Re: a question on incompatibility of properties in a one particle system

Source: http://sci.tech−archive.net/Archive/sci.physics.relativity/2004−10/4865.html

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Date: 10/21/04

Date: Thu, 21 Oct 2004 21:16:28 +0200

"Bilge" <dubious@radioactivex.lebesque−al.net> a écrit dans le message de news:slrncnf85d.8l.dubious@radioactivex.lebesque−al.net...

Chaverondier
> >a mixed state is also used to model the state of a part S1
> > of an EPR correlated system S = S1 U S2. This so called
> > mixed state is characterized by a reduced density operator
> > (a weighted sum of rank 1 projectors instead of a rank 1
> > projector characterizing a pure state). This reduced density
> >operator provides the statistics of quantum measurements
> > on subsystem S1 of system S when the state of S2 is not
> > accounted for.

Bilge
> I have no idea what S1 U S2 is supposed to mean.

Chaverondier
A system S comprising a subsystem S1 and a subsystem S2

Bilge
> Physics has a standard language. If you expect to be
> understood, use it. If it's too much effort to write, it's too
> much effort for me to try and decipher.

Chaverondier
When some problem of translation or notation arise,
I try to correct it or provide a definition if it is needed
(when somebody points out the problem).

Bilge
> The reduced density matrix applies to systems in
> which one or more components is _not_ detected.

Chaverondier
Nevertheless, it has a precise physical meaning and can be calculated

on any subsystem of a given quantum system by the partial trace operation (applied to the density operator of the whole system).

Chaverondier
> >The reduced density operator modeling S1 alone together with
> >the reduced density operator modeling S2 alone provide an
> >incomplete knowledge of S = S1 U S2 quantum state. The state
> >of this quantum whole is more completely modeled by a pure
> >state of system S (or a density operator modeling the mixed state
> >of system S if system S is not isolated hence not in a pure state).

Bilge
> A spin singlet is a pure state.

Chaverondier
Yes.

Bilge
It's not decomposable.

Chaverondier
What do you mean by decomposable ? I precisely point out that the reduced density matrix of each part S1 and S2 of a system S comprising subsystems S1 and S2 (S be a singlet or not, that's not my point) doesn't encompass all the information modeled by the pure state of the whole system S as soon as S1 and S2 are EPR correlated.

Bilge
> Stop posting a lot of meaningless babble.
> If you have a point, write out a real equation.

Chaverondier
Before writing any equation, it is necessary to agree on what we are writing equation about.

Bilge
>>> An epr pair is only an epr pair because the pair is described
>>> as a single state which is completely unpolarized, so that the
>>> total spin projection along any axis is S_z = 0. By contrast,
>>> if the photons were independent, i.e., a statistical mixture,

Chaverondier
>>Photons can be independant and in a pure
>>state (ie in a known polarization state).

Bilge
> No, they cannot.

Chaverondier
Yes they can.

Bilge
> But, don't take my word for it. Let me provide you with some
> statements taken verbatim from, ``Density Matrix Theory and
> Applications'', Blum, Karl:

> ``It is not possible to characterize a mixture by a single
> state vector.''

Chaverondier
Agreed. That's precisely one of the points I am stressing.

Bilge
> ``In general, {\it a beam of photons is said to be in a mixed state
> if it is not possible to describe the beam in terms of a single
> state vector}.''

Chaverondier
No objection up to here.

Bilge
> ``The system is a coherent superposition of basis states, \phi_n,
> if its density matrix is not diagonal in the \phi_n representation.
> If, in addition, the system is in a pure state, it is said to be
> completely coherent.''

Chaverondier
Still no objection here.

Bilge
> ``If \rho is diagonal, the system is said to be an incoherent
> superposition of the basis states states (provided there is
> more than one non−vanishing element.''

Chaverondier
And I still completely agree with that last statement.

Bilge
>>> [system state] should be replaced by a mixed state
>>> in which there is more information

Chaverondier
> >This happens only AFTER one of the photons of the EPR
> >correlated pair has interacted with its polarizer, not before.

Bilge
> The detection occurs on a spacelike interval. That means the detection
> can be made simultaneous. There is _no_ absolute time ordering.

Chaverondier
I was not adressing the question of time ordering of spacelike
events here (this question depends on the interpretation of

quantum indeterminacy). You can make only one photon of
the pair interact. The entanglement between the EPR correlated
photons pair and one polarizer occurs as soon as one polarizer
interacts with one photon of the pair (the interaction of a second
photon with its polarizer is not needed for the entanglement of
the EPR pair with one polarizer to take place).

Chaverondier
>>A theory is deterministic when the
>>evolution it predicts is deterministic.

Bilge
> A theory is determimistic if it is completely
> specified by the initial conditions, i.e., it's classical.

Chaverondier
Though deterministic (quantum evolution of an isolated quantum
system is completely specified by the initial value of its state vector
and its Hamiltonian), the unitary evolution of isolated quantum
systems is generally not considered as a classical process.

Bilge
> Deterministic systems are also generally chaotic.

Chaverondier
Yes. And it's probably extremely difficult to extract some specific
deterministic feature out of a chaotically deterministic dynamic
(here is the conspiracy you were evocating in a previous post).

Chaverondier
> >No known facts (only hypotheses which are still
> >awaiting for an experimental proof) are up to justify that
> >the unitary, reversible and deterministic propagation of
> >the Von Neumann chain may be broken at some moment.

Bilge
> I have no idea what you are trying to say.

Chaverondier
Quantum dynamics of isolated systems is deterministic.
Presently, as far as I know, no known physics observation
have provided any proof that an isolated quantum system
might, under certain circumstances, exhibit an indeterminist
or irreversible behavior.

Quantum irreversibility and indeterminacy show up only
when the observed system interacts with an other system
in an incompletely specified quantum state (or too
complex to handle other than classically).

Bernard Chaverondier
http://perso.wanadoo.fr/lebigbang/transformation.htm
Derivation of Lorentz transforms and inertial system
of coordinates in the framework of Aristotle space−time.
http://perso.wanadoo.fr/lebigbang/epr.htm
Quantum determinism or Relativist locality ?