Anti Heisenberg – Refutation of Heisenberg's Uncertainty Principle

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Abstract—**Today the so-called Copenhagen Interpretation of quantum mechanics dominated description of the physical world still denies the possibility to assign exact simultaneous values to (all) physical quantities. A prime example is claimed to be the fundamental and universal relationship between position and momentum of a particle. According to Heisenberg's quantum mechanical uncertainty principle for position and momentum, the more precisely the momentum (position) of a particle is given, the less precisely can one say what its position (momentum) is and vice versa.**

The purpose of this publication is to provide a mathematical proof that Heisenberg's uncertainty principle for position and momentum is refuted under any circumstances. As we shall see, accept Heisenberg's uncertainty principle as valid then you must accept too that +0 = +1, which is a logical contradiction. Thus far, it is possible to derive a logical contradiction out of Heisenberg's uncertainty principle. Heisenberg's uncertainty principle is refuted.

Index Terms—**Causality, quantum mechanics, special and general relativity, unified field theory.**

I. INTRODUCTION

Quantum mechanics, still dominated by the so-called Copenhagen interpretation, is perhaps the most successful theory in the history of mankind. But it is also a theory which violates some fundamental principles of modern science too, in particular the principle of causality. Heisenberg's uncertainty principle [1], as one of the most important and famous aspects of quantum mechanics, is the striking aspect of the differences between a causal and the Copenhagen interpretation of quantum mechanics dominated non-causal understanding of the physical world and objective reality as such.

According to Heisenberg's uncertainty principle (for position and momentum) we cannot assign exact simultaneous values to the position and momentum of a physical system. Position and momentum can only be determined with some characteristic 'uncertainties'. In last consequence, even the relationship between cause and effect can be determined only with some characteristic 'uncertainties'. Due to this logical or philosophical implication of Heisenberg's uncertainty principle, a deterministic relationship between cause and effect cannot be accepted. Consequently, due to Heisenberg, we must regard the principle of causality as refuted.

II. MATERIAL AND METHODS

There are several different, mathematical formulations of Heisenberg's uncertainty principle.

A. Heisenberg's Uncertainty Principle

One striking aspect of today's fundamental and universal description of the physical world as provided by quantum mechanics is Heisenberg's uncertainty principle. The principle as proposed by Heisenberg became soon considered to be a cornerstone of the Copenhagen interpretation of quantum mechanics and of science as such. The argument that led Heisenberg to his formulation of the uncertainty principle can be found in an article of 1927, entitled as "Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik".

TABLE I: HEISENBERG'S UNCERTAINTY PRINCIPLE

"Im Augenblick der Ortsbestimmung ... verändert das Elektron seinen Impuls unstetig. Diese Änderung ist um so größer, je kleiner die Wellenl änge des benutzten Lichtes, d. h. je genauer die Ortsbestimmung ist ... also je genauer der Ort bestimmt ist, desto ungenauer ist der Impuls bekannt und umgekehrt." [1]

Translated into English, Heisenberg summarized his findings in a general conclusion:

"When the position is determined .. the electron undergoes a discontinuous change in momentum. This change is the greater the smaller the wavelength of the light employed, i.e., the more exact the determination of the position ... thus, the more precisely the position is determined, the less precisely the momentum is known, and conversely"

Heisenberg's transition from a deterministic science to an indeterministic science marks a drastically change in our everyday's understanding of the physical world. But it may be useful to point out that Heisenberg himself did not provide a general and exact mathematical derivation of his uncertainty principle. Due to his uncertainty principle, Heisenberg estimated the "imprecisions" based only on qualitative example [1] to be of the order

$$p_1 \times q_1 \sim h \tag{1}$$

where p_1 denotes something like the mean error of the momentum p and q_1 denotes something like the mean error of the position while h denotes Planck's constant. Heisenberg

himself did not give a precise and general mathematical definition of his uncertainty principle.

The first mathematically exact formulation of Heisenberg's uncertainty principle is due to Kennard. Heisenberg's uncertainty principle for position and momentum as derived by Kennard [2] and advocated by Heisenberg himself is

$$+\sigma(X) \times \sigma(p) \geq \frac{h}{4 \times \pi} \qquad (2)$$

where $\sigma(X)$ denotes the standard deviation of position, $\sigma(p)$ denotes the standard deviation of momentum, h denotes Planck's constant and π denotes today as mathematical constant known value *pi*.

