

LOUIS DE BROGLIE AND THE FACTOR OF INTENTION IN THE UNIVERSE



From the desk of Pierre Beaudry



LOUIS DE BROGLIE AND THE FACTOR OF INTENTION IN THE UNIVERSE

(Revisiting Louis de Broglie's wave/ particle paradox)

By Pierre Beaudry, December 24, 2012



Figure 1. Are you looking for the intention behind the universe? (Flammarion Woodcut.)

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FOREWORD

Why can't scientists understand there is a direction to the universe and that this anti-entropic direction represents a cyclical intention of progress that is built-into the smallest part of our universe? Today, most physicists don't realize that the most fundamental aspect of science is to win the fight that demonstrates that there is such periodical intentionality between the parts and the whole of the universe.

In 1985, Dr. Robert Moon wrote a crucial report on the crisis of the Fifth Solvay Conference of 1927, for the purpose of restoring this intention by solving the four most important epistemological problems that prevented modern physics from moving ahead. Moon's effort was to show that Louis de Broglie had successfully solved these four problems with his wave-particle theory. This report has three sections.

1. ROBERT MOON AND THE FOUR EPISTEMOLOGICAL FALLACIES OF MODERN PHYSICS
2. DAVID BOHM AND LOUIS DE BROGLIE ON THE LEAST ACTION PILOT-WAVE THEORY
3. THE LEIBNIZ INVERSION OF TANGENTS FROM THE PAST TO THE FUTURE

INTRODUCTION

“There is an intention in the universe because even though a multitude of particle combinations are possible, only the wave pathways of those that are isoperimetric and anti-entropic succeed.”

Dehors Debonneheure.

There is directionality to the universe and that directionality represents a cyclical intention of progress that is built into the smallest parts of the universe as a whole. As Lyn identified, that intention of progress is manifested through increases in energy-flux-density of the universe that is brought about within cyclical space-time-progressions, which mankind is able to reflect, as a willful and self-conscious intention of the creative power of the universe itself. It is for that reason that Plato identified in his *Timaeus* that human reason is the proportional reciprocal of the intelligence in the heavens, “*In Imago Dei.*”

It is in that sense that mankind was created solely for the purpose of making the universe self-conscious of its own happiness. There exists, therefore, a factor of intention in the physical universe, which corresponds to the creative thinking process of the human mind, and it is the development of that intentional process which makes the universe happy. In this report, I will demonstrate that the underlying intention of the universe is not only to create man in the image of its own physical principles, but that the universe has expressed intelligence in precisely the fact that it intended to be happy by being dominated and ruled by a thinking humanity.

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1. ROBERT MOON AND THE FOUR EPISTEMOLOGICAL FALLACIES OF MODERN PHYSICS

The science of physics has stopped progressing ever since the Solvay Conference of 1927, because Niels Bohr, Max Born, and Werner Heisenberg, succeeded in imposing on the conference attendees the Copenhagen School statistical view of their Quantum Mechanics as the ultimate and final form of knowledge of the universe. From that moment on, the reductionist Aristotelian faction of quantum mechanics, represented primarily by Heisenberg, Bohr, Born, Pauli, and Dirac, took over the domain of physics and completely excluded the Platonist faction represented primarily by Plank, Curie, Einstein, and de Broglie. Sense perception had won the fight over mind, or as Karl Popper reported, “The real break was...between a radical and dogmatic empiricism and critical realism.” (Robert J. Moon, *The Gifts of Louis de Broglie to Science*, *International Journal of Fusion Energy*, Vol. 3, No. 2, April 1985, p. 69.)



Figure 2. Participants of the Fifth Solvay Physics Conference, Brussels 1927.

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Moon summarized the Fifth Solvay Conference crisis situation as follows:

“De Broglie was pounced upon by members of the Fifth Solvay Physics Conference in 1927. The Congress did not like his concept of the pilot-wave associated with a particle and the consequent double solution. Wolfgang Pauli made important objections to de Broglie's concept and felt that it did not provide a consistent account of the many-body system or, in particular, a two-body scattering process. De Broglie felt that his idea had at least a germ of an answer. This was not appreciated by those present at the Solvay Conference, and de Broglie's friend Einstein did not speak up for the theory. These two rejections led to rejection by the Congress, which in turn caused de Broglie to close his books on this theory, giving up further work on it.” (Robert Moon, Op. Cit., p. 64. Reported from David Bohm and Basil Hiley, [*The de Broglie Pilot-Wave Theory and the Further Development of New Insights Arising Out of It*](#), *Foundations of Physics*, Vol. 12, No. 10, 1982, p.1003)

Although Einstein had agreed with some aspect of de Broglie's theory as early as 1924, he chose not to speak out publically in favor of de Broglie's theory. Einstein had in fact written to H. A. Lorentz on Dec 16, 1924: “A younger brother of de Broglie (the one we know) has undertaken a very interesting investigation (Paris Dissertation, 1924) to interpret Bohr-Sommerfeld quantum rules. I believe this is a first weak ray to illuminate this most serious of our physical riddles. I have also found something that speaks for his construction.” (*The Scientific Correspondence of H. A. Lorentz*, Volume I, Springer, Amsterdam, 2008, p. 568.) However, as Moon reported, de Broglie learned of Einstein's letter only after Einstein's death in 1955.

Einstein had, himself, waged a fight against the reductionists of the Copenhagen School, but without any real success, and the overwhelming majority of theoretical physicists were against him. The Einstein-Podolsky-Rosen EPR paradox was the unsuccessful flank they used. The EPR paradox was a thought experiment designed to demonstrate the inadequacies of quantum mechanics, notably, by challenging the fact that it is impossible to know both the position and the momentum of a quantum particle as advocated by the “uncertainty principle” of Heisenberg.

