"State of the Art" and perspectives:
Quantum Physics and the Ontological Problem

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Our task, today, is to explore the "ontological connections" of physics. To put it roughly, it is to try and find out what, in view of contemporary physics, Reality is, or can be. I mean, Reality with a capital R, that is, Man-Independent Reality. And, to this end, I would like to start by pointing out what it, most certainly, is not.

For this, let me first recall to you the difference there is between an ontologically interpretable theory and a mere model, and stress that philosophical atomism is just a model. As a model, of course, the usefulness of atomism is unquestionable. In chemistry, biology and related sciences, it constitutes a wonderfully efficient tool for the analysis of an enormous amount of data. Still, let us have a closer look at it. Ancient atomism conceived the World as composed of localized tiny objects interacting through contact forces. Modern-time atomism is not as restrictive in this respect. In it, genuine non-contact forces may be present, but with the proviso that they decrease when distance increases, as Newton assumed. In modern-time atomism, therefore, there is only one way to explain observed strong correlations between very distant phenomena. It is to assume that these phenomena are due to some past common cause, from which effects are gradually propagated to each one of the phenomena in question. Now, in as much as ontology is at stake this is, in fact, a crucial point: For, as you know, John Bell showed, during the sixties, that there are correlation effects that cannot be explained in that way. Indeed, through a conjunction of theoretical and experimental results (including those of Aspect) it is now proved that the World in its entirety cannot be thought of as composed as modern-time atomism claimed it to be. In a way Bell thus demonstrated what could have been suspected since the advent of quantum mechanics. For the whole structure of this theory - with entangled wave functions and so on - is indeed quite alien to the notion of local events not in any way associated with perception; and, in fact, it already suggested "nonlocality", or "globality".

So you see, however useful atomism may be as a model, it is now clear that it cannot be elevated to the status of a genuine ontology. And, in fact, this has turned out to be true of all tentative World-views that may be called "mechanisms": I mean all the World views based exclusively on familiar concepts.

In fact, physicists have known for quite a long time that they could not do with familiar concepts only. Already during the XIXth Century, it proved necessary to introduce new concepts not reducible to the familiar ones. A good example is the one of autonomously existing fields. And it became more and more clear that the source of these new and useful concepts is mathematics. In fact, this became absolutely obvious with the advent of General Relativity.

Such concepts as metrics, curved space, etc. are totally unfamiliar. We do not have them at the start. It is only due to their mathematical definitions that they have precise, unambiguous meanings. And they work! In present day, astronomy most facts would be totally unaccountable without them. So that, after all, we can claim physics has produced a momentous epistemological discovery. The discovery that — contrary to what Descartes and all his contemporaries believed — we can, and must, apply reason, even outside the realm of familiar, or so called innate, concepts. So, you see, we are not very far from Pythagoras' famous dictum "numbers are the essence of things"; to be understood as "mathematics are the essence of things". Not just a precise tool for associating concepts together but the very origin of (at least some of) the concepts. If I dared I would call that view, "Einsteinism": the idea that "reality as it really is" can be reached, but only by using concepts borrowed from mathmatics.

As you see, this conception — that I call Einsteinism — is really an ontology. A tentative description of "reality as it really is". And although this ontology is rarely even mentioned by the professional epistemologists, it constitutes I think — at least implicitly — the "firm belief" of most physicists and, even more so, of theoretical physicists. My theorist colleagues are of course fully convinced that old "mechanism" is dead, but it seems to me that they found in Einsteinism a substitute to it that they deem satisfactory. Not that they follow Einstein in his detailed views concerning contemporary physics and in particular, quantum physics. But I think that — without probably having intensely pondered the matter — they instinctively apply to quantum physics the view that the later Einstein entertained concerning General Relativity, that is, the view according to which mathematics enable us to discover what are the "really good" concepts: I mean the ones by means of which it is possible to describe Man-Independent-Reality as it really is.