In his Chicago Lectures Heisenberg presented Kennard's derivation of his own uncertainty principle and claimed that Kennard's proof "does not differ at all in mathematical content" [3] from his own argument presented earlier (1927). There is only a very important and notable difference. Kennard's proof is mathematically exact. In fact, it is clear that in Heisenberg's own view all the above questions stand or fall together.

B. Heisenberg's Uncertainty Principle and Causality

The lack of causality within the so-called Copenhagen interpretation dominated quantum mechanics is grounded on Heisenberg's position too. Heisenberg states at the end of his historical paper

TABLE II: HEISENBERG AND CAUSALITY

"Weil alle Experimente den Gesetzen der Quantenmechanik und damit der Gleichung (1) unterworfen sind, so wird durch die Quantenmechanik die Ungültigkeit des Kausalgesetzes definitiv festgestellt." [4]

Heisenberg points out that all experiments are governed by the laws of quantum mechanics and thus far by his equation (1) which is identical with his uncertainty relation/principle. Hence, because of this quantum mechanics has refuted the most important of all scientific principles, the principle of causality, definitely.

Just about 10 years later, Bohr demands something similar.

TABLE III: BOHR AND CAUSALITY

" it is no longer possible sharply to distinguish between the ... behavior of a physical object and its inevitable interaction with other bodies serving as measuring instruments ... physics ... forces us to replace ... causality by ... 'complementarity.' ." [5]

However, these generalizations of Heisenberg and Bohr are not as straightforward as Heisenberg and Bohr suggested.

C. Robertson Uncertainty Relation

Robertson [6] derived from fundamental postulates of today's quantum mechanics an uncertainty relation valid for any observable A and B and any state ψ generally as

$$\sigma(A, \psi) \times \sigma(B, \psi) \geq \frac{\left| \langle \psi [A, B] \psi \rangle \right|}{2} \qquad (3)$$

where the variance $\sigma(X, \psi)^2$ of an observable X in state ψ is defined by $\sigma(X, \psi)^2 = \langle \psi | X^2 | \psi \rangle - \langle \psi | X | \psi \rangle^2$

D. Ozawa's Inezquality

In 2003 Masanao Ozawa [7] (Nagoya University, Japan) published a new "universally valid" uncertainty relation derived mathematically from quantum measurement theory. According to Ozawa, the new "universally valid" formulation Heisenberg's uncertainty principle describes error and disturbance as well as fluctuations as

$$\varepsilon(A) \times \eta(B) + \varepsilon(A) \times \sigma(B) + \sigma(A) \times \eta(B) \geq \frac{h}{4 \times \pi} \qquad (4)$$

where $\varepsilon(A)$ denotes the root-mean square error of an arbitrary measurement for an observable A, $\sigma(A)$ denotes the standard deviations of A in the state ψ just before the measurement, $\sigma(B)$ denotes the standard deviations of B in the state ψ just before the measurement and $\eta(B)$ denotes the root-mean-square disturbance on another observable B induced by the measurement.

III. RESULTS

A. Refutation of Heisenberg's Uncertainty Principle I

Claim

Heisenberg's uncertainty principle is logically and mathematically not correct. Thus far, accept Heisenberg's uncertainty principle as valid then you must accept too that

$$1 \sim 0. \qquad (5)$$

Proof by contradiction

As usual, the starting point of our proof by contradiction is the opposite of the claim above. We are sure and accepting that Heisenberg's uncertainty principle is logically and mathematically correct. Consequently, we are not able to derive any logical contradiction out of Heisenberg's uncertainty principle. Especially, Heisenberg's uncertainty principle known as

$$p_1 \times q_1 \sim h \qquad (6)$$

is generally valid. After subtraction of h, we obtain

$$p_1 \times q_1 - h \sim h - h \qquad (7)$$

which is equivalent to

$$p_1 \times q_1 - h \sim 0. \qquad (8)$$

The left term is different from zero. Dividing by the left

term, it follows that

$$\frac{p_1 \times q_1 - h}{p_1 \times q_1 - h} \sim \frac{0}{p_1 \times q_1 - h} \qquad (9)$$

or at the end

$$1 \sim 0 \qquad (10)$$

which is a logical contradiction.
Q. e. d.