In 1935, Einstein, Podolsky, and Rosen published their EPR paradox in a paper entitled, [*Can Quantum Mechanical Description of physical Reality Be Considered Complete?*](#) The argument they used demonstrated that there were cases where “a particle possesses both a precise position and a precise momentum.” (Robert Moon, Op. Cit., p 69.) However, formal arguments were not sufficient to do the job. It was not enough to demonstrate the existence of determinacy and show that the Quantum Theory was incomplete. That was ineffective because it was itself a formal fallacy that did not go to the heart of the matter. The point was to identify that Quantum Mechanics was a fraud, because it was purely based on sense perception and sense perception is not scientific knowledge, period.

Moon's polemical approach with Bohm and Hiley was a better flank because it showed the four fallacies of composition of Quantum Theory and the necessity to restore science on solid grounds. Moon identified the four epistemological fallacies that prevented the Solvay Conference physicists from understanding real physics. Those four fallacies were: 1) reducing reality to *sense perception*, 2)

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measuring reality with *quantum probability*, 3) pretending to have *absolute knowledge*, and 4) rejecting *causality*. I reproduce, here in their entirety, the four points as Moon stated them:

“There are four essential groups of problems with which these essays are concerned and in which de Broglie fought great battles.

“(1) The first set is concerned with Heisenberg's dictum that microphenomena exist if and only if they are observable. De Broglie, on the contrary, held to his concept of the pilot-wave, ψ —a real microphenomenon wave that guided particles.

“(2) The second set of problems has to do with Bohr's concept that quantum probabilities represent an ultimate limit to human knowledge. Contrary to this, de Broglie conceived of a random set of subquantal hidden variables in a real vacuum with which particles interact and exchange energy; that is, a vacuum alive with subquantal distributions of violent motions, so that particle energy changes when moving from one point to another, in accordance with the principle of least action. These new quantum forces reflect the "wholeness" of the surrounding universe. This concept is that of a new ether model. The vacuum state is the state of "empty space," vibrant with a covariant distribution of covariant spinning oscillators and with random jumps in the velocity of light. This ether is not the old ether-at-rest model, but is a "new description of nature's 'vacuum' that implies a Copernican revolution against the world vision of Newton and Laplace, since it organically combines causal motions with permanent randomness. It interprets quantum mechanics as a Markov process at the velocity of light," Vigier writes.

“(3) The third set concerns "the physical origin of the laws of nature themselves." The Copenhagen School, according to Vigier, "regards Quantum Theory as a general form of knowledge that is final in its essence. If this is true, knowledge of nature will never change again but only eventually develop through the introduction of new elementary particles, new Lagrangians, new quantum numbers, and new forms of interaction."

“De Broglie and Einstein's approach to theory is basically different, Vigier says. Reality is immense, and no description of the universe by means of a theory and experimental proof will ever be a total and final one. Rather, each new theory proved by experiment is just another thin layer of insight into the nature of the real world.

“(4) The fourth set of problems deals with "the existence of causality in nature and covers the present controversy raised by the, now very probable, confirmation of the nonlocal character of quantum mechanical predictions, discovered by John Bell in the Einstein-Podolsky-Rosen type of experiment." (Robert Moon, Op. Cit., p. 64)

Here, Moon has identified the four epistemological fallacies that every future scientist has to investigate with respect to the required mental condition of future physical science. It is useful to look at those four problems as a quadratic epistemological test of validity for anyone who wishes to join either the Aristotelian faction or the Platonic faction in science. The positive or negative answer to these

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questions will determine whether someone is in favor of the oligarchical principle of “going along to get along,” or is against it. Moon’s report leaves no other choice outside of this alternative.

The first problem of *sense perception*, as Lyn keeps emphasizing, is the most fundamental problem in general and in science in particular, because it is the essential underlying assumption behind the other three problems of physics. In quantum theory, the question of sense perception was identified very early at the 1927 Solvay Conference by Heisenberg, who established that the physical reality of the electron had no reality outside of being, “in some sense,” produced by the act of sense perception of the observer. The electron, which is in reality unobservable by sense perception, cannot have a determined measurement of position and momentum at the same time because they cannot be seen. It has been the propitiatory fears of the scientists themselves which has kept alive this false underlying assumption that physical reality had to be seen, and it is nothing else but sense perception which has let the mathemagicians of this Aristotle-Newton tradition dominate science until today.

The second problem of *quantum probability*, which was originally defended by Niels Bohr, is based on the underlying assumption whereby if the universe is only knowable through sense perception, it must follow that there is no higher knowledge than statistical probability, and consequently, there cannot exist any form of least action principle in the universe, because the universe cannot have any inclination for acting one way rather than in another. The fallacy, here, is that there is no “interactive wholeness” in any small or large actions in the universe. The universe is a disconnected whole, and all actions are separate and without any principle of reason. This view implies that only mathematical formulas relating to empirical sense perception experience can be validated and, therefore, must act like frequency statistics of Insurance Companies. This is how “digital physics” became the natural consequence of Quantum Theory.

The third problem of *absolute knowledge* is, again, a natural consequence of sense perception and of its popular principle of “going along to get along,” because there is nothing more certain than sense certainty. How can something that is seen or not seen by your own two eyes become doubtful. It is one thing to be certain of seeing something; it is another to be certain that what we see is true. The reason to doubt is not about the certainty of the experience, but, rather, about the certainty that such an experience is true knowledge. The failure, here, comes from the fact that scientists took the evidence of the experiment for the actual truth of the matter as opposed to what is meaningful to the mind about such evidence. Indeed, if sense perception takes preeminence over mind, in terms of knowledge, science can only become absolute and dogmatic, because only a closed mind can be certain.

The fourth problem of *rejection of causality* is also a consequence of excluding reason as the basis for scientific knowledge. When science is entirely based on the standard of experiments where universal principles are excluded in favor of sense experience, then, there can be no causality, nor any form of intention in the universe, because sense experience can only identify an effect, never the causal process that is behind that effect. It is the processes that generate the effects that form the content of scientific knowledge, not their calculated results. This is why Quantum Theory can only reflect reductionist dogmas based on statistics of repeatable experimental facts. When facts become the be-all and end-all of science, all that you are left with are the footprints. What you need to look for is the foot.