However, present day physics confronts physicists with difficulties, also concerning Einsteinism. To see this, let's consider the principle of the well-known Young-like experiment. A beam of photons (or other particles) is shot though a diaphragm with two slits and the particles that do go through the slits then fall on a screen where their impacts appear. What is observed is that these impacts, instead of gathering into two spots corresponding to the two slits, as we should naively expect, get grouped in such a way as to constitute so-called interference fringes, quite similar to those we would expect if, instead of a particle beam, we had to do with a wave phenomenon. Qualitatively, there are two possible interpretations. One of them is to assume that the particles are accompanied with a wave that guides them, in such a way that the probability for the particle to be at such and such a place at such and such a time is proportional to the intensity of the wave at that place and time. The fringe-like gathering of the impacts is then simply explained by the fact that the wave goes through both slits. This is essentially the de Broglie–Bohm account. As I just stated it, it looks very simple and nice, but it so happens that in it, for reasons linked to non–locality, as soon as slightly more complex situations are considered, very awkward problems appear. For these reasons, on which there is no time now to dwell, most physicists discard this interpretation.

At first sight, the other possible interpretation seems much more strange, for it is grounded on an idea of which, true as it is, we seldom think nor need to think. What I have in mind is the fact that the domain of validity of a concept may well have a limited extension. When we become aware of this, we realize that while the particle concept is totally suitable for describing such phenomena as emissions, impacts and more generally "what happens" when some, direct or indirect, observation is involved, this does not guarantee that it is suitable in a kind of absolute way, that is, even inbetween observations. Within this more cautious way of thinking, that focuses physics on human experience rather than on "Being", use of classical concepts - those of particle (which implies locality), velocity, field, force etc. - is not banned but it does not force itself upon us as a rational necessity. In the present case, we must consider that the particle concept applies at the point of impact on the screen, presumably also at emission, but we do not know whether it applies inbetween or not. So, we must be careful. Having prepared a beam of particles, the physicist has, concerning this preparation, some knowledge that he synthesizes in the form of a mathematical entity called "initial density matrix" or "initial wave function $\psi(t_0)$" when this knowledge is maximal. At his disposal he also has a differential equation — called the Schrödinger time-dependent equation — that enables him to deduce from $\psi(t_0)$ a new mathematical entity called $\psi(t)$, conventionally called "time-dependent wave function". And he also has at his disposal a general rule - called the "generalized Born Rule" - that, from $\psi(t)$ enables him to calculate probabilities.

Now, what are these probabilities exactly? Which are these probabilities of? Well, if, as it is the case in the young-like experiment, a screen is present beyond the diaphragm, it acts as a particle detector. And experience then shows that the thus calculated probabilities do correctly agree with the impact distribution observed on the screen. So, we may feel confident that, generally speaking, the probabilities we infer from the wave function $\psi(t)$ are those we would have of observing a particle at some given place if we were to set a particle–detector there. The question is: can we picture all this in more realistic terms? Naively, of course, we feel inclined to do so. Instead of considering the probability as being the one we would have of finding the particle there if we looked there, we are tempted to simply consider it as the probability that the particle is there, whether we have a look or not. However, this temptation must be resisted, for yielding to it would lead us into a pitfall. This is easily seen for indeed, if we could meaningfully speak of the probability a particle has of being, at a given time, at a given place or region of space — whatever that region is — then, in the case of a Young-like experiment we could meaningfully speak of the probability an individual particle has of being, at some time, precisely within one particular slit. But we would then have a hard time explaining how it can be that every one particle goes through both slits at once. And since some such idea is necessary for explaining the fringes (remember we barred out the Bohm theory), we would be deadlocked. So, you see, when speaking of quantum particles we should carefully avoid the expression "probability of presence at such and such place". In French the corresponding expression is often used. But it is misleading. In English, the usual expression is "probability to be found" and this is actually the only correct one.

Now, from these elementary considerations a very important consequence follows, that concerns the notion of "objectivity". That science is objective is of course true. But this is only part of the story, because the word "objectivity" has two quite different meanings. According to one of them, a statement is objective if it exclusively mentions the objects it deals with, without in any way referring to the subjects who know or will know what is asserted. Of such statements I proposed to say that they are *strongly* objective. According to the other meaning of the word, a statement is objective if its truth value is the same for everybody. If it is true or false for all of us. Of such statements I suggested to say that they are *weakly* objective only. In classical physics — as in most sciences — practically all basic statements were of the strongly objective kind (with the possible exception of those of statistical mechanics, which could anyhow be considered as nonbasic!). At a time it could therefore be believed that all scientific statements had to be strongly objective. But we have just seen a counter-example, and a very impressive one indeed since it concerns one of the basic laws of quantum mechanics, which lies on the root of all contemporary physics. This counter-example is nothing else than the Born rule for probabilities, for what we have seen is that, at least when applied to particle positions, this rule is — in my terminology — *weakly* objective only.

