

## CONSIDERATIONS CONNECTED WITH THE WORDS “IS” AND “EXISTS”

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### **Abstract**

Two roads of thinking are presented in this essay concerning the word “IS”. One is suggested by quantum mechanics, which introduces into physics considerations what does it mean that something IS. The second road was in the past discussed by philosophers, of whom three are presented: S. Thomas Aquinas, Martin Heidegger and Edith Stein. Both roads show a lack of duration of NOW, which in quantum mechanics may be connected with the reduction of the wave packet. A series of reductions (or of NOW) leads to creation of time. “Something IS” is being distinguished from “Something EXISTS”. Existence contains a fate produced by the time evolution.

What does it mean for me (as for a physicist) that an object “IS”? I am tempted to say that I have then in mind a wave function, which corresponds to a state, which may be actualized as a result of observation (measurement) performed by a conscious observer[1]. We enter here the territory of foundations of quantum mechanics, not yet well understood by physicists. It seems that we are able to perform quantum mechanical calculations leading to extremely good results, without full understanding of their foundations. There is no doubt that quantum mechanics provides, for an object, information of its states and probabilities of their actualization. Every such actualization leads to a well defined state, in which (we may say) the object IS. But a solution of our problem is also a wave function (a state) which is a sum of former wave functions with corresponding coefficients. We say then that we have a superposition of states. Can we say that the object then IS? From the point of view of a common user of a language the object IS NOT. However, the state corresponding to a superposition of states informs us about possibilities of being. Edith Stein[3] declares: what may be, IS in a sense. The potential being is not a nonbeing. But, no doubt, it belongs to another “sphere” of being than the actual IS.

Hence (from the point of view of a physicist) we have the following situation: an object IS (in an extended sense) in the “sphere” of a superposition of states and, suddenly, a “reduction of the wave packet” occurs – something like a flash – which transfers the object to another IS — IS in a common understanding of this word. Next reductions of the wave packet provide next such flashes (for instance along the path of a particle in the Wilson chamber). Each denotes a NOW. A sequence of NOW gives a flow of time, gives birth of time. Our object not only IS but EXISTS in time. We are here touching the existentialist aspect of quantum mechanics.

Let me be clear: the word IS we use in this essay for denoting the fact that something IS whereas the word EXISTS stresses the fate of our object. And it has a necessary connection with time.

We may believe that for macroscopic objects the “alternation” between the two “spheres” takes place so often, that we have an impression of a continuity.

We are dealing now with very difficult problems. Strictly speaking, what was said above about the “two spheres alternation” is valid

for an isolated quantum object. An observer (conscious – to a certain point) causes the reduction of the wave packet. But it is not so that the observer may intentionally choose actualization, that and not the other, from among those which are possible. That would be a *Weltbildung* according to the observer's will. A specific role of consciousness is evident from the very recent experiments with photons and slits [2]. The result of reduction of the wave packet is one, if the observer is able to know the photon's path, and another, if he is not able to possess this knowledge. Thus the role of consciousness is very subtle indeed.

Moreover, all this is additionally complicated due to the so-called decoherence. Since a full isolation of our object is in practice not possible, a decoherence occurs, which destroys a superposition of states. Hence, after some time, which may be very short, we have no superposition but a concrete state, without a clear involvement of a conscious observer. This is especially important for macroscopic objects, for which an isolation from environment is doubtful and thus the decoherence dominates. Physicist today divide: Some remain faithful to the so-called Copenhagen interpretation, which stresses the role of a conscious observer and some stress the fact of decoherence, rejecting that role.

Whatever is the truth, I believe that at the bottom, at the base of events, an alternation of the two "spheres" occurs, and there is a subtle but real role of a conscious observer in the process of a reduction of the wave packet.

I am not touching here the problem of "parallel worlds" (Everett) where the role of consciousness may again show up [5, 6].

These considerations belong to physics but also to this part of philosophy which discusses problems of being – the part known as metaphysics or ontology. Philosophers are interested in this part for more than two thousands years. One must not declare that their achievements are obsolete and not commensurate with the contemporary progress. It is not philosophy but physics which had nothing to say so far in these matters. Recently, it touches these problems via the quantum mechanics, which no doubt provides us ontological questions.

