < t < 0$.
As the universe evolved, any system with unstable $t < 0$ either became relativistic $(1 < t)$ or collapsed into a classical system.
This would explain why we don't observe .[a]ntiobjects.[o]r antimatter structures in the universe: they simply couldn't sustain themselves due to early gravitational annihilation.
Furthermore, this doesn't require a violation of CP symmetry entirely, but rather introduces the idea that time and its natural evolution favored matter over antimatter because systems with $t < 0$ weren't sustainable on the cosmological scale.

6.10. Fractals and Time

There are spatial fractals in the world that have non-integer dimensions, and these are an excellent analogy for extending the concept to time. If space can have fractional dimensions (as in fractal theory), then time could also take on non-integer values.

This would suggest the existence of systems with fractional times $0 < t < 1$, which would imply that the transition between quantum and classical is not abrupt, but gradual.
For $t = 0$: The system is completely quantum. There is no well-defined trajectory, but rather a superposition of states.
$t = 1$: The system is classical, with well-defined trajectories and no superposition. $0 < t < 1$: The system is

in an intermediate state.
This could mean that it still retains part of its quantum nature (such as superposition) but also displays classical characteristics (such as partial localization).
In this interval, decoherence is not yet complete. It's possible that quantum information isn't completely lost, but rather gradually degrades. The existence of fractional times $0 < t < 1$ implies that the transition from quantum mechanics to classical mechanics is not a binary event, but a continuous process. This could help explain quantum decoherence, the emergence of classical reality, and the possible connection with quantum gravity.

6.11. Analysis of Space and Time

Analyzing everything, I come to the conclusion that time does depend on the observer, but space is ethereal and is not influenced by a point of view, even though there are non-spatial objects. Let's look at it in more detail.

Time is relative and can change.
In theory (and also in relativity), the internal time of each system can be different depending on its speed, environment, energy, or degree of interaction.

In theory, time emerges from the interaction between systems. Therefore, it is malleable, adaptable, and can be fractional or even negative. It can also collapse to zero (as in quantum systems) or dilate (as in relativity).
Conclusion: time is dynamic, interactive, and relative.

Space, on the other hand, seems more rigid.
My observation: Space doesn't change in nature, but rather scales or deforms, but it remains the same in structure.
We can measure it smaller or larger, but it's still there.
Unlike time, there is no clear equivalent to "space = 0,.$^{\text{ex}}$cept perhaps in gravitational singularities or nothingness.

In the framework:
When the time of a system collapses to 0, space still exists (as in dark matter: t = 0, but X = 0).
Even if a system is spaceless (like nothingness), there is no way to scale space to fractional values in the same way as time.
Conclusion: Space is more static or structural, while time is dynamic and interactive.

Therefore: time folds, mixes, and collapses. Space stretches, curves, and drags. But only time can disappear.

Deepening the idea:
Space can never equal zero, because there is always a "background structure.$^{\text{o}}$r minimal geometric relationship that defines the existence of a system. Even in quantum states with an indeterminate position, the system continues to exist on a spatial basis.
On the other hand, time can equal zero in certain (quantum) frames, generating timelessness or frozen time.

So, an aspatial system is one that:
Has no defined spatial coordinates.
Does not occupy volume, nor is it localized.
But it can have time, or even have negative or fractional time.

Therefore: if space cannot equal zero, then its absence (aspatiality) is not a collapse, but a condition outside the classical geometric framework.
Therefore, the hypothesis allows for systems that are not located but do evolve. For this reason, space-based

objects are objects with space = 0?.

6.12. Gravity

The theory of Interactive Time does not deny General Relativity or Minkowski's geometric structure; rather, it expands upon it. In relativity, gravity is the manifestation of the curvature of space-time caused by energy and mass.

In this hypothesis, this curvature continues to exist, but time is not an absolute and global background, but rather a result of the interaction between systems with distinct internal times. Gravity would then be the observable result of a deeper process: the coupling and synchronization of internal times through the structure of space.

Space continues to be deformed by mass and energy, as Einstein dictated, but the "flow of time"we perceive is actually the effective time that emerges from this interaction between systems. In this way, the theory of interactive time is compatible with Relativity and offers a more fundamental reinterpretation of the origin of time and its relationship to gravity.

Conclusions

This hypothesis of time redefines time as an internal property of each system that only acquires physical meaning when interacting with other times. This allows us to:

Explain the transition between quantum, classical, and relativistic systems as geometric and relational processes.
Describe dark matter, antimatter, and dark energy without breaking known physics, but rather by extending it.
Introduce a framework where the concepts of nothingness, emptiness, spacelessness, and timelessness play defined roles.
Justify why time can collapse or reverse, while space is stable but can curve or fragment.
Interpret decoherence, entropy, and CPT symmetry within a more general system based on the interaction of times.

In short, time is no longer a universal background against which everything occurs, but a dynamic consequence of the interaction of systems. And this insight offers a new way of understanding and possibly unifying modern physics.

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