Hence, it seems that weak objectivity is one of the most salient features of quantum mechanics, at least when taken in its pure, unaltered version (without the additional *ad hoc* terms I shall mention in a moment). This is a momentous difference with classical physics. Within physics as it is taught in high schools, students learn that there exist atoms, that there exist such things as electric and magnetic fields and so on, obeying some well specified differential equations. And they are persuaded that these equations make it possible to do definite predictions as to what will be observed under definite circumstances. Experiments are then done, showing that indeed these predictions are confirmed by observation. In (unaltered) quantum physics the rational line of approach is different. The primary notions are not — or should not be! — those of fields existing by themselves, as Einsteinist ontology suggests, and of equations governing their evolutions. The primary notion is that of mathematical rules that enable us *to predict what we shall observe*. Then, fields and so on are no more than words in a language that happens to be convenient for referring to some elements of these rules.

This identification of the basic quantum mechanical laws to a set of predictive rules is clearly the most cautious way of describing the laws in question. And I claim that it is also the most advisable. To make this point, let me stress, first of all, that it suffices to provide u4 with the best possible knowledge concerning what we shall observe under such and such circumstances, which means it *does* fulfill the *main* — perhaps the *only* reasonable — purpose of science: that of correctly accounting for human communicable experience. And, second, let me remind you that describing the quantum laws just as rules removes a basic, well-known difficulty, linked to the wave-function collapse. For indeed, when a measurement takes place and when, among several possibilities, we observe one being realized, our information is increased. This unavoidably modifies our probabilities of observing related effects. Consequently, the object wave function, that yields such probabilities, has to be abruptly changed. This shows that the notion of "wave function collapse" can hardly be avoided. However, for the physicists who believe that the wave function constitutes a genuine element of reality this is an *ontological scandal* since it seems to mean that the mere fact of somebody taking cognizance of something may *modify reality*. And the horror of the scandal is even increased by the fact that, since wave functions are most often extended in space, the cognizance-act in question may instantaneously change reality even at considerable distances. Fortunately, nothing like such a scandal appears if we grant at the start that quantum mechanics is but a weakly objective theory: I mean a theory whose sole purpose is to inform us about communicable experience, without any admixture of intuitive ontology.

In fact, the view that science deals with human experience rather than with ontology was one of Niels Bohr's guiding ideas. It is therefore not surprising that, in 1958, he wrote this: "The description of atomic phenomena has […] a perfectly objective character in the sense that no explicit reference is made to any individual observer and that therefore [...] no ambiguity is involved in the communication of information" (end of quotes). This sentence may be considered as a remarkable characterization of the basic nature of quantum mechanics and can, at the same time, serve as a clear definition of what I called weak objectivity a moment ago. Indeed, in my language Bohr simply states here that quantum mechanics is a weakly objective theory.

Under these conditions it could have been expected that the bulk of the theoretical physicists — and particularly those who considered themselves as being conceptually faithful to Bohr's ideas — would have adhered (perhaps with some other terminology) to the said view: to the view that quantum mechanics is weakly objective only. However, strangely enough, this was not at all the case. In fact, most physicists seem to have taken up the view that, in some way or other, the wave function is ontologically real, or has at least some ontologically real features. Unavoidably, they then fall on the conceptual difficulty of the collapse. The alternative approach I am sketching here — and which is, to some extent, in line with Bohr's one, as we have just seen — has at least the merit that it nicely avoids this ontological scandal.