In the philosophical part of this essay I shall discuss those aspects of ontology which were presented in writings of Thomas Aquinas,

Martin Heidegger and Edith Stein. In their writings I see (although it may be an illusion) some parallelism of ideas to those suggested by physics.

S. Thomas Aquinas is very often considered as the voice of Aristotle, however not quite correctly. He took from Aristotle very much, but in a basic aspect is different. Aristotle identified being with its essence, i.e. with what a being IS. Thomas distinguished in a being its *essentia et esse*, i.e. what a being is from that it is. Here he follows the Arabic predecessors. S. Thomas understood “IS (*esse*)” of beings as their participation in something which may be expressed as “a sea of *Esse*” (*Esse* is treated as a noun not as a verb) [7]. He identified this *Esse* with God – God as a source of all particular *esse*. Moreover, S. Thomas made use of a very common fact of changes in beings. He declared that a change (i.e. a transition *potentia – actus*) demands time. For him, time is identified with “counting” “before” and “after” in a change. Since in a change there is always a sequence of events, we have time. It is a birth of time. The most striking declaration of Thomas is that he feels compelled to connect the notion of time with a conscious “counting” observer!

S. Thomas wrote[8]: “Time is applicable to what is material. It bases on motion, i.e. on what is earlier and later. But its deepest principle lies in an act of a counting soul (i.e. a conscious observer). Therefore there would be no time without a soul” (*Tempus – quoad suum quasi materiale, fundatur in motu: scilicet prius et posterius; sed formale eius, completur per actum animae numerantis. Ideo non esset tempus, si non esset anima.*)

There are striking similarities between those concepts and the concepts of Martin Heidegger [7]. First of all, Heidegger clearly distinguished between *essentia* and *esse*. He introduced something like the sea of *Esse – das Sein*. (He did not however identify *das Sein* with God). Last not least, he introduced a conscious factor – *Dasein* – which not only IS but also EXISTS in time (it has a fate).

Edith Stein made use of both: S. Thomas and Martin Heidegger, but she is original in what she stressed (if I understand her correctly). First of all she enhanced the importance of potential being [3]: “What may be, in a sense IS (*möglich sein heisst ja nicht einfach nicht sein*). Past and future being is not simply nonbeing”. Secondly, she directed our attention to a flash of NOW: “My IS lies on an edge of knife [4]

(*Messers Schneide*). That what we feel as a duration is a constant transfer of the point of touching. This is the existential duration which creates time as its space. To be presents itself in this sense as to become".

All what I have written about time seems to be in agreement with a linear time. The linear time may be treated as a parameter, which determines a place on a line representing a physical property. This line starts from a value  $t_i$  of the parameter  $t$  and ends at a value  $t_f$ . These values may formally be  $-\infty$  and  $+\infty$ . The word "infinity" which showed up here (in its mathematical notation) is quite familiar for mathematicians and for those who apply mathematics in their sciences. Such mathematical infinity is precisely defined.

For S. Thomas such a condition (no beginning and no end), taken, nota bene from Aristotelean Physics, is only necessary but not sufficient, for defining the notion of eternity. This condition does not liberate an observer from the line of time. We need another condition, which says that in eternity there is no succession. There is ESSE without succession, all at once – *tota simul* [8].

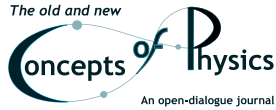
The conclusion, which can be derived from this comparison of physics and philosophy is: The two pictures seem to be coherent. The common picture contains two characteristic "spheres" of being – the "sphere" of potential being, perhaps identical with the veiled reality [9] of superposition of states, and the "sphere" of actual being, perhaps identical with the result of the wave packet reduction. This picture stresses also the role of a conscious observer, as the one who produces the reduction (physics) or as Dasein (philosophy). And, finally, the picture leads to the notion of existence, understood as the sequence of packet reductions (physics) or continuous moving of the "edge of knife", which creates time.