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Such are the four plagues of Twentieth Century science, the four horsemen of the Mind's Apocalypse. Let us hope that Twenty-first Century science will not continue on the same disastrous course. As Bohm and Hiley put it:

“Most physicists have adopted views similar in key ways to those described above, though the details vary considerably. However, de Broglie, Einstein, Schrodinger, and others disagreed with this approach, because they felt that there is a uniquely defined reality, which can be grasped in thought and is yet independent of thought. Without considering this reality, science is reduced to a set of formulas and recipes for predicting the results of experiments. Indeed, a large number of modern physicists have since then, at least tacitly, come to adopt such a point of view, perhaps because it is part of the pragmatic spirit of the age.” (Bohm and Hiley, Op. Cit., p. 2) (<http://leopard.physics.ucdavis.edu/rts/p298/pilotwavetheory.pdf>)

The fact that reality “can be grasped by thought and is yet different from thought” is an ontological measure which identifies and confirms that the physical universe is reciprocal and must have a mind of its own. The point is that the creative processes of the universe are not different than those of the human mind, but different from the human mind. The Aristotelians have missed that one. Think about it, for a while, and you will realize that it is stupid for man to pretend that the universe is purely phenomenal, because it is the universe which created man, not man who creates the universe. This ontological stupidity has lived long enough, and it has to be stopped, because it is now putting the human species in danger of total extinction.

The ugly truth of the matter is that the great majority of physicists have adopted that view primarily because their financial future would be in jeopardy if they dared go against the rule of public opinion. It is primarily this lack of courage to tell the truth that is the cause of the degeneracy in science today, because scientists have accepted to become corrupted by the oligarchical principle of going along to get along, which Bohm and Hiley have obliquely identified as the “pragmatic spirit of the age.” It is in that ontological context that a proper understanding of the Pilot-Wave Theory of Louis de Broglie becomes essential.

2. DAVID BOHM AND LOUIS DE BROGLIE ON THE LEAST ACTION PILOT-WAVE THEORY

In April 1985, Robert Moon published a very special report to celebrate the 90th birthday of Louis de Broglie in which he stressed how the “spirit within the scientist” always takes a poetic form describing God's creation and that this was the way that de Broglie had described his own discovery of wave dynamics by stating that “A great light suddenly appeared in my mind.” Here is Moon's poetic description of de Broglie's discovery:

“Ideas are buried within the individual's spirit and burst forth when the individual's freedom is not suppressed by worldly materialism and dogmatism. Ideas do not come from conscious mentation or reading, since ideas are part of the individual's spiritual makeup and must be searched for from within in order to be discovered. Ideas may flow contrary to the prevailing stream of human thought. The individual will most likely have to navigate upstream and avoid aimless drift, in order to find fertile soil in which to plant an idea for the benefit of mankind.”

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“Such a navigator was de Broglie. Kind and gentle to all, but firm with his concepts, he "attempted to develop the most promising alternative to the orthodox version of quantum mechanics." He started with a model that involved a pilot-wave or guiding wave vibrating within a particle, much like a radar on an airplane sees the entire topology ahead, and this in turn guides the plane by means of actions by the pilot. This pilot-wave calls for a double solution to the equations of quantum mechanics.” (Robert J. Moon, [The Gifts of Louis de Broglie to Science](#), *International Journal of Fusion Energy*, Vol. 3, No. 2, April 1985, p. 63.)

And, I might add that ideas come from the principles of the universe as a whole and they are meant to return to them in a modified fashion by way of human reciprocity. What de Broglie had discovered was that the guiding wave within the electron might not know precisely where it was going to end up, but it knew what pathway to take in order to get there, simply because it was guided by the universe as a whole to use the most efficient pathway possible. That is the crucial point to focus on, and that is the point I began to develop two years ago in my report on [Louis de Broglie: the Wave and Particle Paradox](#). I did not know at the time that Moon had written this article for IJFE, and that David Bohm and Basil Hiley had also used the same least action principle that Louis de Broglie had used for their theory of the electron during the 1980's.

The point these four nuclear physicists made is that there is an economy of pathways in nature, which is entirely based on the ability of the universe to avoid all extraneous work and dead ends that would be in the way of reaching its goals by the shortest possible space-time means. In other words, things don't exist in isolation from one another; they are the result of a process of creation as a whole that has generated them, and it is in this generating “process of wholeness” that you can find the intention for their existence. Unless a student begins by investigating that fundamental causal principle that Nicholas of Cusa had identified as the isoperimetric principle, and which Pierre de Fermat later developed as the fundamental least action principle of nature, he will never become a true scientist. This is how de Broglie put it in the introduction of his doctoral dissertation of 1924:

“Guided by the idea of a general relationship between the notions of frequency and of energy, we acknowledge in the present study the existence of a periodical phenomenon related to a piece of energy whose nature remains to be clarified as to its proper mass, and in accordance with the Plank-Einstein equation. The Theory of Relativity has taught us to associate with any uniform motion of a material point the propagation of a certain wave whose phase travels in space faster than light. (Ch. I.) In order to generalize that result in the case of a non-uniform motion, we are made to admit proportionality between the impulsion of the Universe vector of a material point with the characteristic vector of an associated wave propagation whose time component is established by its frequency. The principle of Fermat applied to the wave, therefore, becomes identical with the principle of least action applied to a moving body. The rays of the wave are identical to the possible trajectories of the moving body.” (Louis de Broglie, *Recherches sur la Théorie des Quanta*, Annales de la fondation Louis de Broglie, Vol. 17-N0. 1, 2007, p. 3.) <http://tel.archives-ouvertes.fr/docs/00/04/70/78/PDF/tel-00006807.pdf>

This least action principle between time frequency and special action is at the heart of the intention of the universe and at the center of the wave-particle paradox, because this is the way that nature

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knows how to use the omnipresent Cusa principle of isoperimetric action that is required to produce the greatest amount of work by the least possible amount of time and action. This maximum-minimum principle of action is best represented in nature by the generalized form of least action pathway of the circle, the sphere, the torus, and the catenary-tractrix principle, because they all have built inside of them a well-ordered time-reversal clock. These different geometries represent the least inadequate forms of least action processes whose trajectories are the most efficient for increasing the power of the universe.