Well, we are now really at the very core of the conceptual problem we want, today, to analyze. In short, the question is: "to which extent can we depart from scientific realism?", scientific realism being defined as the idea that — if not atoms and particles — at least *macroscopic* objects ***really exist as we see them.*** In fact, most physicists, — whether or not they adhere to Einsteinism, as most theorists do — are strongly inclined toward such a scientific realism, that of course is the reason why they consider that such an important element of the theory as the wave function should be real. This is why, in recent times, modifications of quantum mechanics have been suggested, with, avowedly, the only purpose of solving the collapse riddle without giving up the reality of the wave function. In substance, all these models have in common the idea of introducing an additional term in the Schrödinger equation. A term small enough not for substantially modifying the predicted behavior of microscopic objects, but for inducing a very rapid collapse of the center of mass wave function of macroscopic aggregates of such objects. This term, then, explains that, when a microscopic object interacts with a measuring instrument, the overall wave function, common to the object and the (macroscopic) instrument, spontaneously collapses. "Spontaneously" meaning that our becoming aware of the outcome has no role in that collapse.

There are several such theories, or models. In some of them, such as the Ghirardi, Rimini and Weber one, the additional term is brought in a totally *ad hoc* way. Others, such as the one Roger Penrose trusts in, try to somehow relate the said term to something already known: in Penrose's case, gravitation. These are very interesting attempts and I would say that, within the realm of scientific realism, these attempts must be done, even if the touch of artificiality common to them all, makes them resemble a little bit — in spirit — the Ptolemaic epicycles, which may make us a bit uneasy concerning any one of them in particular.

Those of us who do experience this feeling of uneasiness may come to wonder whether the difficulty is not of a more fundamental nature. Could it be, after all, that scientific realism is wrong? When you start asking yourself this question you begin recapitulating for yourself the arguments that seem to convincingly plead in favor of scientific realism. You then discover that they are essentially two in number. One of them is the fact that a vast number of predictions are always being made — by myriads of human beings — on the basis of the hypothesis that physical objects exist and have observable features that are fully independent of our knowledge, such as that of being at definite places. These predictions are practically always successful, which of course tends to corroborate the hypothesis on which they are grounded. The other argument invoked in favor of realism is the intersubjective agreement concerning contingencies. It is pointed out that if several people see an object lying at some definite place, the explanation that seems to be, by far, the most convincing one is that there *really is* an object at that place.

However, it so happens that, for somebody who has a knowledge of quantum mechanics, neither one of these two explanations is convincing. The reason is simple. It is that they are not binding. And they are not binding just because the quantum formalism yields alternative explanations, not based on realism, of both the observed regularities and the intersubjective agreement. The quantum formalism grounds these explanations on its own laws. And these laws, to repeat, are not based on scientific realism as I defined it. In particular, they do not rest on the idea that objects occupy definite places. But they do nevertheless correctly predict the observed regularities and the intersubjective agreement.

So, you see, scientific realism is not a prerequisite for science. And since it conflicts with orthodox quantum mechanics (I mean quantum mechanics without additional ad hoc terms in the Schrödinger equation) the most reasonable position is to rule it out.

Still, you might say that the "instrumentalist" alternative approach that I am now advocating also meets with problems. One of them consists in the fact that the quantum laws are predictive of observations so that, to be able to state them, we have to describe the operations we perform — preparation and measurement —, which cannot be done without making use of macroscopic, realist concepts. Another, related, problem, is of course to explain why, within the macroscopical domain, the predictions we make by using the realist language of classical physics — speaking of localized objects and so on — do work, even in cases in which the relevant wave functions are practically not localized. Well, in these fields a great stride forward has been made during the last decades. I am referring to a theoretical development called "the theory of decoherence". In fact this is not really a new theory. It merely consists in the - recently made - discovery of some consequences of quantum mechanics that theorists had not previously thought of. It is based on the fact that, considered quantum mechanically, a macroscopic system has energy levels that are so closely packed together that, even extremely minute perturbations, can cause transitions between them. Even the intergalactic background radiation is capable of doing so. As a consequence, macroscopic systems can never be considered as being isolated from their environment.

