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Heisenberg's uncertainty

A relativistic interpretation

Heinz-Joachim Ackermann

[1] xxx Germany

[2] Email address: xxx@gmx.de

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Abstract. Nearly 100 years after the discovery of non-classic models, initialized by relativity theory and quantum theory, the unification of both theories has not been reached completely. Experimental and mathematical researches for mistakes of basic theories haven't been successful. Mathematical descriptions of theory models keep correct. But what simple thing could remain and disturb the unification of these theories permanently?

PACS. PACS-key uncertainty relation – PACS-key relativity

1 Introduction

Present models of physics are sensitively dependent on the interpretation model of Heisenberg's uncertainty equation (Rennert, Schmiedel, Weissmantel [**?**]). The dual-slit experiment had to be discussed about what difference there was between the reflections on the screen. Starting with low intensity of a particle beam, some dots were seen. During the increasing intensity of that beam, the dots got more and more and took finally the shape of wave lines. Today the opinion is recognized: The dots would be the direct reflections of the particles' positions, and the wave lines would be the reflections of the wave property of particle matter. These both effects would express the dual nature of matter. Consequently, the interpretation followed: *It is impossible to predict the position of a particle and its momentum with the same precision* (Schroedel [**?**]).

This interpretation leads to relevant questions: Why should a continuous transition from dots to wave lines give the right to set a border line between properties when one observes dots on the one hand and wave phenomena on the other hand? Where should such a border exist if it ever exists? Is this very important property dependent on

individually subjective adjusting? Should the dots really be the particles' impacts? Solving these problems, Heisenberg's uncertainty was interpreted statistically. But Einstein already warned. "In accordance to the present form of the quantum theory, the present physicist generation [...] means that the state of a system cannot be directly but only indirectly characterized by statistics of the measurement results achievable at the system; the conviction is predominant that the experimentally protected dual nature (corpuscular and wave structure) was only achievable by such a reduction of the reality concept. I think that such a far-reaching theoretical renunciation is not caused in the meantime by our real knowledge and that one shall not let prevent himself from thinking the way of relativistic field theory to its end." (Einstein [**?**])

2 An interpretation leading to relativity

When a lot of elementary particles in movement are causing wave quanta (e.g. matter waves), then single particles are causing single wave quanta in agreement to De Broglie's matter wave quanta. A lot of wave quanta draw a wave picture; single wave quanta draw single dots on the screen. There is no difference between both. Of cause, these dot-like indications aren't the particles' impact positions! They all are indications of wave quantum interactions. Why do we then discuss about the positions of elementary corpuscles and about dual nature?

One part of Heisenberg's uncertainty relation has the following form (Rennert, Schmiedel, Weissmantel [**?**]):

$$\hbar \leq \Delta p \times \Delta r \tag{1}$$

Here are Planck's constant $\hbar = h/2\pi$, momentum difference Δp and amplitude difference $\Delta r = 2 \times \Delta X$ with ΔX as slit length. This equation doesn't let any place for the particle position. It seems like elementary particles themselves wouldn't be able to be touched directly. For this reason the mathematically correct amplitude difference Δr was statistically interpreted. Then the square of the amplitude r^2 would be a measurement of the particle position probability (Rennert, Schmiedel, Weissmantel [**?**]). This way the amplitude r was nearly equalized to the particle's position r_{rot}. Can this procedure remain correctly when we want to unify both theories of relativity and of quanta?

The momentum p is the result of a movement: $p = m \times v$, of indicated mass m and its speed v. Therefore the momentum is combined with the wave quantum. It is a wave quality of matter waves. When a particle is in movement, it always takes its way in curved orbits. Lines in this world have not straight since Einstein's general relativity (Stephani [**?**]). Consequently, every particle's movement has a determined radius of rotation r_{rot}. The vector of the rotation radius r_{rot} shows from the rotation center to the particle position. But the force vector of its wave energy field shows from the particle position to the center of rotation without reaching it (because of special relativity). It is the amplitude r of the matter wave. There are both different orientations: 1. The rotation radius r_{rot}

of the particle and its position at the orbit. 2. The wave amplitude r of the matter wave caused by the particle's movement and the position of the wave quantum next to the center of the rotation (next to the middle dot of the circle of the rotation orbit). In the result, the wave quantum acts to another wave quantum of another particle like touching hands of the particles. Locally, the particles' centers themselves don't act between each other directly.

Because the rotation radius r_{rot} und die wave amplitude r are not the same, and because their vectors are contrary to each other, one cannot set both to equal qualities as already done by quantum physics. The particle position r_{rot} should not be statistically mixed up with the wave amplitude r. The existing mix up leads to the opinion, the wave amplitude r was equal to the particle position probability using r_{rot}.

Consequently, one dot on the screen would not be a direct reflection of the particle position, but a position sign of one interaction between both the wave quantum caused by the one particle's movement and the other wave quantum of another particle. But that particle's position itself would not be able to be indicated directly by any dot on the screen. Then the following different interpretation model would result from uncertainty equation: *It is impossible to predict the interaction position of the wave quantum of an elementary particle and its momentum with the same precision. The square of the amplitude r^2 is a measurement of the wave quantum's position probability* .

