Anti Heisenberg. The end of Heisenberg's uncertainty principle.

Ilija Barukčić [1, 2]

[1] Horandstrasse, DE-26441 Jever, Germany.
[2] Corresponding author: Barukcic@t-online.de

Abstract

In contrast to many other physical theories quantum mechanics is generally regarded as above any theory we have ever had and perhaps the best candidate for a universal and fundamental description of objective realty as such. Heisenberg's uncertainty principle is not the only aspect of the conceptual difference between quantum and classical physics but is certainly one of the most important and famous aspects of quantum mechanics. As we will see, quantum mechanics as a theory and especially Heisenberg's uncertainty principle challenges not only our imagination but violates some fundamental principles of classical logic as such. Heisenberg's uncertainty principle is refuted.

Keywords

Relativity Theory; Quantum Theory; Unified Field Theory; Causality;

1. Introduction

First and foremost, by starting from radical and controversial assumptions, Heisenberg himself attributed a general and far-reaching status to his own uncertainty principle. We are prepared to be confronted with Heisenberg's most radical step.

 "**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**." [1]

Translated into English:

'Because all experiments are governed by the laws of quantum mechanics and thus far by equation (1), it is therefore that **quantum mechanics has established the invalidity of the principle of causality definitively**.'

We are faced with the necessity of a radical revision of the foundation for the explanation and description of objective reality as such. We shall not go too deeply into this matter but it is precisely this requirement which prevents us from being able to take into account that Heisenberg's uncertainty principle can be treated as mathematically and logically consistent.

2. Material and methods

Logically or mathematically, Bell's theorem is formulated as **a non strict inequality**.

2.1. Definitions

Definition: Strict inequalities

In terms of algebra, a strict inequality possesses either the symbol > (strictly greater than) or < (strictly less than). A strict inequality is without an equality condition. In general, it is

$$a < b \tag{1}$$

while the notation a < b means that "a is strictly less than b". In the same respect, it is

$$a > b \tag{2}$$

while the notation a > b means that "a is strictly greater than b".

Definition: Non strict inequalities

In contrast to strict inequalities, a non strict inequality is an inequality where the inequality symbol is $\geq$ (either greater than or equal to) or $\leq$ (either less than or equal to). Consequently, a non strict inequality is an inequality which has equality conditions too. In terms of algebra, we obtain

$$a \leq b \tag{3}$$

The notation a $\leq$ b means that "a is either less than or equal to b".   Equally it is

$$a \geq b \tag{4}$$

The notation a $\geq$ b means that "a is either greater than or equal to b". A non strict inequality can lead to a either or fallacy, a so call 'black or white' fallacy.

Definition: Heisenberg's uncertainty principle

A preliminary and simplistic formulation of the quantum mechanical uncertainty principle for momentum and position can be found in Heisenberg'a article of 1927, entitled as "Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik" as

"Im Augenblick der Ortsbestimmung ... verändert das Elektron seinen Impuls unstetig. Diese Änderung ist um so größer, je kleiner die Wellenlänge 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**" [2]

Translated into English:
'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**'

Let us now move to another question about Heisenberg's uncertainty principle. Speaking, as it is often done, Heisenberg himself did not provide a general and exact derivation of his uncertainty principle. Finally, on a more formal level, we note that the first mathematically exact formulation of Heisenberg's uncertainty principle is due to Kennard [3]. In particular, in his Chicago Lectures Heisenberg himself pointed out that Kennard's proof "does not differ at all in mathematical content" [4] from the argument he had presented earlier. Finally, the only difference is that Kennard's proof "is carried through exactly" [4]. Heisenberg's uncertainty principle often reads as

$$\sigma(X) \times \sigma(p) \geq \frac{h}{4 \times \pi} \tag{5}$$

where $\boldsymbol{\sigma(p)}$ is the standard deviation of momentum, $\boldsymbol{\sigma(X)}$ is the standard deviation of position, **h** is Planck constant and **p** is the mathematical constant. Due to Heisenberg's uncertainty principle, **either**

$$\sigma(X) \times \sigma(p) = \frac{h}{4 \times \pi} \tag{6}$$

is true **or**

$$\sigma(X) \times \sigma(p) > \frac{h}{4 \times \pi} \tag{7}$$

is true but not both simultaneously.   From Equation (7) follows that

$$\frac{4 \times \pi}{h} \times \sigma(X) \times \sigma(p) > 1 \tag{8}$$

The following table is able to illustrate the last relationship.

Table 1. Heisenberg's uncertainty principle as a strict inequality

(4×π/h)× σ(p)× σ(X)	>	1

Due to Equation (8), Heisenberg's uncertainty principle demands that

$$\frac{4 \times \pi}{h} \times \sigma(X) \times \sigma(p) - 1 > +0 \tag{9}$$

Definition: Heisenberg's term

We define Heisenberg's term H as

$$H \equiv \frac{4 \times \pi}{h} \times \sigma(X) \times \sigma(p) - 1 \tag{10}$$

Due to Equation (9) Heisenberg's term H has to be greater than zero or it is

$$H > +0 \tag{11}$$

2.2. Axioms

Axiom I. (Lex identitatis).