B. Refutation of Heisenberg's Uncertainty Principle II

Claim

Heisenberg's uncertainty principle is logically and mathematically not correct. Heisenberg's uncertainty principle leads to a contradiction and is based on a contradiction. If you accept Heisenberg's uncertainty principle as valid then you must accept too that

$$+1 = +0. \qquad (11)$$

Proof by contradiction

Following the rules of a proof by contradiction, the starting point of our proof is once again the opposite of the claim above. Our position is that Heisenberg's uncertainty principle is logically and mathematically correct. Consequently, it is not possible at all to derive any kind of a logical contradiction out of Heisenberg's uncertainty principle. Heisenberg's uncertainty principle is known as

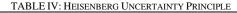$$+\sigma(X) \times \sigma(p) \geq \frac{h}{4 \times \pi} \qquad (12)$$

and as such formulated in the form of a non-strict inequality. The same uncertainty principle is logically and mathematically correct if

$$+\sigma(X) \times \sigma(p) = \frac{h}{4 \times \pi} \qquad (13)$$

and if

$$+\sigma(X) \times \sigma(p) > \frac{h}{4 \times \pi}. \qquad (14)$$

Clearly, both cannot be regarded as being correct at the same time, which does not make Heisenberg's uncertainty principle logically and mathematically inconsistent as such. The following table illustrates the last relationship.
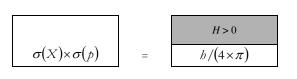
TABLE IV: Heisenberg Uncertainty Principle

Without loss of generality, we must now consider that this strict inequality demands on this account, that there is a Heisenberg's term (may be of unknown magnitude) denoted as H, which has to be greater than zero or $H > 0$ which transfers this inequality into an equality.

The following table illustrates the last relationship.

TABLE V: Heisenberg Uncertainty Principle

In other words, as may readily be verified, Heisenberg's uncertainty principle, treated as logically and mathematically correct demands thus far equally, that

$$+\sigma(X) \times \sigma(p) = \frac{h}{4 \times \pi} + (H > 0). \qquad (15)$$

At the same time it is true that

$$+\sigma(X) \times \sigma(p) = \frac{h}{4 \times \pi}. \qquad (16)$$

After substitution, one then finds straightforwardly that

$$\frac{h}{4 \times \pi} = \frac{h}{4 \times \pi} + (H > 0). \qquad (17)$$

Subtracting the term h/(4 x π), we obtain

$$\frac{h}{4 \times \pi} - \frac{h}{4 \times \pi} = \frac{h}{4 \times \pi} - \frac{h}{4 \times \pi} + (H > 0) \qquad (18)$$

or

$$0 = +(H > 0). \qquad (19)$$

After division by (H > 0), it is

$$\frac{0}{+(H > 0)} = \frac{+(H > 0)}{+(H > 0)}. \qquad (20)$$

or

$$+0 = +1. \qquad (21)$$

Q. e. d.

In general, it appears to be very difficult to accept that our world is grounded on a logical contradiction $+0 = +1$, which is exactly what Heisenberg's uncertainty principle demands. Thus far, contrary to our starting point and in contrast to our expectation, we were able to derive a logical contradiction out of Heisenberg's uncertainty principle. Heisenberg's uncertainty principle is refuted.

C. Refutation of Robertson's Uncertainty Relation

Many times, the Robertson uncertainty relation is regarded as the general form of Heisenberg's uncertainty relation.

Claim

The Robertson uncertainty relation is logically and mathematically incorrect. If you accept Robertson's uncertainty relation as generally valid then you must accept too that

$$+0 = +1. \tag{22}$$

Proof by contradiction

The Robertson uncertainty is generally formulated as

$$\sigma(A,\psi) \times \sigma(B,\psi) \geq \frac{\left|\langle\psi|[A,B]|\psi\rangle\right|}{2} \tag{23}$$

where the variance $\sigma(X,\psi)^2$ of an observable X in state ψ is defined by $\sigma(X,\psi)^2 = \langle\psi|X^2|\psi\rangle - \langle\psi|X|\psi\rangle^2$. As a non-strict inequality, Robertson uncertainty relation is determined by the fact that

$$\sigma(A,\psi) \times \sigma(B,\psi) = \frac{\left|\langle\psi|[A,B]|\psi\rangle\right|}{2} \tag{24}$$

and that

$$\sigma(A,\psi) \times \sigma(B,\psi) > \frac{\left|\langle\psi|[A,B]|\psi\rangle\right|}{2} \tag{25}$$