The position of an elementary particle cannot be indicated, it cannot be measured. All interactions are completely bound to wave quanta.

The new interpretation would not set dual nature combining particles with waves to one thing of probability since today particles seem to be waves. The equality of particles and waves wasn't given. What is helpful for our changing statistic interpretation to this new explanation? Now it is possible to see an elementary particle being a special feature of nature. The question 'What really is a particle?' can be answered by Einstein's general relativity theory. Elementary corpuscles must be cosmoses especially microcosms . When microcosms would be oscillating, Planck's constant h could be introduced into Einstein's cosmoses, and both theories had a chance to be unified. It is interesting that Heisenberg's uncertainty causes the spherical oscillation of a spherical corpuscle using the product: mass times speed times amplitude; and changing it into the resting particle quality: rest-mass m_o times vacuum speed of light c times the amplitude of the particle-cosmos r_o, which is the expansion and contraction length of this microcosm:

$$\hbar = m_o \times c \times r_o \tag{2}$$

.

An oscillating microcosm had to be a spherical body vibrating like a spatial wave, sending and receiving primary wave quanta of gravitation as well as causing secondary wave quanta in movement. There is a system of quantum oscillators – the microcosms – exchanging primary wave quanta. The singularities of gravitation would

really be located then inside of the particles – expected by Einstein. The positions of the oscillators would cause the general relativity, the movements to each other would cause the special relativity of all the clocks in the universe. Clocks are objects which are giving a frequency resulting from their oscillation. Now we can imagine that the elementary particles are the universe' clocks. This way Einstein's clocks would find their best place (Einstein [**?**]).

The well-known gravitation radius r of a black hole is $r = 2GM/c^2$ (Lanius [**?**]), where are M as internal mass, G as Newton's gravitation constant and c as vacuum light speed. Kerr's solution (1963) of general relativity theory gives this conclusion as possible: $r/2 \leq R \leq r$ (Stephani [**?**]).

The amplitude R of an oscillating black hole results then:

$$R = \varphi GM/c^2. \tag{3}$$

Variable φ is defined with $1 \leq \varphi \leq 2$. The smallest amplitude results to $R_o = r/2$.

For an oscillator the equation of quantum theory is valid: $e = h\nu$, with energy e, Planck's constant h and frequency ν. Using the equation $e = mc^2$ (with particle's rest-mass m), the mass will be $m = h\nu/c^2$. The product of frequency ν and wave length λ yields light speed $c = \nu\lambda$. The amplitude R of a vibration is $R = \lambda/2\pi$. We get the equation of frequency $\nu = c/2\pi R$. Mass equation results then $m = h/2\pi Rc$ and $m = \hbar/Rc$ (Rennert, Schmiedel, Weissmantel [**?**]). Consequently, the amplitude R of an oscillation is following now:

$$R = \hbar/mc. \tag{4}$$

Compton's wave length is comparable with it which is a function of the momentum mass of a light quantum. But here the equation (2) expresses the mass m of a resting particle which itself has an oscillation of its sphere's vibration R causing its momentum exchange.

For both amplitudes R, the relativity's equation (1) will be equalized to the quantum theory's equation (2), and finally equation (3) follows:

$$m = c\hbar/\varphi GM$$

with the new constant κ

$$\kappa = c\hbar/G$$

and

$$m = \kappa/\varphi M \tag{5}$$

with $\kappa = 4.737 \times 10^{-16}\,\mathrm{kg}^2$. The result is formed from relativity theory and quantum theory leading to cosmos-features which have the quality of spherical oscillation like spatial wave oscillators.

Both kinds of masses stand in relationship by constant. If this had any relevance, each mass would be another feature of mass. This cohesion can be solved when the masses are distinguished into the internal sum of masses M and the external quantum mass m. An oscillating black hole of the inner mass M locks its internal coordinate system totally. That mass M like electromagnetic waves, too, cannot pass the horizon r. Therefore, the internal mass M does not act to the outside any more. Its exchange quanta of gravitation remain locked. Geodesic lines are completely curved. They lead back to the center of the black hole. Externally measurable mass m of the black hole now is

derived from the oscillation of the black hole. This mass m is to be understood as the result of the spherical vibration of the black hole, when gravitational exchange quanta are spherically sent to and received from everywhere (these are spherical longitudinal waves). Black hole now is a quantum transmitter and a quantum receiver of those quanta transmitted by different black holes.

Consequently, the internal mass M of that black hole will be zipped away, because the external mass m is always smaller than the internal mass M. The oscillating black hole of the sun, e.g. may only weigh $m_\odot \approx 1.2 \times 10^{-46}$ kg, when internally the sun's mass of $M_\odot \approx 2 \times 10^{30}$ kg would be zipped.