## References

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Comment



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To learn anything about quantum mechanics by studying the writings of St. Thomas Aquinas, Martin Heidegger, and Edith Stein may strike some as an unlikely prospect. At the same time, only the most dedicated logical positivist could ignore the fact that there is an uncanny mixture in quantum mechanics of two aspects of philosophical thought: epistemology and ontology. So it is not surprising to find that there are some hearty souls who still look to classical philosophy for enlightenment regarding unclassical problems. Professor Janik is obviously one of these; he points out in his paper certain similarities he finds between the Copenhagen interpretation of quantum mechanics and some of the ontological considerations of the three philosophers mentioned above, one from the thirteenth century and two from the twentieth. That he does this in such a direct way in so few words is quite remarkable. However, the very brevity of the paper leads to certain questions that remain unclarified. This is probably a

good thing, if I understand the editorial statement of purpose for this journal correctly, for Professor Janik's paper undoubtedly serves as a basis for further discussion concerning the ontological implications of quantum theory. In this spirit, then, while agreeing wholeheartedly with his general approach, I will mention a few points that raise questions for me.

Consider, for example, a photon in a state that is a superposition of two orthogonal states of definite linear polarization. By passing this photon through a linear polarization analyzer, if it goes through and is not absorbed, we say that a reduction of the wave packet has occurred and the photon now has a definite linear polarization. Professor Janik proposes that, before the passage, the photon does not have an existence "from the point of view of a common user of a language" but that after passage it "IS in a common understanding of this word." However, before the measurement, the photon might very well "exist from the point of view of a common user of a language" in a *single* state of circular polarization, whereas after the measurement it has "jumped" into a superposition of states of opposite circular polarization. So, from the point of view of circular polarization, the photon ceases to exist after the measurement in the "common understanding" and has reverted to an Edith Stein ontological state. Clearly, an eigenstate of any observable is at the same time a superposition of eigenstates for another noncommuting observable. But can the very existence of an "object" depend on the choice of which property of the object we choose to measure?

Another point that presents a problem for me is the role of the "conscious observer" in the reduction of the wave packet. I get the feeling from Professor Janik's paper that there is something almost mystical going on here, although I think this is far from his intention. Does every reduction of a wave packet require a "conscious observer" or not? At what level do we have a true confusion in quantum theory between epistemology and ontology? Professor Janik states: "A specific role of consciousness is evident from the very recent experiments with photons and slits (Greenstein 2). The result of reduction of the wave packet is one, if the observer is able to know the photon's path, and another, if he is not able to possess this knowledge. Thus the role of consciousness is very subtle indeed."

The key phrase here is: "if the observer is able to know the pho-



ton's path." In my opinion, the mix-up between epistemology and ontology lies at a deeper level and is independent of the mental intervention of a "conscious observer." To illustrate, consider neutron diffraction from a crystal containing a single isotope, where the nucleus of this isotope has a spin. Neutrons, let us say, are being detected one by one as they pass through the crystal. Let us assume that the majority of these neutrons are contributing to a coherent diffraction pattern that is being built up. Occasionally, however, a neutron arrives at the detector, which contributes to an incoherent pattern that is also emerging along with the coherent diffraction. What is the source of these incoherent arrivals? One source could be the scattering of a neutron from a nucleus during which the spin of the neutron is flipped. In such a case, somewhere, among the Avogadro's number of nuclei, there is one and only one (which one is totally unknowable to us) that bears the telltale sign of an altered angular momentum, which means that a neutron was located at the position of *that* nucleus at some point in its traversal of the crystal and so could not contribute to the coherent pattern whose very existence depends on every neutron leaving no physical trace of its path. Here there is no "conscious observer" involved in the reduction of the wave function of the incoherently scattered neutron, certainly not one that "is able to know the neutron's path." And yet, even here with only the faintest imprint in nature indicating the passage of a particle, there is an almost irresistible tendency on our part to file this under epistemology, as if it were the mere *possibility* of the knowledge of which nucleus did the scattering that counts, even if this knowledge is beyond human ability and could perhaps be acquired only by a being with a higher level of intuition than we possess (*uns Menschen*), as Kant might put it.

Finally, I would like to add a few words concerning the argument that quantum mechanics should be able to describe macroscopic objects as well as atomic objects. This was the positive motivation for Bohr's correspondence principle as well as the negative motivation for Schrödinger's cat, which he invented to illustrate the absurdity of applying quantum mechanics directly to macroscopic objects. I personally find it very unsatisfying to think of a macroscopic object, a mountain for example, as something for which "the 'alternation' between the two 'spheres' [of being] takes place so often, that we

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have an impression of a continuity,” as Professor Janik puts it. What bothers me about this is the idea that we are somehow being deluded in our intuitions of the sensible world around us, especially in those intuitions that lead us to our fundamental concepts of substance and being.