Re: Are all QM interactions measurements?

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From: Anthony Cerrato (*tcerrato_at_optonline.net*)
Date: 10/20/04

Date: Wed, 20 Oct 2004 06:11:21 GMT

"Old Man" <nomail@nomail.net> wrote in message
news:sIadnRXwWLRzQencRVn−hQ@prairiewave.com...
>
> "Anthony Cerrato" <tcerrato@optonline.net> wrote in
message
> news:Fx2dd.10439$YM4.3872902@news4.srv.hcvlny.cv.net...
> >
> > "Old Man" <nomail@nomail.net> wrote in message
> > news:Ju2dnZwPAvEGFencRVn−rw@prairiewave.com...
> > >
> > > "Anthony Cerrato" <tcerrato@optonline.net> wrote in
> > message
> > >
news:klycd.28020$Fe6.12707137@news4.srv.hcvlny.cv.net...
> > > >
> > > > "Edward Green" <spamspamspam3@netzero.com> wrote in
> > message
> > > >
news:eca320d0.0410161930.6052958e@posting.google.com...
> > > > > "Simon Hopkins"
<simon@hopkins9666.fsbusiness.co.uk>
> > wrote
> > > > in message
news:<ckr3uidsh1@newsg3.svr.pol.co.uk>...
> > > > >
> > > > > > I've recently read about a version of the
> > double−slit
> > > > experiment which uses
> > > > > > lenses and mirrors
> > > > > >
> > > >
> >
(http://www.sciencefriday.com/images/shows/2004/073004/Afsha
> > > > rExperimentSmall
> > > > > > .jpg). I am a QM novice so my thinking may be
wrong
> > but

> > > > *I would have thought*
> > > > > > *that when a photon meets a lens it collapses. A*
new
> > > > *photon is then created*
> > > > > > *with a new wavefunction. Surely this means that*
> > *Shahriar*
> > > > *Afshar is not*
> > > > > > *measuring wave−particle qualities of a single*
photon
> > *but*
> > > > *wave like qualities*
> > > > > > *of one photon and particle like qualities of*
> > *another. Or*
> > > > *am I deluding*
> > > > > > *myself?*
> > > > >
> > > > > *I'm not only a perpetual novice, I'm an habitual*
> > > > *deflationist: I fail*
> > > > > *to see what is so wonderful about the results of*
this
> > > > *experiment.*
> > > > > *Light is already "acting like a particle and a*
wave at
> > *the*
> > > > *same time"*
> > > > > *in any experiment involving wave interference and*
> > *photon*
> > > > *detectors:*
> > > > > *nothing new has been added.*
> > > >
> > > > *The major point of the Afshar experiment is that he*
> > *claims*
> > > > *it disproves the principle of complementarity,*
> > *formulated by*
> > > > *Niels Bohr, which has been one of the cornerstones*
of
> > > > *Quantum Mechanics from the earliest days. The*
principle
> > > > *states that, either the particle−nature or the*
> > *wave−nature*
> > > > *of a fermion or boson (e.g., photon) may be*
determined
> > *in*
> > > > *experiments, but not both at the same time. Afshar*
> > *claims*
> > > > *his experiment can detect both of these natures,*
> > *throwing*
> > > > *the Copenhagen Interpretation of QM into dispute.*
> > *Whether or*
> > > > *not his experiment is valid, is the question yet to*
be

> > > > answered. ...tonyC
> > >
> > > There's nothing new under the Sun. Created as a
> > particle,
> > > the photon suffers self−interference as a wave, and is
> > finally
> > > absorbed and detected as a particle.
> > >
> > > It's all metaphysical smoke and mirrors; verbal
> > slights−of−
> > > hand; falsification of unlivable straw men.
Quantitative
> > > prediction is all that counts. As Feynman said,
shut−up
> > and
> > > calculate !
> > >
> > > [Old Man]
> >
> > Are you saying that Afshar's claim that the principle of
> > complementarity, which has been a cornerstone of Quantum
> > Mechanics from the earliest days, is wrong? If you are,
come
> > right out and say it−−and justify it with physics, not
> > semantics.
> >
> > I've been hearing that "shut−up and calculate!" crap for
> > decades, and that's why there's been absolutely no real
> > progress on _understanding_ QM on any fundamental level
> > since Bohr et al. devised the Copenhagen Interpretation.
> > There are only 2 possibilities, Afshar's statement is
right
> > or it is wrong. If you don't know, say so, and let
others
> > get on the pot to figure it out. If you do know, please
> > explain a little more clearly. What exactly is the straw
man
> > here? Regards, ...tonyC
>
> Old Man wonders where Cerrato got the audacious notion
> that wave and particle represent mutually exclusive
modes.
> Certainly not from Bohr. Possibly from Afshar ?
>
> [Old Man]

Where did I say that? Not me! I certainly did not imply that
"wave and particle represent mutually exclusive modes"
unless you draw that conclusion from the nature of Afshar's
experiments.
Your mind is playing tricks, methinks. I was talking about

the Complementarity Principle, which primarily discusses detection of a particle's properties with respect to the nature of the detection technique, or do you have some special definition of that, other than Bohr's.

I endorse the following; do you not agree?

I quote from <http://en.wikipedia.org/wiki/Complementarity> :

"In Physics, 'complementarity' is a basic principle of quantum theory, and refers to effects such as the wave−particle duality, in which different measurements made on a system reveal it to have either particle−like or wave−like properties. Niels Bohr is usually associated with this concept; in the orthodox form, it is stated that a quantum mechanical system consisting of a boson or fermion can either behave as a particle or as wave, but never simultaneously as both. A less orthodox interpretation is the "duality condition," described by the inequality due to Englert (see Phys. Rev. Lett., Vol. 77, 2154 (1996)), which allows wave and particle attributes to co−exist, but postulates that a stronger manifestation of the particle nature leads to a weaker manifestation of the wave nature and vice versa.

The emergence of complementarity in a system occurs when one considers the circumstances under which one attempts to measure its properties; as Bohr noted, the principle of complementarity 'implies the impossibility of any sharp separation between the behaviour of atomic objects and the interaction with the measuring instruments which serve to define the conditions under which the phenomena appear.' "

Regards, ...tonyC