It so happens that this fact goes a good way towards solving the problems I just mentioned. However the solution is of a vastly unexpected and indeed quite puzzling nature. It consists in showing that although there are physical quantities the measurements of which would reveal that a macroscopic object — or, if you prefer, its wave function — is not localized, still, such measurements are so incredibly complex that, in practice, they cannot be made; so that nothing stops us from following our natural tendency, which is to interpret our sensations as bearing on objects all lying at definite places. Unquestionably this theory yields a picture of the world-as-it-is and of our relationship to it that is extremely different, nay, that is even the opposite, of the classical, commonsense one, according to which the objects possess, by themselves, the forms and positions we see they have. If an analogy were requested, the least misleading one would consist in comparing the object with a rainbow. If we drive a car, we see the rainbow moving. If we stop, it stops. If we start again, it set moving again. In other words, its properties partly depend on us. And of course, since all this proceeds from the very nature of the rainbow, the dependence in question is a fact, also in the case that we do not actually move. If unaltered quantum physics is to be seen as a universal theory, this must, more or less, be the status of all the objects relatively to us. They are phenomena in the philosophical sense. In other words, they are elements of an "empirical reality" which is, at best, the distorted image we build up of Man-Independent Reality.

Before leaving this particular subject let me still make one point. It is that, combined with recent experimental results, decoherence yields a strong argument in favor of quantum universality. I am referring here to experiments performed at the Ecole Normale Supérieure, in Paris, by the Haroche group. In short, what these physicists did was to take a macroscopic (in fact a mesoscopic) object and suddenly put it in a state in which it is, in a way, temporarily disconnected from its environment, or at, least, not in a stable equilibrium with it. Immediately after this has been done, their apparatus shows that the object exhibits typical quantum properties, proving that it obeys quantum mechanics. And then, within a time that is very short but finite — and that they are able to measure — the link between it and the environment gets reestablished and the object becomes classical again. Clearly, if there were two completely disconnected physics — quantum physics governing atomic objects on the one hand and classical physics governing macroscopic objects on the other hand — such a result would be totally unexplainable. So, you see, the result in question seems to rule out such a sharply dualistic view. Of course, it does not, by itself, rule out the "additional terms" theories, where spontaneous collapses take place. But in my view the very existence of decoherence theory considerably reduces the convincing power of these theories since, so long as ontological prejudice are "pushed aside", decoherence yields the same explanations as they do, without involving ad hoc or far–fetched hypotheses.

Closing this parenthesis, let me come back to the point I was trying to make, namely that, when all is said and done, the most reasonable standpoint seems to be to discard the view I called *scientific realism* (which, we saw, includes "Einsteinism"). Under these conditions, and since quantum mechanics most successfully accounts for our experience, a question can hardly be avoided: After all, conceptually, is a Man-Independent-Reality" needed at all? The reason why the question cannot be abruptly discarded is that doubts concerning the relevance of the Man-Independent-Reality notion have been with us for a long time. They may be said to originate from Berkeley's idealism, although Descartes may be seen as a forerunner. From this seed, the idea gradually developed among philosophers that such general notions as Being, things-in-themselves, Reality per se and so forth are redundant, useless, and "therefore" invalid, concepts: and that, when all is said and done, it is only on the basis of human experience that we can define anything that can properly be called real. This could be called "radical idealism". And indeed it may be claimed that the modern or contemporary philosophical doctrines that most attracted attention — think of phenomenalism, positivism, antirealism, internal realism and so on — implicitly partake of radical idealism. For the reasons we just reviewed some might say that quantum mechanics points in the same direction. However, I consider that there are also powerful counter-arguments to radical idealism. If you ask me, I shall explain them to you in the discussion. They have induced me to state a postulate which I take as a basic one. I called it the *Open Realism* postulate. Open realism is a minimal assumption. Apart from radical idealists anybody would endorse it, from the pope to the most die-hard materialists! For it just posits that there is "something" the existence of which does not proceed from the existence of the human mind, without assuming anything at all concerning the nature of this "something". Not even that it is knowable. The matter is just left open: it is to be decided on the basis of what factual knowledge, and in particular scientific knowledge, reveals.

Since we posit nothing concerning this "something", we must give it a neutral name. The least compromizing one I could think of is the one I already used today, namely "Man-Independent Reality".

This being said, let us ask some questions concerning this Reality.

First question: is it atomizable?

To this question we already have the answer. It is not. Modern-time atomism is ruled out by the Bell theorem, as we saw. And since the opposite to atomization is unity, we may conjecture that Man–Independent Reality partakes in some way of holism.

