On the Heisenberg Uncertainty Principle:
A Stroke of Genius or a Misinterpretation of Planck's Quantum of Action

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Abstract

The Planck's quantum of action was subjected to a decided investigation concerning its validity. Thereby the maximum mass, which is important for this system, could be calculated with the help of the formula for the calculation of gravitational constant, which was worked out in the projection theory[2], and could be identified unambiguously as proton mass. Thus, also a minimum length and time, as well as form and size of the proton as cubic minimum volume (space pixel) are determined. Our and Heisenberg's interpretation of the quantum of action, which he expressed in 1927 in his famous uncertainty principle, were contrasted, whereby from our point of view Heisenberg's interpretation is rather to be classified as questionable, which the reader may well question as our subjective conviction.

Introduction

The name Heisenberg is closely connected with the uncertainty principle formulated by him in 1927, just like the name Einstein with the formula $E=mc^2$ or the name Planck with the quantum of action. But just these formulas, at least with Einstein and Heisenberg, are not to be seen as their intellectual masterpiece.
Einstein found the above-mentioned formula, often simply called Einstein's formula, so to say as a "by-product" at the calculation of the relativistic mass-increase and Heisenberg's principle we will classify as a " bad compromise" at the end of this work and hope that the reader can understand our valuation after the following explanations.

The uncertainty principle is formulated nowadays in the textbooks about as reproduced below.

[1]*It is impossible to determine the position and momentum of a particle or the time and energy of a process, in general a pair of conjugated quantities at the same time exactly. In such a measurement always remain uncertainties Δx and Δpx or Δt and ΔE, whose products in principle cannot be made smaller than h/π.*

$$\hbar \le \Delta P \cdot \Delta s$$
$$\hbar \le \Delta E \cdot \Delta t \quad \text{(H.1)}$$

To criticize, possibly even to reject the formula of such a renowned physicist, honored with a Nobel Prize and obviously, as the special stamp with his portrait and his formula shows, esteemed by society, is a difficult, daring undertaking. To our knowledge, critical voices about this famous formula are hardly heard, rather not at all. On the contrary, the uncertainty principle is always invoked in the field of quantum physics, when other attempts of explanation fail, without questioning them even in the slightest.

Obviously, nobody realizes that the uncertainty principle is Heisenberg's personal interpretation of the quantum of action, which cannot be derived from Planck's equation and therefore, in our opinion, is incorrect.
Of course, at first it seems logical to assume a quantum, a package of indeterminacy, quasi a black box as a measure for a principal uncertainty in physical measurements.
In this respect, Heisenberg's formula is quite logical but not really convincing.

But it is really astonishing that a physicist of the caliber of a Heisenberg did not understand or did not want to understand the compellingly derivable conclusions from the quantum of action, which we will come to later.

Calculations

In fact, it is very easy to deduce the true nature of our physical world from Planck's formula. The conjugated quantities energy and time resp. momentum and distance are indirectly proportional, i. e. equal to product, which is also expressed in the Heisenberg uncertainty principle. If the value of this product (here h) is finite, there results

a) a finite value for the mass which is the basis of the momentum or the energy and therefore
b) a minimum value for the one quantity, if the conjugated quantity reaches a maximum.

$$h = E_{\max} \cdot t_{x_{\min}} = m_{x_{\max}} c^2 \cdot t_{x_{\min}} \tag{H.2}$$

$$h = P_{\max} \cdot s_{x_{\min}} = m_{x_{\max}} c \cdot s_{x_{\min}} \tag{H.3}$$

Now it is not necessary to insert any masses into the above equations on a trial basis or even to speculate about exotic masses, e.g. the numerous baryons of particle physics with a lifetime between 20^{-10} and 10^{-24} s, but we can calculate the mass m_{xmax} directly, if we use the formula for the calculation of the gravitational constant (H.4 resp.H.6), which was worked out in the projection theory[2].

$$* G = \frac{V_x c}{6 m_x s_E t_E} \sqrt{1 - \left(\tfrac{1}{4}\right)^2} \tag{H.4}$$

$^{**}s_E = 1m$ $t_E = 1s$

These factors result from the derivation of the calculation formula for G (time-distance unit area, see The Projection Theory2). They do not play a role in the numerical consideration carried out here and were *therefore not considered in the following equations. Of course, they must be supplemented again subsequently to obtain the result in the correct dimensions.*

$$\sqrt{1-\left(\tfrac{1}{4}\right)^2} = f_{D4} \tag{H.5}$$

$$G = \frac{V_x c f_{D4}}{6 m_x} \tag{H.6}$$

$$m_x = \frac{V_x c f_{D4}}{6G} \tag{H.7}$$

$$s_{x_{\min}} = \frac{h}{m_{x_{\max}} c} \tag{H.8}$$

A smallest length, which cannot be fallen short of, inevitably also requires a smallest volume, the shape of which we do not know We first assume a spherical structure.
For the volume of a smallest sphere, V_{xminsp} with diameter s_{xmin} from Eq. (H.3) we get:

$$V_{x\min sp} = \left(\frac{s_{x\min}}{2}\right)^3 \frac{4\pi}{3} = \frac{s_{x_{\min}}{}^3 \pi}{6} \tag{H.9}$$

If we substitute the right-hand side of Eq. (H.8) for s_{xmin} into Eq. (H.9) we get:

$$V_{x\min sp} = \frac{h^3 \pi}{6 m_{x_{\max}}{}^3 c^3} \tag{H.10}$$

We substitute this volume into Eq. (H.6) and solve for m_{xmax}

$$m_{x_{\max}} = \sqrt[4]{\frac{h^3 \pi f_{D4}}{6^2 G c^2}} = 8,7577 \cdot 10^{-28} \left[kg\right] \tag{H.11}$$

The result shows that the assumption of a spherically symmetric volume does not lead to a meaningful result, since no elementary particle with the mass calculated above is known.