If this solution was a general principle, then those mass portions ΔM of M at the inside of a black hole would be oscillating black holes themselves. Relatively, these objects then were black sub-holes. They would be formed out starting from the surface of the black hole and falling down to its center. The mass M of the black hole would be zipped in portions of successfully decreasing masses and sent to the center. At the inside of the black sub-holes further substructures would form themselves after this principle into black sub-sub-holes and so on, probably down to the area of the unstable elementary particles. The consequence of this hypothesis was a hierarchy of oscillating black holes.

After falling-down of black sub-holes on their orbits, these objects had to rotate around their common gravitation center and naturally to move upwards.

Now another construction is following: the zipped mass has a new quality – it can fly out from the black hole when the gravitation radius is negated by a strong acceleration of black sub-holes. This moment the black hole itself is negated and opens itself.

During their climbing from the center, the substructures consisting of black sub-holes and their own subs would open by decay and eject particles and radiation in series of flashes. The radiation accelerates those black sub-holes which are just escaping at the top of the objects' front. Such a kind of inflation inside the black-hole-cosmos seems to be comparable with the inflation observed in universe. If radiation was balanced, topmost black sub-holes would open themselves at the inside of the gravitation radius r of their receptacle-black-hole; the variable φ we call now inflation factor doesn't take the value of larger than 2. That black hole remains locked.

When internal radiation energy was supported externally or when it got a surplus of energy during the formation of the black hole, that is bigger than necessary for locking it: the topmost black sub-holes are ejected far away from the theoretical gravitation radius r of the black hole. The inflation factor φ is larger than 2. This is possible because that mass which is already ejected from black sub-holes doesn't reach to close the state of the black hole. Locking the expanding black hole, the internal mass of the topmost black sub-holes was missing. These portions open themselves now at the outside of the hole being white now. This kind of an unstable black hole is destroyed as fast as

it was formed! It only has lived half a period of an oscillation.

In the conclusion, our hypotheses could be confirmed after this principle of decay of black sub-holes. This way, we had constructed a cosmic oscillation accompanying effects of different inflation. If the oscillation was the first principle in universe, then the universe was newly explicable as a hierarchical system of oscillating black holes. The concept of black hole now is not sufficiently explaining the states of black at a collapse and of white at a decay (at an anticollapse) any more. A new concept is necessary, suggested for example using *protocosm* . Protocosms then are unstable non-stationary black and white holes. Their tasks are mass zipping, destruction of its structures down to the particles' area, transport of the mass to another place with next to light speed, ejection of the new mass portions as concentrated rotation systems accelerated by radiation. Finally, protocosms were the reformer of the matter. Tunneling of particles is simply to be understood now: particle's wave quanta are interacting to each other and this way forcing their particles on their orbit. A wave quantum is like a hand of a particle. It touches the other hand and binds the particle with it.

3 Conclusions

1. In principle there is no question of the particle's position, but of the particle's wave quantum position.
2. The real dot-like position of a particle does not exist. A particle is made by sub-particles forming sub-wave quanta which can be indicated by wave interactions.
3. Reflections of the world's structure are always reflections of wave quanta.
4. Particles play their role of being cosmoses consisting of sub-particles in movement having interactions among their wave quanta.
5. Universe could be explained by a hierarchy of oscillators having positions and movements to each other and exchanging wave quanta among them. Hierarchy makes a cosmic system of oscillators – of Einstein's clocks.
6. The hypothesis of the dual nature of matter has covered the real nature of primarily oscillating particles and the primary wave quantum exchange among them causing the gravitation and causing the electrostatic force by oscillating electric charge cosmoses bound to the gravitational corpuscles. The relative movements of these oscillators to each other cause the secondary wave quanta of gravitomagnetic waves (gravitation waves) and electromagnetic waves. Now there is a chance for a deeper understanding of particles and waves. The way seems to begin going to the unification of the theories.
7. Big bang was the opening of the first protocosms in the center of universe: extremely many small protocosms exploded and radiated energy quanta and particles. But this process was limited to the center of the universe.
8. Inflation of universe was the effect of the acceleration of those protocosms which were flying above the big bang. They were successively bigger, lighter and faster

than the first protocosms inside their cloud being the big bang.

9. Quasars were protocosms just after the phase of opening. Even micro-quasars were protocosms opening and locking themselves in short periods.
10. Galaxy centers would include protocosms swallowing old matter and ejecting new matter. Because of the oscillation of protocosms, gravitation force of galaxy centers had to be discontinuous.
11. Planetary and satellite systems were the results of the substructures of star-protocosms.
12. Protocosms were the preconditions of life programmed like unicellular organisms, ready for cell division after reception of matter.
13. Stable particles were stable cosmoses as black holes with inflation factor φ of 1. Their amplitudes are equal to R_o. Energy support would have destabilized them. Energy release and release of particle pairs would stabilize them back.
14. Using relativity theory's equation (1) combined with the equation (2)of quantum theory forming the oscillating cosmos feature (3) may be the start of the unification process of both theories.
15. Instead of strings there was a hierarchical system of spherically vibrating protocosms and microcosms forming the macrocosm by primary exchange of longitudinal wave quanta with spherical shapes (with three-dimensional vibrations).

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