Second question: is Man–Independent Reality scientifically knowable?

Well, it is clear that, in order to faithfully describe something that is Man–Independent, statements just concerning what impressions this "something" arouses in us would be fully inadequate. We should exclusively use statements describing the thing itself: In other words, "strongly objective" statements. But we have seen that "orthodox" quantum mechanics, without admixtures or alterations, is weakly objective only. Since we also saw it is likely that quantum mechanics is universally valid, we must consider it as likely that Man-Independent Reality is not scientifically knowable.

Third question: is Man-Independent Reality embedded in space and time?

The fact that Man-Independent Reality is unknowable does not render this question meaningless. Ideally, we might conceive of a Man-Independent Reality lying in space-time and the detailed structures of which would be unknowable to us. However, in order to have some plausibility, this conjecture (of an embedding) must be comforted by arguments having substance. Now admittedly it is easy to think of very commonsense arguments pointing to the "obviousness" of the embedding in question, but when these arguments are considered under the light of our present-day knowledge — in particular the one brought about by quantum mechanics — they turn out to be essentially lures. In particular, we saw that, contrary to commonsense evidence, Man-Independent Reality cannot be local (I mean: composed of localized elements). Under these conditions, it seems reasonable to consider that the spatial order we see around us — and which astronomy reveals at large — is but an *explicit* order, as Bohm used to say, that is, an order that partakes very much of the weak objectivity and cannot therefore be identified with the "absolutely real" order, the one Bohm called the *implicit* one. This implicit order is not really attainable by us but, to repeat, suggestions from contemporary physics tend to indicate that it is not spatial.

So, all the indications we have point towards the idea that Man-Independent Reality is not embedded in space, or, to put it otherwise, that space is, as Kant said, a "mode of our sensibility". Concerning time we have less direct indications. However, it can be pointed out that if Man-Independent Reality were embedded in some "time", this could not be the "relative time" of special relativity. It could only be cosmic time. However, the existence of cosmic time does not follow from general relativity alone. Indeed, it is not law-like but merely fact-like. Cosmic times exist only in some cosmological models, those in which the Universe is assumed isotropic. It so happens that our Universe is fairly isotropic, so that a cosmic time can be defined concerning it. But then, since Man-Independent Reality is not in space as we just saw, the fact that the Universe as we see is isotropic cannot be a feature of Man-Independent Reality. It is a trait of empirical reality only. And therefore, so it is also cosmic time. Hence, Man-Independent Reality cannot be embedded into it.

To sum up: there are forceful arguments against conventional — that is, traditional — realism. But then, if radical idealism is to be rejected as well, that is, if the postulate of open realism is adhered to, then only two possibilities remain: either Man-Independent Reality is altogether unknowable, a "pure X", or it is such that we can get, or guess, some knowledge about it, but merely allegorical.

Well, I think there are rather convincing arguments favoring the second branch of this alternative over the first. The main one is that the observation of natural regularities and the intersubjective agreement both cry out for explanation. And you probably remember that, if we could dismiss the conventional — that is, realist — explanation as we did, this was only because we had an alternative one at our disposal, namely the set of quantum mechanical laws. Now, even those among the philosophers of the past that were most oriented towards positivism or pragmatism had to acknowledge that, to serve as bases of genuine explanations, laws had to be something more than just empiricist syntheses of past observations. In other words, they themselves had to be considered as having some sort of a basis. For us, who accept the Open Realism postulate, this basis, of course, is Man-Independent Reality, which means that the quantum laws somehow proceed from the structures of Man-Independent Reality and therefore may well give us a glimpse on what these structures are. Indeed this argument may be supported by other considerations. For example, it certainly would be mathematically simpler if the radiation field were just a scalar, but it is not. And though we cannot take any definite ontological commitment as to its ultimate nature, still we do have there a piece of knowledge that cannot be thought of as being exclusively our own construction. Similarly, it sometimes happens that beautifully rational theories are falsified by experiment. Such facts not only convincingly show that there is "something" outside us — that "something" saying "no" — but, at the same time, they give us some knowledge about that "something". It is true that it is merely negative knowledge, but it is knowledge at all. Non–locality, for example, is a negative knowledge of this kind.

