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AN INSIGHT INTO ORIGIN OF THE CONCEPT OF TIME SYMMETRY

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ABSTRACT:
The time symmetry can be perceived by an easy analogy, if time were symmetrical a video perfectly of actual events would view realistic whether played backwards or forwards. An evident objection to this aim is gravity things fall down. Its acceptance is the major point of casual mechanics departure. Time asymmetry of Noether's theorem force and its quantum mechanical analog involves energy conservation violation in normal understanding which can be ignored regarding tthat time posses energy. Time asymmetry is often taken as quantum and classical electrodynamics by man made way by ignoring the advanced solutions as non physical. This study discusses about the time origin of the concept of time symmetry

Index Terms:Time Assymetry, 3 dimensional geometry, space time, probability amplitude

THREE DIMENSIONAL GEOMETRY CARRIES INFORMATION ABOUT TIME

To "quantize general relativity" seemed an attractive enterprise in the 1940s and the 1950s. why did the enterprise seem more difficult the further it was pursued? For no reason so much as this, that it suffered from a false reading of the familiar demand for "covariance": It conceived of the dyamic object as 4-D spacetime. However, spacetime does not wiggle. It is 3-D space geometry that undergoes the agitation. The history of its wiggling registers itself in frozen form as 4-D spacetime. What then is Einstein's classical theory of gravity all about? It is about

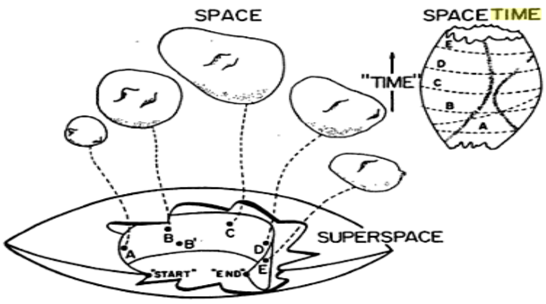


Figure 1.1: Space, spacetime and superspace, Upper left: Five sample configuration A, B, C, D, E attained by space in the course of its expansion and recontraction. Below: Superspace and these five sample configuration each represented by a point in superspace located on one and the same leaf of history that curves through superspace. Upper right: Spacetime, the classical physics history of space geometry conceived as undergoing a deterministic evolution in time, A, B, C, D, E. Let the representative point move from one location in superspace to another. Then the 3 geometry alters as if alive a cinema of the deterministic classical dynamics of space. of these classical concepts which still continue to make sense in quantum theory?Space yes superspace, yes space time, no the dynamics of 3-geometry, or geometrodynamics – the Einsteinian analog of Maxwellian electrodynamics.

Meyer [1] has mentioned that since those early days we have learned that the dynamics of 3-geometry, ${}^{(3)}G$, both classical and quantum, unrolls in superspace, S. Superspace is that infinite-dimensional manifold, each point of which represents one ${}^{(3)}G$. two nearby points in superspace represet two 3-geometries that differ only little in shape. “Time”: time as spelled with a “t”? Search about as we may in sup[erspace, nowhere can we catch any sight of it. Of 3-geometries, yes; of time, no. Out of these 3-geometries, however can we reconstruct time? In classical theory, yes; in quantum theory, no. Classical theory, plus initial conditions, confronted with the overpowering totality of $^{(3)}$G’s that constitute superspace, picks out that single bent-leaf of superspace which constitutes the relevant classical history of 3-geometry evolving with time. Otherwise put,

- Classical geometrodyamics in principle constitutes a device, an algorithm, a rule for calculating and constructing a leaf of history that slices through superspace.
- The $^{(3)}$G’s that lie on his leaf of history are YES 3-geometries [YES with respect to the prescribed initial conditions!]; the vastly more numerous $^{(3)}$G’s that do not are NO 3-geometries.
- The YES $^{(3)}$G’s are the building blocks of the $^{(4)}$G that is [the relevant] classical spacetime [for this problem, with its specified initial conditions.
- The interweavings and interconnections of these building bloacks give the [relevant spacetime; that is, the appropriate] $^{(4)}$G its existence, its dimensionality and its structure.
- In this structure every $^{(3)}$G has a rigidly fixed location of its own.
- In this sense one can say that the ‘many-fingered time’ [carried by] each 3-geometry is specified by the very interlocking construction itself. . .[in brief ‘3-geometry carries information about time [2].

