Abstract

Renewed interest in the quantum zigzagging causality model is highlighted by an ingenious proposal by Suarez to test the timelike aspect of nonseparability. Taking advantage of a work by Fröhner I argue that $\Psi$, the Dirac representation of a state, has the Bayesian-like connotation of best estimate given the Hilbert frame chosen. As a measurement perturbs uncontrollably a system it is (Hoekzema’s wording) a retroparation. My bet is that Suarez’ sources and sinks of paired particles operating inside the coherence length of the laser beam will evidence retrocausation.

Keywords: zigzagging causality, measurement as retroparation, $\Psi$ as best estimate given the Hilbert frame chosen, “veiled reality”.
1. Whenever chance occurrences show up as spacetime events, correlated probabilities imply (via Bayes reversible formula) reciprocally telegraphed information. Relativistic covariance is then exigible.

Fourier analysis steps in; Fröhner [1], in an interesting paper, argues that it is inherent in the probability formalism.

For the chance events handled by statistical mechanics the phase cell is crucial, and its magnitude has physical meaning. De Broglie, updating a deep remark of Hamilton and others (Klein,1890; Vessiot,1906), likened action to phase via Planck’s constant. Heisenberg, Fourier-associating position and momentum, quantified the phase cell. Finally Born showed that probability is a keystone in the transition from geometric to wave mechanics. Fröhner’s guided tour of the story uses Hamilton’s equations in place of the Hamilton-Jacobi extremum law.

Quantum mechanics is thus viewed as being jointly the physical statistical mechanics and the physical telegraphic network. The Bayesian reversal of joint probabilities entails action-reaction reciprocity for spacelike separated events and cause-effect reversibility for timelike separated ones. Retrocausation is thus legalized.

Information pertaining to veiled reality is telegraphed via de Broglie waves. The $\Psi$, Dirac’s representation of a state, has the Bayesian connotation of estimate of the state given the Hilbert reference frame chosen -the one fitting the preparing or retroparing [2] device parading as a macroscopic “object”.

So Dirac’s bra or ket expresses a telegraphable information (transition amplitudes including the propagator [3]). The much commented upon “sum-and-product rule of amplitudes” stems from a limitation in the telegraph. Fröhner, and before him Barut [4], assuming hiddenness of a prepared EPRB spin zero state, derive classically the correlation formula. How is this possible? Fröhner answers: “Quantum mechanics looks like an error propagating formalism for uncertainty afflicted systems obeying the classical equations of motion”.

Experimentation invalidates one EPR [5] or Bell [6] assumption: A quantum measurement or observation unveil’s not a preexisting magnitude but, perturbing the system, contributes in its realization. Wheeler’s [7] “delayed choice experiments” stress this; for instance, “measuring an electron spin” implies first aligning it arbitrarily, second retroparing it as $\pm \frac{1}{2} h$. All this was part of the twenties refrain, and should not have been forgotten.

2. A measurement thus is a reversed preparation -a retroparation [2]. Such is the basis of the zigzagging causality model of EPR correlations [8]. As the correlated measured magnitudes do not preexist in the prepared state, retrocausation is implied by definition. The EPR phenomenology pinpoints the faulty EPR assumption: not identifying measurement as retroparation.

The concise derivation [3] of the EPRB formula thus allowed is valid for both space or time distant occurrences. Sutherland [8] (a member of the zigzagging causality club) temporarily resigned in 1985, frightened as he was by the radicality of retrocausation in the timelike case; now Tapster et al [10] have evidenced it.

3. This author deems fundamentally deficient any analysis of “quantum philos-
ophy” that is not explicitly Lorentz-and-CPT invariant; he suspects it to conceal important phenomena. So he bets that Suarez \[11\] very ingenious proposed test of timelike non-separability will vindicate the zigzagging causality model; he feels that the sources and sinks of photons operating inside the coherence length of the laser beam will exhibit timelike nonseparability.

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