The strict form of Robertson uncertainty relation can be illustrated as follows.
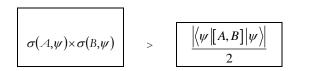
TABLE VI: ROBERTSON'S UNCERTAINTY RELATION

$\sigma(A,\psi) \times \sigma(B,\psi)$	$>$	$\dfrac{\left\|\langle\psi\|[A,B]\|\psi\rangle\right\|}{2}$

TABLE VII: ROBERTSON'S UNCERTAINTY RELATION

$\sigma(A,\psi) \times \sigma(B,\psi)$	$=$	$R > 0$
		$\dfrac{\left\|\langle\psi\|[A,B]\|\psi\rangle\right\|}{2}$

This strict inequality must be consistent with Robertson's equation above too and can thus far be transferred into Robertson's equation above without any loss of generality. To proceed further, we assume that there is a Robertson's term (may be of unknown magnitude) denoted as R, which has to be greater than zero or $R > 0$ and which transfers this Robertson's inequality into an equality. The following picture illustrates this far reaching relationship once again to achieve another point of view.

Consequently, Robertson's relation may be written as the superposition of a known and an unknown term as

$$\sigma(A,\psi) \times \sigma(B,\psi) = \frac{\left|\langle\psi|[A,B]|\psi\rangle\right|}{2} + (R > 0) \tag{26}$$

From above, we must equally accept that

$$\sigma(A,\psi) \times \sigma(B,\psi) = \frac{\left|\langle\psi|[A,B]|\psi\rangle\right|}{2} \tag{27}$$

Substituting this relationship into the equation before, we obtain

$$\frac{\left|\langle\psi|[A,B]|\psi\rangle\right|}{2} = \frac{\left|\langle\psi|[A,B]|\psi\rangle\right|}{2} + (R > 0) \tag{28}$$

Subtracting

$$\frac{\left|\langle\psi|[A,B]|\psi\rangle\right|}{2} - \frac{\left|\langle\psi|[A,B]|\psi\rangle\right|}{2}$$
$$= \frac{\left|\langle\psi|[A,B]|\psi\rangle\right|}{2} - \frac{\left|\langle\psi|[A,B]|\psi\rangle\right|}{2} + (R > 0) \tag{29}$$

and collecting together terms, we obtain

$$0 = (R > 0) \tag{30}$$

Dividing by $(R > 0)$ we must accept that

$$\frac{0}{+(R > 0)} = \frac{+(R > 0)}{+(R > 0)} \tag{31}$$

or

$$+0 = +1. \tag{32}$$

Q. e. d.

A logical contradiction is something we try to avoid. In particular, in our today's understanding of the foundations of science as such, logical contradictions cannot be accepted.

In other words, as already verified by the direct proof above, Robertson uncertainty relation leads to a logical contradiction and is based on a logical contradiction. Robertson uncertainty relation, the general form of Heisenberg's uncertainty relation, is refuted.

D. Refutation of Ozawa's New 'Universally Valid' Uncertainty Relation

Claim

Ozawa's new "universally valid" uncertainty relation is neither logically nor mathematically correct. Ozawa's new "universally valid" uncertainty relation is based on a contradiction and leads to a contradiction. If we accept Ozawa's new "universally valid" uncertainty relation as generally valid and correct, then we must accept too that

$$+0 = +1. \tag{33}$$

Proof by contradiction

Once again, according to the rules of a proof by contradiction, we start with the opposite of the claim above. Our position is that Ozawa's new "universally valid" uncertainty relation is mathematically and logically correct. Consequently, it is not possible at all to derive any kind of a logical contradiction out of Ozawa's new "universally valid" uncertainty relation. Ozawa demands that

$$\varepsilon(A)\times\eta(B)+\varepsilon(A)\times\sigma(B)+\sigma(A)\times\eta(B)\geq\frac{h}{4\times\pi}. \quad (34)$$

Consequently, accepting of Ozawa's new "universally valid" uncertainty relation as generally valid we must accept that
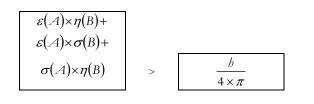
$$\varepsilon(A)\times\eta(B)+\varepsilon(A)\times\sigma(B)+\sigma(A)\times\eta(B)=\frac{h}{4\times\pi} \quad (35)$$

and that

$$\varepsilon(A)\times\eta(B)+\varepsilon(A)\times\sigma(B)+\sigma(A)\times\eta(B)=\frac{h}{4\times\pi} \quad (36)$$

Illustrating Ozawa's new "universally valid" uncertainty relation, we obtain the following picture.