The work done by Zurek and Thorne [3], published a year ago, entitled Complexity, Entropy and the Physics of Information contains further discussion of this point and these ideas. The encounter of Heisenberg and Bohr that led to the principle of indeterminism and then to the principle of complementarity excited Bohr’s old and much admired professor at the University of Copenhagen, Harald Hoffding. Professor Hoffding invited Bohr and Heisenberg around in the evening to explain to him what this bruhaha on indeterminism and complementarity was all about. Regarding the double slit experiment (fig 1.6) he asked, “Where can the electron be said to be in its travel from the point of entry to the point of detection?” Bohr’s reply deserves t be quoted: “To be? To be? What does it mean ‘to be’?”.

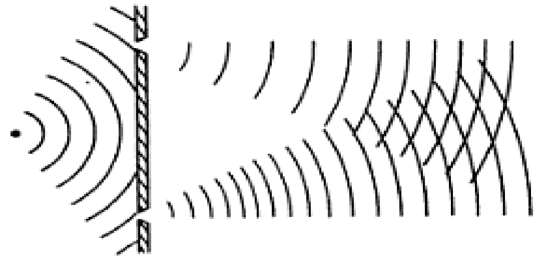


Figure 1.2: Double Slit Experiment, Not shown in the detector at the right that registers electron arrival

When we turn from electron to photon we recognize that the photon has no existence in the atom before it is emitted. It has no existence in the detector before the detector goes off. But any talk about what the photon is doing between the point of production and the point of reception is, as we know, simply mere talk. To put it in a more dramatic form, the photon is a great smoky dragon. (fig 1.7). The point of entry of the photon is indicated by the tail. And the point of reception is indicated by the mouth of the great smoky dragon biting the one counter or the other, but in between all is cloud. Put it yet another way. We used to think that the world exists “out there” independent of us, we the observer safely hidden behind a one-foot thick slab of plate glass (fig 1.8) not getting involved, only observing [4].

However, Kragh [5] concluded in the meantime that isn’t the way the world works. In face we have to smash the glass, reach in, and install a measuring device. But to install that equipment in that place prevents the insertion in the same place at the same time of equipment that would measure the momentum. We are inescapably involved in coming to a conclusion about what we think is already there. Surely we will never understand ho come time until we understand how come the quantum. Whence the necessity for quantum mechanical observership? Does not the necessity for observership reveal itself in this central feature of nature, that we have no right to say that the electron is at such-and-such a place until we have installed equipment, or done the equivalent, to locate it. What we thought was there is not there until we ask a question. No question? No answer!

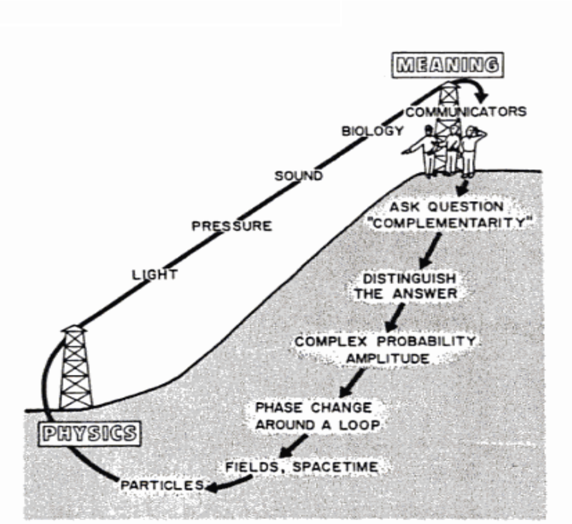


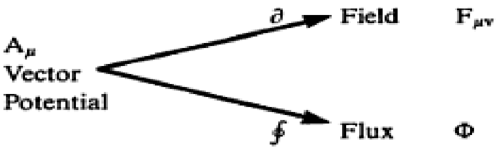
Figure 1.3: World viewed as a self synthesizing system of existences. Physics gives light and sound and pressure tools to query and to communicate. Physics also gives chemistry and biology and through them observer participators. They by way of devices they employ the questions they ask and the registration that they communicate put into action quantim mechanical probability amplitude and thus develop all they do kown or ever an know about the world

In a double slit electron interference experiment of the type proposed by Krueger [6], the interference fringes experience a phase shift proportional – so it is customary to say – to the flux of magnetic field through the domain bounded by the two electrons path. We reverse the language when we turn to the “It From Bit” interpretation of nature. We speak of the magnetic field, and by extension space-time and all other fields, and the whole world of particles built upon these fields, as having no function, no significance, no existence, except insofar as they affect wave phase, affect a 2-slit interference pattern, or more concretely, affect the counting rate of elementary quantum phenomena. Fields and particles give physics and close the loop. Out of meaning, Wootters has pointed out; we come to an understanding of the machinery of complementarily, so central to the machinery of quantum theory.

