The Uncertainty Principle must be a Variable Concept: the Uncertainty Principle Depends on the Complex Physical Time only.

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Abstract. The uncertainty principle states that the amount of uncertainty of a particle’s velocity multiplied by the amount of uncertainty of a particle’s position is a constant. In other words, the more certain about particle’s velocity, the less certain about particle’s position and vice versa. This paper will focus on the uncertainty measure is not a constant but a variable quantity. The uncertainty principle is situation based realism. In certain situations, it is more and in certain situations, it is less. The variable uncertainty principle is the total amount of uncertainty of position and velocity multiplied by the total amount of certainty of position and velocity is a constant. I will also discuss that the physical time is a complex quantity and the variable uncertainty principle actually depends on the complex physical time. The complex physical time has two parts – the real physical time and the imaginary physical time.

1. The Theories

1.1 First Theory
The Physical time is a complex quantity. It has two parts – the real physical time and the complex physical time.

1.2 Second Theory
The total amount of uncertainty of particle’s position and velocity multiplied by the total amount of certainty of particle’s position and velocity is a constant – The variable uncertainty principle.

1.3 Third Theory
Without any external disturbances, the complex physical time is perfectly a sinusoid. The imaginary time acts as an elevator of the complex physical time. The temporal sinusoid is always positive for astronomical bodies made of particles and negative for bodies made of anti-particles. The temporal sinusoid has extremely tiny magnitude and extremely large time period; because of that the temporal sinusoid is very very close to its average value.

1.4 Fourth Theory
Due to the elevation by the imaginary physical time, the complex physical time sinusoid is always positive; it means it runs in the forward direction only, as it is now in the present state of the particle’s Universe. The reverse is true for anti-particle’s Universe.

1.5 Fifth Theory
Because of the extremely low magnitude and enormously large time period, the temporal sinusoid can be approximated to its average value. Because, there is extremely gradual change in magnitude of temporal sinusoid, there is hardly any noticeable effect of mass on the complex physical time, but the complex physical time gets slowed down under the influence of positive mass (mass made of particles), time dilation. The reverse is true for negative mass (mass made of anti-particle).

1.6 Sixth Theory
The elevation by the imaginary time in the particle’s Universe made the complex physical time to run in positive direction without much change in shape with the effect of mass.

2. Introduction
The complex physical time runs in the forward direction in particle’s Universe because of the relativistic speed of astronomical bodies in an elliptical orbit. In the elliptical orbit, the astronomical bodies have variable speed with unique speed at every point [1, 2]. The speed – time curve is a perfect sinusoid. The speed – time curve of Earth around Sun resembles a sinusoid with one revolution is one time period of sinusoid. The speed of Earth is shown in the following figure –

![Figure 1. Speed of Earth around Sun with 1 denotes one complete revolution of Earth around Sun](image)

The figure shows the speed of the Earth in the vertical axis and real physical time in the horizontal axis. Because physical time is a complex quantity, the imaginary physical time is also in the vertical axis. The imaginary physical time elevated the speed – real physical time sinusoid to make the speed always positive with respect to the horizontal axis of reference. OA is the average speed of Earth; OA is also the amount imaginary physical time for Earth. If Earth were made of anti-particle, Speed – real time characteristic would be –

![Image with diagram]
Figure 2. Speed of Anti – Earth around Anti – Sun with 1 denotes one complete revolution of Anti – Earth around the Anti – Sun

$OB$ would be the average speed of Anti – Earth; $OB$ would be also the amount imaginary physical time for Anti – Earth.

Let, the speed of Earth around Sun is $V$
Now, $V$ is a function of Space and Complex Time
Let, Space is $S$ and Complex Time is $T$

\[
V = F(S,T) \tag{1}
\]
\[
V = \frac{dS}{dT} \tag{2}
\]

The speed of Earth, $V = \frac{dS}{dT}$ is non-zero and Earth has a variable speed around Sun. If $dS$ is constant, $K$, then $V$ is a function of $T$ only.

\[
V = F(T) \tag{3}
\]
\[
V = \frac{K}{dT} \tag{4}
\]
\[
V \propto \frac{1}{dT} \tag{5}
\]

Thus, $V$ is non-zero but finite [3, 4] if $dT$ is non-zero and finite. The space displacement ($dS$) is always a constant $K$, it is the variable complex time ($dT$) that creates variable speed of the astronomical bodies. If $V$ oscillates as sinusoidal wave, $dT$ also oscillates as sinusoidal wave but in reciprocal relationship with $V$; if $V$ increases, $dT$ decreases and if $V$ decreases, $dT$ increases. It proves that the complex physical time is sinusoidal too.

Let, the magnitude of temporal sinusoid is $M$ and the fundamental time period of the temporal sinusoid is $T_0$.
Let, $M \rightarrow 0$, then $T_0 \rightarrow \infty$

It is because we know the complex physical time has finite energy in it. It implies that the complex physical time has very very low peak with infinite fundamental time period in it. $M \times T_0$ is infinity multiplied by zero. The result is a finite quantity but not zero.