TABLE VIII: Ozawa's New Generally Valid Uncertainty Relation

$\begin{array}{l}\varepsilon(A)\times\eta(B)+\\ \varepsilon(A)\times\sigma(B)+\\ \sigma(A)\times\eta(B)\end{array}$	$>$	$\dfrac{h}{4\times\pi}$

This mathematical formulation of Ozawa's new "universally valid" uncertainty relation in the form of a strict inequality cannot contradict the mathematical formulation of Ozawa's new "universally valid" formulated as equality. Let us now consider the particular case of this aspect of Ozawa's new "universally valid" uncertainty relation in more detail. As discussed previously, this strict inequality of Ozawa's new "universally valid" uncertainty relation can be transferred into Ozawa's equality above without any loss of generality. To proceed further, we assume that there is an Ozawa's term (may be of unknown magnitude) denoted as Ω, which has to be greater than zero or $\Omega > 0$ and which transfers the strict inequality of Ozawa's new "universally valid" uncertainty relation into an equality.

TABLE IX: Ozawa's New Generally Valid Uncertainty Relation

$\begin{array}{l}\varepsilon(A)\times\eta(B)+\\ \varepsilon(A)\times\sigma(B)+\\ \sigma(A)\times\eta(B)\end{array}$	$=$	$\Omega > 0$
		$\dfrac{h}{4\times\pi}$

In general, due to Ozawa, we must accept that

$$\varepsilon(A)\times\eta(B)+\varepsilon(A)\times\sigma(B)+\sigma(A)\times\eta(B)$$
$$=\frac{h}{4\times\pi}+(\Omega>0) \quad (37)$$

Equally, we must accept too, that

$$\varepsilon(A)\times\eta(B)+\varepsilon(A)\times\sigma(B)+\sigma(A)\times\eta(B)=\frac{h}{4\times\pi} \quad (38)$$

Rearranging these equations, we obtain

$$\frac{h}{4\times\pi}=\frac{h}{4\times\pi}+(\Omega>0). \quad (39)$$

Further manipulation yields

$$\frac{h}{4\times\pi}-\frac{h}{4\times\pi}=\frac{h}{4\times\pi}-\frac{h}{4\times\pi}+(\Omega>0). \quad (40)$$

or

$$+0=+(\Omega>0). \quad (41)$$

After division by $(\Omega > 0)$ it is

$$+\frac{0}{(\Omega>0)}=+\frac{(\Omega>0)}{(\Omega>0)} \quad (42)$$

or

$$+0=+1. \quad (43)$$

Q. e. d.

One quickly finds that Ozawa's new "universally valid" uncertainty relation leads to a logical contradiction and is based on a logical contradiction.

Ozawa's new "universally valid" uncertainty relation is mathematically and logically inconsistent and refuted.

E. The Relationship between Position and Momentum

The discovery of the normal distribution is associated with names like Abraham de Moivre (1667-1754), Johann Carl Friedrich Gauß (1777-1855) and Pierre-Simon, marquis de Laplace (1749-1827). The importance of the normal distribution is backgrounded by the central limit theorem. Under some certain conditions, the mean of a random variable is distributed approximately normally, independently of the form of the original distribution of the random variable. A random variable with a Gaussian distribution is said to be normally distributed. Thus far, even physical quantities like position and momentum often have a distribution very close to the normal.

A normal distribution for position X is described by the probability density function $p(X = X_t)$, identical with the

square of the wave function $|\Psi(X, t)|^2$ to find the particle at X_t, as

$$|\Psi(X,t)|^2 = p(X = X_t) = \frac{e^{-\frac{1}{2}\times\left(\frac{X_t - E(X)}{\sigma(X)}\right)^2}}{\sqrt[2]{2\times\pi}\times\sigma(X)} \quad (44)$$

where

$E(X)$ denotes the expectation value of X after many measurements of the position X_t under repeated identical conditions,

X_t is the possible interval value of the random variable X,

π denotes the mathematical constant pi, approximately equal to 3.14159,

$\sigma(X)$ denotes the standard deviation of the random variable X.