Let me end by summarizing what we noted and by putting forward some speculations all this leads me to.

I think that non–locality is one of the main things we saw: for it disproves modern-time atomism and thereby bears a severe blow to, at least, the most elementary — and most widely spread! — version of materialism. And a second very important feature we noted — and which points entirely in the same direction — is the weak objectivity of unaltered quantum mechanics. If quantum mechanics is really to remain unaltered, weak objectivity is to be viewed as a truly basic feature of our knowledge of what exists. I mean: it signifies that, after all, Plato and Kant were right: we are very much like the prisoners described in the myth of the cave. We do not see the absolute, and the objects we do see are not "real things". We see but shadows of "the Real". In Kant's language, we only have access to phenomena and such phenomena partake somehow of appearances. Correlatively, this leads us very far from the ontology that was the "smallest common denominator" of both Aristotelian and Galilean philosophy (which became the philosophy of classical science): I mean the ontology according to which the elements of the tangible World do exist in themselves (and more or less as we see them) quite independently of our own sensorial and intellectual abilities.

Now, I would not go as far as claiming that this issue — roughly speaking, the issue between Plato and Aristotle — is definitely settled (in the way I just said) by contemporary physics. Within classical physics ordinary things could be viewed as being genuine elements on Mind-Independent Reality and, as I already noted, models exist that — at the price of plugging in small ad hoc terms in the Schrödinger equation — restore the possibility that this classical view be right, at least concerning macroscopic objects. Otherwise said: these models do make it possible to consider such objects as being genuine "objects-in-themselves". Now, scientifically-minded people were so long under the influence of the classical world-view that, for many of them, the idea that physical objects are not of the nature of object-in-themselves is just simply unthinkable. Clearly these scientists cannot perform the mental jump consisting in accepting the type of Platonic-Kantian view suggested by unaltered quantum physics. And it is therefore understandable that, for lack of any other "way out", they should trust one of the models I just mentioned. As for me, however, I consider that we should not remain that much under the influence of the past successes of the classical view. More precisely, I consider that making a beautiful theory intricate through the addition of small terms, just for the benefit of (partly) salvaging a traditional world-view is a move that is too much a reminder of the theory of the epicycles. I view it as being, scientifically, most suspect. I think, in other words, that we should make the jump.

Needless to say that, personally, I make it. In other words, through arguments that have nothing in common with those of Kant I am led to a view that has some features in common with his. I think we must give up the idea that there exists a World fully independent of us and, still, grossly similar to what we perceive. And I therefore claim that (aside from radical idealism) the conception to be held is that of a "veiled" Man-Independent Reality, not imbedded in space and time.

This, to repeat, brings me nearer to Plato than to Aristotle. But not to everything in Plato. What some Thomists such as Gilson find wrong with Plato is that, to the question "What is Being?" he systematically answers by describing «such and such a way of existing». If this were completely right it would make me uneasy, since I think that Being is very much veiled. But, at least concerning the idea of "the Good", which is foremost among Plato's "Ideas" — or "Essences" —, Plato explicitly states that we crave towards it. To know it is important, but we are not able to actually say what it is. So, I think the Thomists' blame to him is perhaps not entirely fair. Anyhow, setting this aside, it seems to me that there is some relationship between the "ontological suggestions" of contemporary physics and the “negative theology”. My point is that there exists a similarity between the notion of Mind-Independent Reality — so much removed from our common way of thinking that it is not even embedded in space and time — and the God of this theology, concerning which we can but say what it is not. Consequently, I would not be averse to a view that, leaving somewhat aside the awkward question of "God as a person", would identify Man-Independent Reality with the notion we have of some divine Being. Consciousness and empirical reality could then be seen — very schematically, of course — as, somehow, co-emerging from the "Being" in question. Thus described this conception, of course, is but a "half-baked" idea, as Wigner used to say. It should be very much elaborated on before getting a respectable form. But I wonder if, then, it would not be of such a nature as to give rise to a revival of interest for the deep and basic debates on the relationship of God and Mankind that, in the XVIIth century, involved Spinoza, Malebranche, Fénelon and others. And it would be remarkable indeed if such a revival were inspired by contemporary physics!