That is to say on the one hand we have the asking of a question but with it we have the distinguishing of an answer. The statistician and geneticist, R.A. Fisher, already in the 1920s before the advent of modern quantum theory, taught us that the concept of probability amplitude is more fundamental than probability itself in distinguishing between one population and another. Thus the relevant quantity in a kind of Hilbert space of different populations (fig 1.10) is not the probability of blue eyes, grey eyes and brown eyes, but the square root of that probability [7].

The angle between the probability amplitude for those two populations in that real Hilbert space measures the distinguish ability of those two populations. One finds himself forced to probability amplitude by the very concept of distinguish ability. What about the other side of the story of the quantum, the idea of complementarily? Stickelberg long ago, and Saxon more recently, and Wooters in more detail have explained how complementarily demands more than real probability amplitudes: complex probability amplitudes. Out of complex probability amplitudes we found the concept of phase change around a loop, and on that foundation the concept of fields and space-time from there to what we call particles, and from there back to physics. So we don’t’s have a tower of turtles to deal with but a logic loop, a meaning loop (fig 1.9) [8].

Berry [9] has mentioned that phase change around a loop in electricity and magnetism as calculated by differentiation from the vector potential leads to the familiar local Maxwell field: But going the other way, integration of the vector potential around a loop, we can come to flux and hence the equally familiar Faraday line of force. “The Faraday line of force supplies a happy analog for the Ashtekar loop. Both lines and loops put at the centre of attention, not the local field but the integral of the relevant potential around a loop. In electromagnetism this idea has become familiar:



Moreover the magnetic flux ϕ expresses itself in direct physical terms as well by one or other familiar measuring techniques as by it from bit definition Aharanov and Bohm (see fig 1.6 supplemented by embraced magnetic flux). “Ashtekar invented the analogous loop-integral method to deal with geometry:

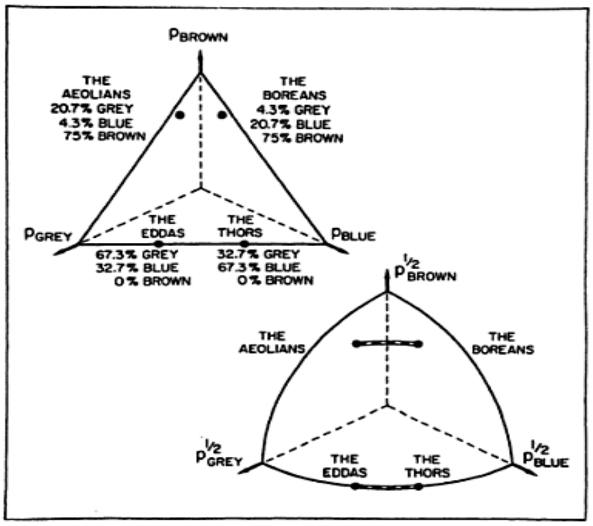
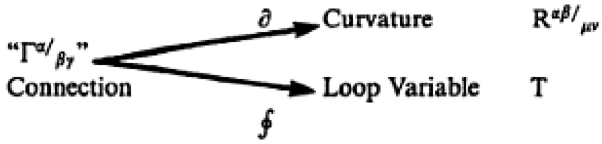


Figure 1.4: From probabilities to probability amplitude as tool for determining distinguishability Triangle above:probabilities of gray, blue and brown eyes for tribes plotted in 3 dimensional probability space. Quarter sphere below Hilbert space: same infromation with axes now meaning probability amplitudes. The angle between two points in this Hilbert space measures the distinguishability of two population



Here the connection, differentiated gives curvature whereas integrated around a loop it gives a two index loop variable T. This connection, however as signified by the quotes, is not the one familiar in texts of relativity and it is not normally a real-valued quantity. To give a little impression of its character it may be enough to note that electromagnetism admits a similar complex “connection” built by combining magnetic potential A with the imaginary unit times the electric field E [10].