The normal distribution for momentum P is described by the probability density function $p(P = P_t)$, identical with the square of the wave function $|\Psi(P, t)|^2$ to find that particle's momentum is equal to P_t, as

$$|\Psi(P,t)|^2 = p(P = P_t) = \frac{e^{-\frac{1}{2}\times\left(\frac{P_t - E(P)}{\sigma(P)}\right)^2}}{\sqrt[2]{2\times\pi}\times\sigma(P)} \quad (45)$$

where

$E(P)$ denotes the expectation value of P after many measurements of the position P_t under repeated identical conditions,

P_t is the possible interval value of the random variable P,

π denotes the mathematical constant *pi*, approximately equal to 3.14159,

$\sigma(P)$ denotes the standard deviation of the random variable P.

Claim

The relationship between position and momentum follows, under conditions of the central limit theorem, as

$$\sigma(X)\times\sigma(P) = \frac{1}{2\times\pi}\times\frac{e^{-\frac{1}{2}\times\left(\frac{X_t - E(X)}{\sigma(X)}\right)^2}}{|\Psi(X,t)|^2}\times\frac{e^{-\frac{1}{2}\times\left(\frac{P_t - E(P)}{\sigma(P)}\right)^2}}{|\Psi(P,t)|^2} \quad (46)$$

Proof

The standard deviation of the normal random variable X, the position, can be derived from

$$|\Psi(X,t)|^2 = p(X = X_t) = \frac{e^{-\frac{1}{2}\times\left(\frac{X_t - E(X)}{\sigma(X)}\right)^2}}{\sqrt[2]{2\times\pi}\times\sigma(X)} \quad (47)$$

as

$$\sigma(X) = \frac{e^{-\frac{1}{2}\times\left(\frac{X_t - E(X)}{\sigma(X)}\right)^2}}{\sqrt[2]{2\times\pi}\times|\Psi(X,t)|^2} \quad (48)$$

while the standard deviation of the normal random variable P, the momentum, is

$$\sigma(P) = \frac{e^{-\frac{1}{2}\times\left(\frac{P_t - E(P)}{\sigma(P)}\right)^2}}{\sqrt[2]{2\times\pi}\times|\Psi(P,t)|^2} \quad (49)$$

as derived from

$$|\Psi(P,t)|^2 = p(P = P_t) = \frac{e^{-\frac{1}{2}\times\left(\frac{P_t - E(P)}{\sigma(P)}\right)^2}}{\sqrt[2]{2\times\pi}\times\sigma(P)}. \quad (50)$$

Multiplying the standard deviation of position and the standard deviation of momentum we obtain

$$\sigma(X)\times\sigma(P) = \frac{e^{-\frac{1}{2}\times\left(\frac{X_t - E(X)}{\sigma(X)}\right)^2}}{\sqrt[2]{2\times\pi}\times|\Psi(X,t)|^2}\times\frac{e^{-\frac{1}{2}\times\left(\frac{P_t - E(P)}{\sigma(P)}\right)^2}}{\sqrt[2]{2\times\pi}\times|\Psi(P,t)|^2}. \quad (51)$$

Rearranging equation, if follows that

$$\sigma(X)\times\sigma(P) = \frac{1}{2\times\pi}\times\frac{e^{-\frac{1}{2}\times\left(\frac{X_t - E(X)}{\sigma(X)}\right)^2}}{|\Psi(X,t)|^2}\times\frac{e^{-\frac{1}{2}\times\left(\frac{P_t - E(P)}{\sigma(P)}\right)^2}}{|\Psi(P,t)|^2}. \quad (52)$$