If we assume a cubic minimum volume in a second step, the equation simplifies as shown in eq. (H.12) and leads to a convincing result, namely to the mass of the proton with a relative deviation of only 3. 10^{-6}

$$V_x = s_{x_{\min}}{}^3 = \left(\frac{h}{m_{x_{\max}} c}\right)^3 \tag{H.12}$$

$$m_{x\max} = \sqrt[4]{\frac{h^3 f_{D4}}{6 G c^2}} = 1,672616 \cdot 10^{-27} \left[kg\right] \qquad \Delta_{rel} = 3 \cdot 10^{-6} \tag{H.13}$$

Note the symbols in red in Eqs. (H.11) and (H.13), which highlight the remarkable fact that a calculation using three natural constants leads to the correct value of a fourth natural constant (m_P).

In principle, a larger error than indicated in eq. (H.12) would be quite to be expected, since the gravitational constant as the weakest part of this calculation could be determined so far only with an accuracy between 10^{-4} and 10^{-5}.

$$m_x = 1,672587 \cdot 10^{-27} \left[kg \right] \qquad \Delta_{rel} = 2 \cdot 10^{-5} \tag{H.14}$$

$$m_{P_{Lit}} = 1,6726219 \cdot 10^{-27} \left[kg \right] \tag{H.15}$$

In Eq. (H.13) the CODATA value for 2014 was inserted and in Eq. (H.14) the currently valid one. It can be seen that the relative error has increased with the current value, thus one has obviously moved to higher values and thus in the wrong direction when determining G, because the calculation of the theoretical value by inserting m_p in Eq. (H.12) results in the value reproduced in (H.17), which is still below the CODATA value of 2014.

$$G = 6,67384 \cdot 10^{-11} \left[\frac{m^3}{kg \cdot s^2} \right] \text{ (CODATA 2014)} \tag{H.16}$$

$$G = 6,67430 \cdot 10^{-11} \left[\frac{m^3}{kg \cdot s^2} \right] \text{ (CODATA 2022)} \tag{H.17}$$

$$G_{cal} = 6,67375004 \cdot 10^{-11} \left[\frac{m^3}{kg \cdot s^2} \right]$$

With the maximum mass calculated above, we can now very easily calculate sxmin and txmin from equations (H.2) and (H.3). As expected, we obtain the values sufficiently known from the projection theory [2], so that applies:

$$s_{x_{\min}} = s_{\min} = \lambda_{CP} = 1,321409855 \cdot 10^{-15} \left[m \right] \tag{H.18}$$

$$t_{x_{\min}} = t_{\min} = 4,40774883 \cdot 10^{-24} \left[s \right] \tag{H.19}$$

It should be briefly mentioned here that of course s_{xmin} and t_{xmin} are directly proportional. Thus, if we insert arbitrary masses m_i into the equations (H.2) and (H.3), the following applies to these quantities:

$$\frac{s_{x_1}}{t_{x_1}} = \frac{s_{x_2}}{t_{x_2}} = \frac{s_{xi}}{t_{xi}} = c \tag{H.20}$$

Summary

Our first assumption from projection theory[2], that the largest stable mass, the proton, plays the decisive role in Planck's quantum of action and thus also determines the temporal and lateral resolution of our projective world, could be proven by the calculations performed above.

Our second assumption, that the smallest volumes of space (space pixels) must be cubic in order to fill an isotropic space without gaps, could also be confirmed computationally.

Our third assumption, that the shape and size of the proton correspond to the cubic minimum volume (space pixel), also follows from the above calculations. We substituted the minimum volume s_{xmin}^3 into Eq. (H.13) for V_x and obtained the proton mass as the result. Consequently, m_p is clearly the mass associated with the cubic minimum volume of space.

Consequently, the projection theory is fully confirmed by the above stringent interpretation of Planck's quantum of action and the resulting calculations.

As already mentioned above, it can hardly be assumed that an exceptional physicist like Heisenberg did not carry out the compelling analysis of the quantum of action carried out by us in the same way. However, the resulting consequences with a "granular" space of cubic minimal volumes and a minimal time were obviously too revolutionary for that time and too fantastic for Heisenberg himself to accept them and to make them the basis of further physical theories.
The fact that in the strange smallest package of action, which Planck had put into the world, there is a principal uncertainty of measurement, which cannot fall below a certain value, was obviously already the most extreme, which could be accepted by the scientific world in 1927.
How overchallenged most physicists were at that time by these new findings is shown e. g. by the fact that Planck himself never conceded a concrete physical existence to his quantum of action but only saw in it a quantity of calculation with which one could very simply calculate the energy of electromagnetic waves.
Is it now possible to let our and Heisenberg's interpretation of the quantum of action stand side by side on an equal level or does the one interpretation require the exclusion of the other?
In our opinion, the latter is true and to the disadvantage of Heisenberg, because according to his interpretation, only the respective products of the conjugate quantities may not fall below a minimum value, but the respective individual quantities may fall below a minimum value, which is in contradiction to the minimum quantities t_{min} and s_{min}, which are mathematically proven by here.
Heisenberg must have seen this too, so that he obviously not only came to a compromise, but from our point of view to a " bad compromise " and with it, however, also by his authority, he has blocked the view on the true structure of our world for many years.

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References

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[2] viXra.org > Classical Physics > viXra:2104.0093