These are the geometric least action pathways that de Broglie called the cyclical “harmonies of phase” between the wave and the particle, where the wave inside of the particle guides the path of the particle as radar guides the pilot from the inside of an airplane. This process of radar phase change is also very similar to a voice register shift in which pre-established Lydian intervals guide the voice into a phase change to a higher register in accordance with the well-tempered bel canto musical system of J. S. Bach.

That efficient phase change also corresponds to the irony of metaphor as Lyn developed the concept from classical artistic composition, as can be experimented in the sudden flash of light that goes on in the mind of someone who makes a discovery of principle. Moon showed that the tactical approach of De Broglie was to stress the importance of such an *action* as opposed to *energy*, and the key problem was to find a way to attach the idea of periodicity to the concept of corpuscle, and eventually replace the notion of *energy* by the notion of *action*. This was the “hidden variable” that triggered the crisis of the 1927 Solvay Conference, and this is what Moon revisited in his IJFE article.

The most exciting aspect of Moon’s paper relates to this pilot-wave theory of de Broglie. This was a true creative concept that de Broglie conceived as early as his Doctoral Dissertation of 1924, and that he further developed in a paper called *Non-Linear Wave Mechanics: a Causal Interpretation*. David Bohm later recognized this as the way to unblock the dead end state of Quantum Theory during the early 1980’s. In his hypothesis, de Broglie assumed that there existed a physically real particle and a physically real wave outside of our sense perception. The beauty of the pilot-wave metaphor lay in the fact that de Broglie described the process as that of a wave process which actually guided the particle from the inside of it, like a periodical process that would reflect the harmonic ordering relationship between the wave and the particle within the universe as a whole. That is where de Broglie located the harmony between microcosm and microcosm.

For both de Broglie and Bohm, the idea of the “pilot-wave” was the metaphor of a relationship between a particle and the background of the universe as a whole, which acted on it and guided its directionality. This was completely contrary to Bohr’s “unanalyzable wholeness.” De Broglie’s idea is that the universe must be “understood as a unique and in principle well defined reality.” Thus, the paradox of the wave-particle is solved when a non-linear singularity gets resolved within the background wave function of a well ordered universe. This is how Bohm explained it: “This requirement of a smooth connection of the two members of the “double solution” [wave and particle] was, of course, what explained the guidance condition. It is significant to note here that his model provides at least a conceptual connection between quantum mechanics and Einstein's attempt at a unified field theory, in which the particle was also treated as a nonlinear singularity that merges with a linear background field (modern soliton theory is also closely related in concept to this approach).” (Bohm and Hiley, Op. Cit., p. 1003)

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In order to make more tangible the “double solution” aspect of the problem, Bohm illustrated the process by considering an interference experiment in which an electron beam of a definite momentum is projected through a double slit system. Bohm’s double slit experiment is aimed at illustrating the wave-particle duality. It consists essentially of a projection of photons which have to travel through a barrier in which there are two slits. By putting a detector screen on the other side of the barrier, the traces of the particles will show up as dots on the screen while the waves will show up as interference patterns. The system accounts for both the traces of particles and waves as simultaneous bunching of trajectories. This is how Bohm and Hiley described the entire process of their thought experiment:

“One of the most important ways in which this interpretation gives new insight is that it enables us to express quantum mechanics and classical mechanics in terms of the same language, so that we can see their similarities and their differences more clearly than is possible in the usual approach, in which they are treated in terms of very different modes of description. The first main difference can be seen by noting that the quantum potential, Q , is not altered when the wave function is multiplied by a constant, so that it does not fall to zero at long distances, where the wave intensity becomes negligible. However, the classical notion of analyzability of a system into independent parts depends critically on the assumption that whenever the parts are sufficiently far removed from each other, they do not significantly interact. This means that the quantum theory implies a new kind of wholeness, in which the behavior of a particle may depend significantly on distant features of the overall environment. This dependence produces consequences similar to those implied by Bohr’s notion of unanalyzable wholeness, but different in that the universe can be understood as a unique and in principle well defined reality. To illustrate in more detail what is meant here, we consider an interference experiment, in which a beam of electrons of definite momentum is sent through a two slit system. In Fig. 1, we show the results of a computation of the quantum potential); and in Fig. 2, we show the trajectories resulting from the potential.