Q. e. d.

The equation above is the mathematically correct formulation of the relationship between position and momentum, if there should be any at all. Only under conditions where

$$\frac{h}{2} = \frac{e^{-\frac{1}{2}\times\left(\frac{X_t - E(X)}{\sigma(X)}\right)^2}}{|\Psi(X,t)|^2}\times\frac{e^{-\frac{1}{2}\times\left(\frac{P_t - E(P)}{\sigma(P)}\right)^2}}{|\Psi(P,t)|^2}. \quad (53)$$

where h denotes Planck's constant h, it follows from

$$\sigma(X)\times\sigma(P) = \frac{1}{2\times\pi}\times\frac{e^{-\frac{1}{2}\times\left(\frac{X_t - E(X)}{\sigma(X)}\right)^2}}{|\Psi(X,t)|^2}\times\frac{e^{-\frac{1}{2}\times\left(\frac{P_t - E(P)}{\sigma(P)}\right)^2}}{|\Psi(P,t)|^2}. \quad (54)$$

that

$$\sigma(X)\times\sigma(P) = \frac{h}{4\times\pi}. \quad (55)$$

IV. Discussion

In contrast to Heisenberg's claims, Heisenberg's uncertainty principle violates some fundamental principles of science. Generations of scientists including Einstein himself and other philosophers have often accused Heisenberg's uncertainty principle of being incorrect but without a

refutation in sight.

Most recently, Heisenberg's uncertainty principle was already refuted under some well-defined conditions [8]. Meanwhile, Heisenberg's uncertainty principle is refuted under any conditions.

Scientist has to draw a sharp distinction between what is correct and what is not correct.

Heisenberg's uncertainty principle together with the several different, mathematical re-formulations of the same are proved as not correct and no longer valid.

Whether the presented formulation of the relationship between position and momentum is the one logically consistent formulation of the relationship between position and momentum is not the point of issue.

The presented formulation of the relationship between position and momentum demonstrates that the solution of this problem is possible while the answer to the problem of the relationship between position and momentum as given by Heisenberg [9] and followers together with the acausal, indeterminstic Copenhagen interpretation of quantum mechanics is neither mathematically nor logically consistent.

V. CONCLUSION

Heisenberg's uncertainty principle is refuted in general. The anti-causal, anti-determinstic Copenhagen interpretation of quantum mechanics has lost its scientific dominance and meaning.

REFERENCES

[1] W. K. Heisenberg, "Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik,"*Zeitschrift für Physik*, vol. 43, no. 3, p. 175, 1927.

[2] E. H. Kennard, "Zur Quantenmechanik einfacher Bewegungstypen," *Zeitschrift für Physik*, vol. 44, no. 4, pp. 326-352, 1927.

[3] W, K, Heisenberg, *The Physical Principles of Quantum Theory*, Chicago: University of Chicago Press, 1930, pp. 15-19.

[4] W. K. Heisenberg, "Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik," *Zeitschrift für Physik*, vol. 43, no. 3, p. 197, 1927.

[5] N. Bohr, "Causality and Complementarity," *Philosophy of Science*, vol. 4, no. 3, pp. 290-291, 1937.

[6] H. P. Robertson, "The uncertainty principle," *Physical Review*, vol. 34, no. 1, pp. 163-164, 1929.

[7] M. Ozawa, "Universally valid reformulation of the Heisenberg uncertainty principle on noise and disturbance in measurement," *Physical Review A*, vol. 67, no. 4, p. 042105, 2003.

[8] I. Barukčić, "Anti Heisenberg - Refutation Of Heisenberg's Uncertainty Relation," in *Proc. Conf. on American Institute of Physics*, pp. 322-325, 2011.

[9] W. K. Heisenberg, "Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik," *Zeitschrift für Physik*, vol. 43, no. 3, pp. 172-198, 1927.

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Thus far, among his main publications in physics, published by the American Institute of Physics, are the refutation of Heisenberg's uncertainty principle (Ilija Barukčić, "Anti Heisenberg - Refutation Of Heisenberg's Uncertainty Relation," *American Institute of Physics - Conference Proceedings*, vol. 1327, pp. 322-325, 2011), the refutation of Bell's theorem and the CHSH inequality (Ilija Barukčić, "Anti-Bell - Refutation of Bell's theorem," *American Institute of Physics - Conference Proceedings*, vol. 1508, pp. 354-358, 2012). In another publication, Barukčić was able to provide the proof that time and the gravitational field are equivalent (Ilija Barukčić, "The Equivalence of Time and Gravitational Field," *Physics Procedia*, vol. 22, pp. 56-62, 2011). Barukčić published 2013 a relativity theory consistent wave equation (Ilija Barukčić, "The Relativistic Wave Equation," *International Journal of Applied Physics and Mathematics* vol. 3, no. 6, pp. 387-391, 2013).