To avoid any kind of a logical fallacy, the following theory is based on the axiom:

$$+1 = +1. \tag{12}$$

3. Results

3.1. Theorem. Heisenberg's first way to define the number 1

Claim.

Heisenberg's uncertainty principle defines the number 1 as

$$\frac{4 \times \pi}{h} \times \sigma(X) \times \sigma(p) = 1 \tag{13}$$

Direct proof.

Due to our Axiom I, it is

$$+1 = +1 \tag{14}$$

We multiply the equation before by the term $\sigma(p) \times \sigma(X)$ and do obtain the relationship

$$\sigma(X) \times \sigma(p) \times 1 = \sigma(X) \times \sigma(p) \times 1 \tag{15}$$

According to Equation (6), this is equivalent with

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

Rearranging Equation (16), we obtain

$$\frac{4\times\pi}{h}\times\sigma(X)\times\sigma(p)=1 \tag{17}$$

Quod erat demonstrandum.

3.2. Theorem. Heisenberg's second way to define the number 1

Claim.

Heisenberg's uncertainty defines the number 1 in the same respect in a second way as

$$+1=+\frac{4\times\pi}{h}\times\sigma(X)\times\sigma(p)-|H>0| \tag{18}$$

Direct proof.

Due to our Axiom I, it is

$$+1=+1 \tag{19}$$

We add 0 to Equation (19) and do obtain the relationship

$$+1=+1+0 \tag{20}$$

Equation (20) can be rearranged as

$$+1=+1+\frac{4\times\pi}{h}\times\sigma(X)\times\sigma(p)-\frac{4\times\pi}{h}\times\sigma(X)\times\sigma(p) \tag{21}$$

and simplified as

$$+1=+\frac{4\times\pi}{h}\times\sigma(X)\times\sigma(p)-\left(\frac{4\times\pi}{h}\times\sigma(X)\times\sigma(p)-1\right) \tag{22}$$

Due to Equation (10) and Equation (11) this equation simplifies as

$$+1=+\frac{4\times\pi}{h}\times\sigma(X)\times\sigma(p)-|H>0| \tag{23}$$

Quod erat demonstrandum.

The following table may illustrate this relationship.

Table 2. Heisenberg's uncertainty and the number 1

		-| H > O |
1	**=**	**+(4×π/h)× σ(p)× σ(X)**

which is equivalent with

Table 3. Heisenberg's uncertainty and the number 1

		-((4×π/h)× σ(p)× σ(X) -1)
1	**=**	**+(4×π/h)× σ(p)× σ(X)**

3.2. Theorem. Refutation of Heisenberg's uncertainty principle in general

Claim.

Heisenberg's uncertainty principle is **neither** mathematically **nor** logically correct. If you accept Heisenberg's uncertainty principle as valid then you must accept too that

$$+0 = +1 \qquad (24)$$

Proof by contradiction.

In general, due to axiom I it is

$$+1 = +1 \qquad (25)$$

According Equation (23), we obtain

$$+\frac{4\times\pi}{h}\times\sigma(X)\times\sigma(p)-\left|H>0\right| = +1 \qquad (26)$$

Due to Equation (17) we find then straightforwardly that

$$+\frac{4\times\pi}{h}\times\sigma(X)\times\sigma(p)-\left|H>0\right| = +\frac{4\times\pi}{h}\times\sigma(X)\times\sigma(p) \qquad (27)$$

Rearranging Equation (27), we obtain

$$+0 = +\left|H>0\right| \qquad (28)$$

Dividing Equation (28) by Bell's term (| H > +0 |), it is

$$\frac{+0}{+\left|H>0\right|} = \frac{+\left|H>0\right|}{+\left|H>0\right|} \qquad (29)$$

Finally, Heisenberg's uncertainty principle demands that

$$+0 = +1 \qquad (30)$$

Quod erat demonstrandum.

4. Discussion

However, Heisenberg generalizations are not as straightforward as Heisenberg suggested. In particular, Heisenberg's uncertainty principle has not refuted the principle of causality. Let us now analyze the result of our theorem in more detail. Finally, on a more formal level, we note that Heisenberg's uncertainty principle forces us to accept that

$$+0 = +1 \tag{31}$$

which is a logical contradiction. It appears very difficult to convince the scientific community that our world is grounded on the equation $+0 = +1$. In the same respect, Heisenberg himself does not accept logical contradictions too. In his 1927 Heisenberg demands that "Eine physikalische Theorie ... niemals innere Widersprüche enthält." [5]. In broken English: 'a physical theory ... should never contain inner contradictions'. Further note, it is possible to derive a logical contradiction out of Heisenberg's uncertainty principle. Heisenberg's uncertainty principle is refuted in general.

5. Conclusions

Heisenberg's uncertainty principle has been already refuted for several times [6]- [7]. Anti Heisenberg provides a new and very simple proof and marks the end of Heisenberg's uncertainty principle.

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