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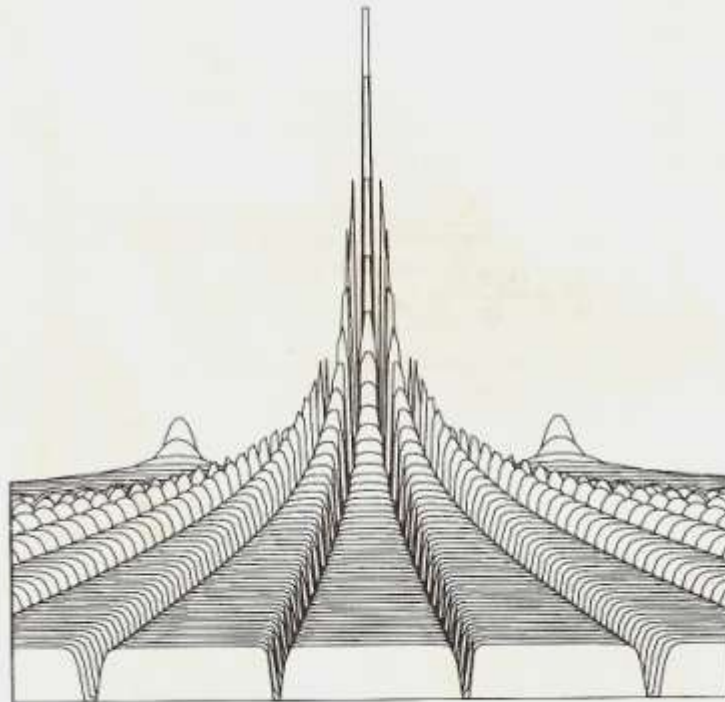
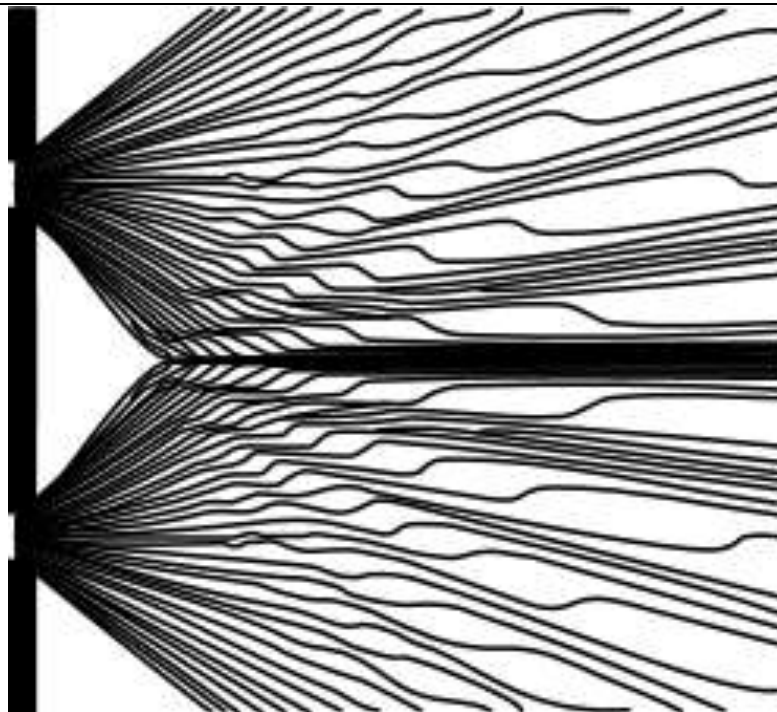


Fig. 1. Quantum potential for a pair of Gaussian slits. The slits can be seen in the background. The fringes are formed in the foreground, the dark bands coinciding with the valleys of the quantum potential.



“Fig. 2 The particle trajectories emanating from the Gaussian slits on the left hand side of the figure. The fringes on the right result from the bunching of the trajectories.”

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*“What is especially significant in Fig. 1 is that the quantum potential remains large at long distances from the slits, taking the form of a set of valleys and high ridges, which later gradually flattens out into broad plateaux. In Fig. 2, one sees how the trajectories are ultimately bunched into these plateaux by the overall effect of the potential, and that this brings about the interference pattern. (So that, for example, if one of the slits had been closed, the quantum potential would have been a smooth parabolic function, which would produce no pattern of fringes). The fact that the quantum potential does not in general fall off with the distance is thus what explains interference and diffraction patterns, and this is clearly also what implies the kind of wholeness of particle and environment to which we have referred above.” (David Bohm and Basil Hiley, [The de Broglie Pilot-Wave Theory and the Further Development of New Insights Arising Out of It](#), *Foundations of Physics*, Vol. 12, No. 10, 1982, p.1006-7.)*

First of all, let me warn the reader against a common mistake that most physicists make on this experimental matter. This two-slit experiment is not a “sense perception experiment” and it was never designed to provide a choice between “seeing” a wave or “seeing” a particle. So, anyone who makes this a “yes or no” question, by pretending it were a “thought experiment,” would be ontologically stupid, because the intention would be wrong and the exercise a fallacy of composition. On the contrary, this is a thought experiment seeking the truth of causality. It has the unique character of pertaining to the pedagogical category of Plato’s Cave.

In other words, the epistemological nature of this thought experiment is analogous to the unity of mind-in-body-paradox whereby the mind is like a prisoner condemned to be chained inside of a dark cave, and unless that prisoner has the courage to break his chains and look at the light of truth that lies outside of the Cave, he will only have access to the real universe through the illusions of shadows projected on the wall of that cave. In a nutshell, that is the Aristotelian problem. The point that Plato made was that reality is not revealed to sense perception, but to the mind, which apprehends some ordering principle that exists beyond the distorting shadows. The fact that the mind requires to go through shadows in order to reach the truth of principle in the universe may appear to be a defect in the dynamic relationship between mind and body, but this is not the case. This is the natural well-ordered state of the human mind which defines true knowledge as a battle-field-of-courage where the human mind is forced to choose between the conditions of *innerdirectedness* or *otherdirectedness*, self-reliance or public opinion. And when the universe takes the path of self-reliance, the wave is always ahead of the particle. In the opposite case, the wave stays back. The universe does it by necessity, but the human being does by choice of free will. This is the battle that de Broglie and Bohm won in their fight for the truth, because they refused to go along to get along.

It is interesting to note, here, that the difference between an Aristotelian and a Platonist resides in that choice of free will. That is the way *innerdirectedness* and *otherdirectedness* has to be understood. For the Aristotelian, *innerdirectedness* is the selfish individual who is introverted, while *otherdirectedness* is understood as the altruistic individual who is extraverted. For a Platonist, the *inner-directed* individual is the person who only resorts to his own powers for discovering the truth, while the *other-directed* individual is the person who relies on the opinion of another for the truth.