Figure 3. The temporal sinusoid reciprocal of speed / real time sinusoid (For Particle’s Universe)
3. Why the uncertainty principle is actually a variable uncertainty principle

Suppose an astronomical body made of particle is free to move in free space. Its speed and position are extremely uncertain. The degree of its uncertainty is extremely huge. The imaginary time $BX$ is a measure of uncertainty and the real time $AX$ is a measure of certainty with the area $OAXB$ is always a constant under any circumstances.

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**Figure 4.** The temporal sinusoid reciprocal of speed / real time sinusoid (For Anti – particle’s Universe)

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**Figure 5.** The Astronomical Body in free space possesses $AX$ real physical time and $BX$ imaginary physical time. (For Particle's Universe)

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**Figure 6.** The Astronomical Body in free space possesses $AX$ real physical time and $BX$ imaginary physical time. (For Anti – Particle’s Universe)
The imaginary physical time magnitude \( BX \) is a measure of uncertainty of an astronomical body’s position and velocity and the real physical time magnitude \( AX \) is the measure of certainty of body’s speed and position such that –

\[
AX \times BX = K \quad (6)
\]

\[
AX = \frac{K}{BX} \quad (7)
\]

The velocity and position of an astronomical body in a certain galaxy is way more certain compared to the body in absolute free space. Suppose we made the uncertainty half for astronomical body in the galaxy with respect to the astronomical body in the free space. Then, the measure of certainty will be double. It is as shown in the following figure –

Figure 7. The Astronomical Body in a certain galaxy possesses \( AX \) real physical time and \( BX \) imaginary physical time. (For Particle’s Universe)

Figure 8. The Astronomical Body in a certain galaxy possesses \( AX \) real physical time and \( BX \) imaginary physical time. (For Anti – Particle’s Universe)

If the astronomical body is in a black hole, its velocity and its position are almost certain, it means \( BX \to 0 \), then \( AX \to \infty \). Thus, \( AX \) is actually on the horizontal axis (\( X \)–axis) only.
Figure 9. The Astronomical Body in the black hole possesses \( AX \) \((AX \rightarrow \infty)\) real physical time and \( BX \) \((BX \rightarrow 0)\) imaginary physical time. (For Particle’s Universe)

Figure 10. The Astronomical Body in the black hole possesses \( AX \) \((AX \rightarrow \infty)\) real physical time and \( BX \) \((BX \rightarrow 0)\) imaginary physical time. (For Anti–Particle’s Universe)

The area \( OAXB \) is always constant, \( K \); so that \( AX \times BX = K \) but the magnitude of \( AX \) and \( BX \) varies to support the variable uncertainty principle.

4. Time Dilation

Without any external influences, the time is a perfect sinusoid. The temporal sinusoid has extremely low magnitude \((M_0, M_G \rightarrow 0)\) and enormously large time period \((T_0, T_G \rightarrow \infty)\). Let \( T_0 \) be the time period without gravity and \( T_G \) is the time period under the influence of gravity. \( T_D \) is the time dilation. \( m \) is the mass of the body. \( M_0 \) is the peak magnitude of the temporal sinusoid without gravity and \( M_G \) is the peak magnitude of the temporal sinusoid with gravity. The enormous temporal time period gets further slow down with the influence of gravity [5, 6]. It is called time dilation [7, 8]. Because \( T_D \) tends to zero, the mass have very insignificant effect on slowing down of the complex physical time [9].
5. Conclusion
The Physical time is a complex quantity. It has two parts – the real physical time and the complex physical time. Without any external disturbances, the complex physical time is perfectly a sinusoid. The imaginary time acts as an elevator of the complex physical time. The temporal sinusoid is always positive for astronomical bodies made of particle and negative for bodies made of anti-particles. The temporal sinusoid has extremely tiny magnitude and extremely large time period. Due to the elevation by the imaginary physical time, the complex physical time sinusoid runs in the forward direction, as it is now in the particle's Universe. But, the reverse procedure is absolutely true for anti-particle's Universe. Because of the extremely low magnitude and enormously large time period, the temporal sinusoid can be approximated to its average value. Because, there is extremely gradual change in magnitude of temporal sinusoid, there is hardly any noticeable effect of mass on the complex physical time, but the complex physical time gets slowed down under the influence of positive mass (mass made of particles), time dilation. The reverse is true for negative mass (mass made of anti-particles). The elevation by the imaginary time in the particle's Universe made the complex physical time to run in positive direction without much change in shape with the effect of mass.

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Acknowledgments
I am grateful to Dr. Aparna Nath, Associate Professor and HOD, The department of Physics (She is also my PhD Guide) at National Institute of Technology Agartala, Tripura, India, for the great inspiration and excellent motivation to write this paper with satisfaction. I am truly thankful to her. Also, I am enormously thankful to The Department of Physics at National Institute of Technology Agartala i.e. NIT Agartala for good conduct and sharp coordination.