If the writings of Oliver Heaviside and his followers could make complex-valued quantities familiar to every engineer dealing with electrical machinery, the work nowadays being published on the loop representation, and since carried out by at least four groups, any well provide similar enlightment to all concerned with the dynamics of geometry. We can measure the magnetic flux through the region between the two branches of the electron beam by measuring the shift it causes in the pattern of interference fringes and via a like fringe shift determine a certain surface integral of space-time curvature. In the case of geometry, through the loop presentation introduced by Ashtekar and other colleagues, we can proceed likewise in analyzing geometry. Instead of going from the connection by differentiation to the local curvature we deal instead with an integral, a loop integral which however, has some connection with the idea of a knot and a knot class. All this is background for dealing with the issue of time. In all the history of physics there is no more solidly founded approach to the origin of concept of time than what general relativity (GMD) gives us [11].

According to Freedman and Clauser [12] GMD tells us not to impose our familiar concept of spacetime, for example, as a God-given necessity, but to start with the concepts of a space that starts small, gets bigger and shrinks, and these 3-geometries as 3-dimensional space slices through that spacetime. Then we can use the location of a 3-geometry itself in the enveloping 4-geomtery as an indicator of what time is, or where it is: This is the BSW concept that 3-geometry in itself carries information not only about space geometry but also about time. If we think of the different 3-geometries we get by slicing this particular spacetime in different ways, we think of those different geometries including lumps, bumps and wiggles as indicators in a great map with one point for each, then we can give that great map the fancy names of superspace. Each point in super space gives us one conceivable stage in the dynamic development of 3-geometry. A leaf of superspace gives us a collection of 3-geomteries that may or may not represent a classical history of space geometry undergoing its deterministic dynamic evolution. But nowhere in this picture is there any time directly to be seen. There is only 3-geometry. Yet this is what classical physic in its highest incarnation tells us is at bottom the nature of time. In place of the deterministic leaf of history cutting through super space quantum theory gives us a thickened leaf, a collection of 3-geometries more vast than we can fit into any one spacetime. Pagels, Heinz [13] has mentioned that in consequence, at the smallest distances, no matter how symbolically we want to portray conditions, we have fluctuations in the geometry which are so great at the Planck scale that the very concepts of before and after lose their significance, their meaning, their application.

CONCLUSION

To conclude, time, in this sense, is not the be-all and end-all of the scheme of physics. To put it more quantitatively, we have fluctuations (1) in the position of a harmonic oscillator given by a simple Gaussian wave function, (2) in a collection of harmonic oscillators given by a product of Gaussians (3) for the electromagnetic field or better for the magnetic field in the ground state a functional, built like the product of Gaussians, which tells us that the smaller the scale of distances we consider, the more markedly fluctuations show up and (4) in the case of geometry, the fluctuations at the Planck level of distances, as estimated by similar reasoning, tell us that the very concepts of before and after simply have no meaning or application at the Planck scale.

I. REFERENCES

1. Meyer A (1922), The philosophy of occupational therapy, Archives of Occupational Therapy, 1, 1-10.
2. Bohr, N. and L. Rosenfeld (1950) Field and charge measurements in quantum electrodynamics, Phys. Rev. 78, 794
3. Zurek, W. H., and Thorne K S (1985) "Statistical Mechanical Origin of the Entropy of a Rotating, Charged Black Hole," Phys. Rev. Lett., 20, 2171-2175.
4. Holland, P (1993), The Quantum Theory of Motion, Cambridge, Cambridge. University Press.
5. Kragh H (2002), *Quantum Generations: A History of Physics in the Twentieth Century*. Princeton University Press. pp. 5–6.
6. Krueger, L. E. (1984). The category effect in visual search depends onphysical rather than conceptual differences. Perception & Psychophysics, 35, 558-564.
7. Fry, E. S., & Thompson R. C. (1976) Experimental Test of Local Hidden-Variable Theories. Physical Review Letters, 37, 465-468.
8. Dowker, H.F., & J.J. Halliwell (1992) Quantum Mechanics of History: The Decoherence Functional in Quantum Mechanics. Physical Review D, 46, 1580-1609.

9. Berry M V (1984), Riemann’s Zeta Function: A Model for Quantum Theory, Tyndall Avenue, Britol BS8, UK.
10. Misra, B., Prigogine, I. and Courbage, M. (1979) ‘From Deterministic Dynamics to Probabilistic Descriptions’, Physica A 98A, 1-26.
11. Piron C (1976), Foundations of Quantum Physics, W. A. Benjamin, SAGE, London.
12. Freedman, S. J. & Clauser, J. F. (1972). Experimental test of local hidden variable theories. Physical Review Letters, 28, 938-941.
13. Pagels, Heinz R (1982), The Cosmic Code: Quantum Physics as the Language of Nature. New York: Bantam Books