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Thus, in this thought experiment, the shadows of Plato's Cave take the shape of ridges and valleys which become gradually flattened-out in the distance, but without losing the strength of their potential in the field-of-battle located between the slits and the wall of the cave. What you are looking at is not reality, but the process of how to get to reality. What you are seeing is the battle-field-of-shadows which points to the reality behind your perceptions. Therefore, you have to interpret what the shadows mean by demonstrating the efficient relationship between wave and particle whose effects are both present in a distorted form, but where, in the real universe, one is ahead of the other. That is what the intention of this thought experiment is all about, and that is the intention factor in the universe. Contrary to most other illustrations of this double-slit experiment, the wholeness of the wave and the particle remains constantly differentiating and interacting throughout the entire process, thus expressing the conceptual guidance connection for a "double solution." As De Broglie wrote in 1954, twenty years after he had made his original discovery:

"Such was the idea which had germinated in my mind and whose curious subtlety still perplexes me to this day. I had given it the name of "double solution theory" and that was the idea which best translated what I truly had in mind. However, for the purpose of clarity of exposition, I had sometimes given it a simplified form, less profound to my mind, which I had identified as the "pilot-wave theory," in which, the particle, assumed as being given a priori, was considered as being guided by the continuous Ψ wave. Discouraged by the unfavorable reception made to my ideas by most of theoretical physicists who had been seduced by the formal elegance and apparent rigor of the purely probabilistic interpretation, I held on to this interpretation and I have accepted it as correct for more than twenty years." (Louis de Broglie, *Une tentative d'interprétation causale et non linéaire de la Mécanique Ondulatoire. (La théorie de la double solution)*, Gauthier-Villars, Éditeur, Paris, 1956, p. VI. PB translation.)

As in the case of a radar instrument located inside of the cockpit of an airplane, the pilot has to respond actively, that is, performatively to the meaningful information that he receives from the waves scanning the entirety of the relevant region of least action physical-space-time surrounding him. This is the point that Bohm made when he said: "The airplane thus responds actively to the form of the waves, and this form is not altered as the intensity falls off with the distance. A similar response to the form of the quantum potential is seen to be the characteristic of the behavior of the electron," (Bohm and Hiley, *Op. Cit.*, p. 1008)

From a causal perspective of quantum theory, Bohm was on the right track when he began to look at this thought experiment as having this Platonic component of quantum potential in the relationship between mind and matter and by inferring that the electron should be viewed as a carrier of "active information," ahead of itself, on the battle-field of the fight between wave and particle, and that the activity of this information is the same as the fight for the improvement of the human mind. However, Bohm slipped into a wrong track when he began to identify that such a relationship pertained to a Cartesian form of duality between mind and matter. Because of this Cartesian fallacy, which he adopted during the 1990's, Bohm's research became totally misleading and ultimately led to the unfortunate reductionist view of the "it from bit" concoction of digital physicist, John Archibald Wheeler. (See David Bohm, [*A new theory of the relationship of mind and matter, reprinted from Philosophical Psychology*](#), Vol. 3, No. 2, 1990, pp. 271-286)

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Be that as it may, the better side of Bohm's conception related to a "*hidden variable*" theory, which should be understood explicitly as an "*intention of mind variable*" theory, which means that the scientist is in no way dependent on sense perceptions, but rather on universal physical principles that constantly relate the human mind to the universe. Even Bohm's choice of computer illustration is not sense perception-dependent. The choice he made was mind-dependent, because what must be understood is a well defined reality in its totality. Therefore, the question was not which one do you want to perceive, matter or mind, ying or yang, zero or one, yes or no, particle or wave, because by choosing to observe the particle rather than the wave, or *visè versa*, you will fall into the sense perception trap of Heisenberg, and you will enter into a menticide pact with the devil if you do that. The point to understand is that a particle without a wave is not a real particle, and the key to the pilot-wave intention is to lead you to the next step in the progress of the universe.

From the vantage point of epistemology, you don't have to make that bad choice of one or the other, because the universe is not out there to trick your eyes. "Now you see it. Now you don't." No! The point is that the mind is capable of "seeing" them both, and must rigorously account for both simply because that "double solution" corresponds to a crucial step toward understanding the universe as a whole. However, this thought experiment becomes a mere Aristotelian trap for anyone who doesn't see that he is actually dealing with Plato's Cave. Therefore, it is worth repeating that this double-slit thought experiment should never be treated as a mere sense perception experiment, but rather, as a true metaphor in the sense that Lyn attributed to the "double solution" of the metaphorical process of irony.

3. THE LEIBNIZ INVERSION OF TANGENTS FROM THE PAST TO THE FUTURE

"All matter originates and exists only by virtue of a force which brings the particles of an atom to vibration which holds the atom together. We must assume behind this force is the existence of a conscious and intelligent mind. This mind is the matrix of all matter."

Max Planck

Most people think it is easy to go from the past to the future, because they are made to believe that they only have to let themselves slide into it as time goes by. That's nonsense because that is pure existentialism. That is another false assumption of sense perception. And, not only is this a wrong assumption, but it is a grave error of judgment about the real ontological nature of time. The passage from the past to the future is not clock-time; it is a moment of change, an actual jump which is one of the most difficult mental inversions to understand and to accomplish, because it is an axiomatic leap of faith into a region of ambiguity which your mind must, from then forward, become totally dependent on, because

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such an inversion is the most important change in your life. This is why it is more important to understand how to get to the future than to know what that future will be.

This is the reason why Gauss said about his fundamental theorem of quadratic reciprocity that it was much more difficult to discover a modulus from a given number, than it was to derive a number from a given modulus. The reason this reciprocal function is so difficult is because the mind must be hanging like a catenary curve from the unsecure unknown upper reaches of the indefinite future as opposed to the secured acquired knowledge of the definite past. And, that future oriented unknown state of ontological existence must always reach out to the limit of a boundary condition to which the human mind is capable of; as if it were the only next step it had to take in the pre-ordained curvature of a process of ***completing an intended universal cycle of action***. It was Leibniz who invented such a method of inversion of tangents as the measure of change in the catenary curve, and that is also the process that one must go through to increase energy-flux-density in the universe. The process is actually very simple, but much more difficult than its reciprocal. For example, take the Euclidean proposition: “Given a circle, find the tangent” and compare it with the Leibniz proposition: “Given the property of the tangent, find the curve.”

Indeed, given a circle, it is very easy to find a tangent and, therefore, determine the direction of the curve at that point; however, given only the property of a tangent, it is much more difficult to find the curve. This inversion works somewhat like the creation of oxygenation of our atmosphere as the new curvature to be generated on Earth in order for life to exist; that is to say, oxygenation is a necessary component for the existence of life, however, life must already exist in order to create it!

Similarly, an economy is oriented toward the future and never toward the past. This is how the credit system of the United States had been established under Alexander Hamilton. The key is to find the characteristic intention of the module that will provide for such a paradoxical closure and ***complete the intended cycle of a future action***. Once it is accepted that you must start from that future intention of final causality, then, the module for any number can be forecasted and found, because the process always starts from that future intention as if the action were already completed as the memory of what is yet to come. This is how Lyn explained the American idea of credit in his last Weekly Report:

“Now, leave money out! Consider the truth, first, and then define money to fit the truth, rather than the truth to fit the money. And that’s what is essential here. Money has no intrinsic value. None. Even among animal species. Animal species dies out, why? Because they don’t evolve to a physical higher state! Or the system of animals, and so forth, do not evolve. So, it’s not just the individual species, it’s the system of animals as they evolve and develop in evolution.

“Now, let’s look at mankind in the same way. Now instead of talking about money, let’s talk *only* about credit. Just keep money out of this for the time being. Because we’re going to come and define money, as something which is a product of the system of credit, not credit as a system of the money, and that’s the fundamental issue here, if you want to get a solution. So, money is worthless, it’s intrinsically worthless! Mankind assigns a value of money; it does not have an intrinsic value in it.” ([LPAC TV Weekly Report with Lyndon LaRouche, Wednesday, December 10, 2012.](#))

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To illustrate this process of credit as *Memory of the Future* by inversion of tangents, go back to my example of a *biquadratic-memory-modular-wave-function*, and relate to the inversion precisely as a memory of what is not there and does not yet exist. Given the process of the Peace of Westphalia principle, for example, find the mental module for the biquadratic universal peace of tomorrow. (Figure 3.)

This *biquadratic memory-modular-wave-function* is not a sense perception object. It is meant to demonstrate that the idea of empty space does not exist and can only be constructed as a cyclical matter of mind; that is to say, determined by quadratic chirality from the future. In this regard, it was Gauss who first discovered this process by successfully challenging the Euclidean-Kantian a priori sense perception notion of empty space in his paper on biquadratics.

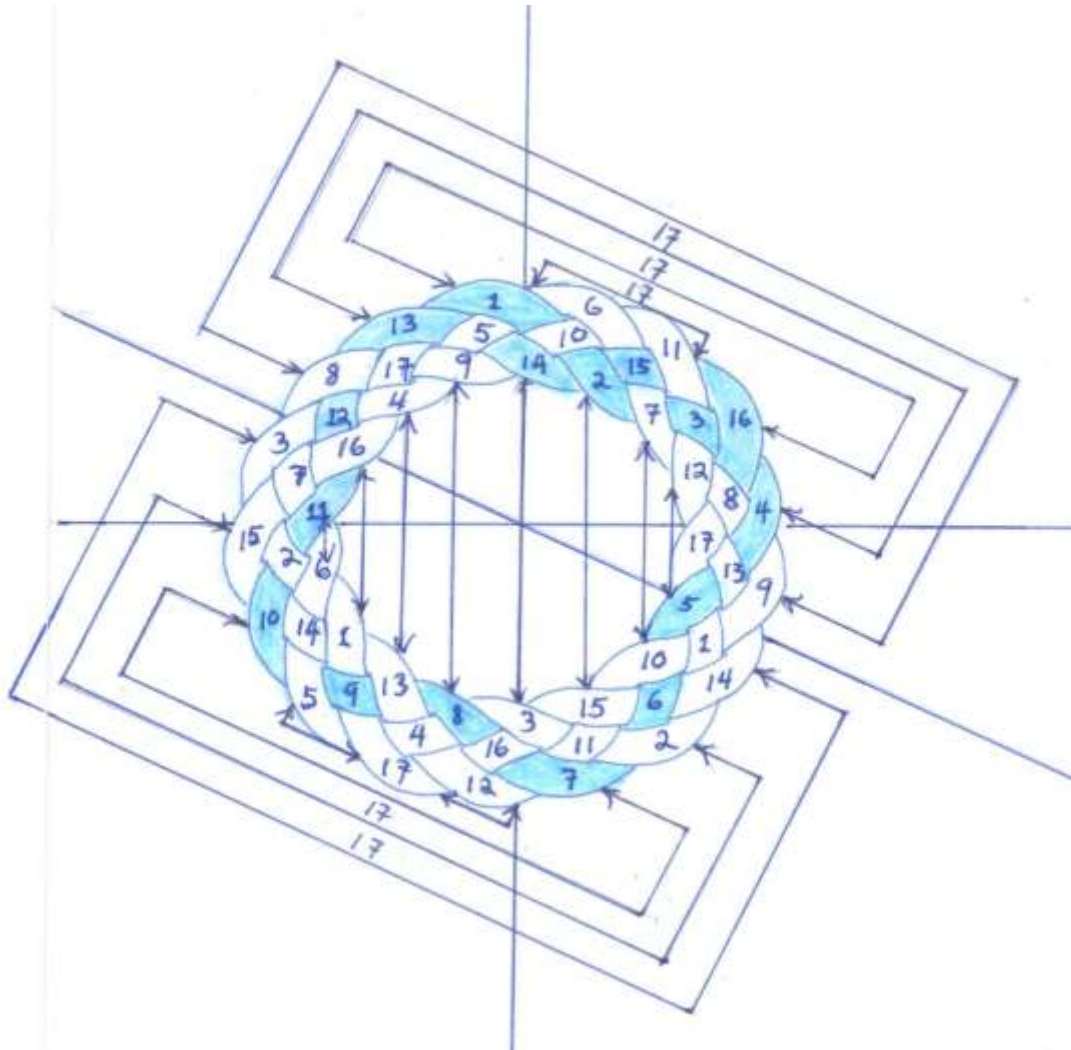


Figure 3. Module for a *biquadratic-memory-wave-function* depicting a Gaussian manifold of biquadratic chirality. The reciprocity distribution of biquadratic residue 4 (mod 17) is moving clockwise, from left to right. Note that the four biquadratic residues (mod 17) are 1, 4, 16, and 13, which are in a P/T

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ratio of $h(h-1)/2 = 32$. The counterclockwise chiral motion, from right to left, is the primitive root of 3 (mod 17) which has a phase interval of 5 steps between each remainder. The whole system is generated from the power of a pilot-wave corresponding to the Leibniz-Fohi characteristic of *I Ching (The Book of Change)*.

Gauss provoked his reader by asking: "Why does space have quadratic chirality?" That is to say, why does space always have to have a minimum of four-point directionality based on four cardinal points in a plane that work like a triple set of dissymmetrical mirror chirality between 1) up and down, 2) right and left, 3) and forward and backward, thus, creating the conceptual space-time modality for dissymmetrical reciprocity. This is how Gauss identified this crucial matter of mind:

"To form a concrete picture of these relationships it is necessary to construct a spatial representation, and the simplest case is, where no reason exists for ordering the symbols for the objects in any other way than in a quadratic array, to divide an unbounded plane into squares by two systems of parallel lines, and choose as symbols the intersection points of the lines. Every such point A has four neighbors, and if the relation of A to one of the neighboring points is denoted by +1, then the point corresponding to -1 is automatically determined, while we are free to choose either one of the remaining two neighboring points, *to the left* or *to the right*, as defining the relation to be denoted by +i. This distinction between right and left is, once one has arbitrarily chosen forwards and backwards in the plane, and upward and downward in relation to the two sides of the plane, *in and of itself* completely determined, even though we are able to communicate our concept of this distinction to other persons *only* by referring to actually existing material objects.*

[* Kant already had made both of these remarks, but we cannot understand how this sharp-witted philosopher could have seen in the first remark a proof of his opinion, that space is only a form of our external perception, when in fact the second remark proves the opposite, namely that space must have a real meaning outside of our mode of perception.] (Carl Gauss, *Collected works*, Volume VIII, Chapter XV. Unfortunately, Bruce Director did not give precise references. <http://www.wlym.com/antidummies/part39.html>)

Here, the Gauss footnote is more important than the construction he gives about the chirality in the plane, because it implies a leap between three separate Euclidean planes of chirality and the reality of space outside of sense perception. The point is not only that Kant missed the reference to physical or mental processes outside of perception, but that the solution to the problem of biquadratic residues cannot be found in the Euclidean plane, and not even in the concept of a rotating cube of triple-chirality for that matter, because it calls for a performative reciprocity principle underlying the process of space-time. This means that it is necessary to locate an axiomatic jump between mind and sense perception, as exemplified by the underlying construction of **Figure 3**, and to discover that the pathway of a doubly-connected-Riemannian-manifold of change is the underlying address of biquadratic space-time. Furthermore, in a letter to C. L. Gerling on Feb. 8, 1846, Gauss was even more precise on the fundamental chiral quality of quadratic space, when he reiterated:

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"The difference between right and left is not capable of definition, but only of demonstration, as is similarly the case with sweet and bitter. But all simile limps. The latter values have a reality only for the taste buds, but the former for all minds for which the material world is apprehensible. But, two such minds cannot directly come to an understanding about right and left, except as one and the same individual material thing builds a bridge between them. I say directly that A can communicate with Z, when A builds, or is able to build, a material bridge between A and B, another between B and C, etc. What worth this matter has for metaphysics, I articulated succinctly in the (announcement of the second treatise on bi-quadratic residues), and in it I've found a conclusive refutation of Kant's illusion, that space is MERELY the form of our external perception." (<http://wlym.com/archive/pedagogicals/geodesy.html>)

Thus, man is able to control what he cannot perceive, because he is able to know what least-action- pathway the universe is going to take next in the same way that the electron knows through its pilot-wave how to get where it is intended to go without being conscious of it. This implies that if chirality is to make any sense, you have to have a physical relationship outside of sense perception which relates to the mind.

So, finally my question is: what is the intention behind such a quadratic dissymmetrical reciprocity of universal space? If the intention is to create a new humanity with this built-in sense of reciprocity, then, count me in. If the intention is to create a new galactic ideal of mankind which does not yet exist, but which will require a new way of communicating in peace with the galactic plasma universe, and take command of its directionality, then, count me in. If this intention that is communicated to mankind by this *biquadratic-memory-modular-wave-function* of the universe implies that man must always have his sails turned into the incoming wind of the future, and must always fight upstream against public opinion, even without knowing where he is going to end up, then, count me in just the same, because, even though I may not know where we are going to end up, I can show you how to get there. Therefore, if this anticipation of an unknown directionality of the universe is going to be part of the isoperimetric least-action anxiety that is guided by the intention of a de Broglie Pilot-Wave; then, definitely count me in, because there is nothing better to worry about than the future, and with de Broglie's Pilot-Wave, you just can't get lost.

FIN
