

Op-Ed: Do quantum or classical physics rule? MIT wants to find out

Posted Feb 22, 2014 by [Paul Wallis](#)

The dichotomy between classical Newtonian physics and quantum physics has created more than a few tense debates. Which are the dominant/presiding physical laws? MIT has proposed an experiment to settle this vexed question.

The trouble is that quantum physics and classical physics are poles apart in so many ways. Quantum behaviour is quite different. It also seems to contradict classical physics in many ways. What holds good in classical physics can be quite irrelevant in quantum physics.

[Science Daily](#) explains the basis of the MIT proposal:

In a paper published this week in the journal Physical Review Letters, MIT researchers propose an experiment that may close the last major loophole of Bell's inequality -- a 50-year-old theorem that, if violated by experiments, would mean that our universe is based not on the textbook laws of classical physics, but on the less-tangible probabilities of quantum mechanics.

Such a quantum view would allow for seemingly counterintuitive phenomena such as entanglement, in which the measurement of one particle instantly affects another, even if those entangled particles are at opposite ends of the universe. Among other things, entanglement -- a quantum feature Albert Einstein skeptically referred to as "spooky action at a distance" -- seems to suggest that entangled particles can affect each other instantly, faster than the speed of light.

As a matter of fact, "instantly" implies something else. A few other questions, in fact:

If particles are entangled so that two entangled particles are both simultaneously, or near simultaneously, affected, what is the force which produces the reaction?

How are reactions transmitted so quickly? Under normal physical laws, there should be a lag time between incident and response.



[Tim Sandle](#)

Fractal, particle physics

Faster than the speed of light? If correct, classical physics loses its most cherished benchmark.

Does this sort of instant reaction not relate directly to “dark matter/energy”? This is the elusive *cause celebre*/conceptual toenail polish for dinosaurs quest which has distracted classical physics for decades. Dark matter/energy is also elusive, strangely reactive, etc.

Is it likely that all the mass in the universe wouldn't include quite a lot of quantum matter?

There's no quantum energy in the universe? Unlikely, wouldn't you say?

OK, so much for the obvious. The proposed MIT test could prove right or wrong the exceptionally convoluted, perhaps exceptionally pointless, logic of various arguments on this subject.

These arguments include:

The Bell Theorem: Physicist John Bell proposed the theory of locality:

Bell devised a mathematical formula for locality, and presented scenarios that violated this formula, instead following predictions of quantum mechanics. Since then, physicists have tested Bell's theorem by measuring the properties of entangled quantum particles in the laboratory. Essentially all of these experiments have shown that such particles are correlated more strongly than would be expected under the laws of classical physics -- findings that support quantum mechanics.

This is a yes/no proposition. Correlations are measurable, so relationships should produce consistencies.

“Hidden variables” theory: That some classical reactions mimic quantum mechanics, and are therefore not bona fide quantum results.

Er... yeah. That means “Something we don't know about is causing something we don't understand, but that doesn't make us wrong.” It just makes us slow-witted, bone lazy, and obviously not trying too hard to explain the results.

The “Free will” theory:

...proposes that a particle detector's settings may "conspire" with events in the shared causal past of the detectors themselves to determine which properties of the particle to measure -- a scenario that, however far-fetched, implies that a physicist running the experiment does not have complete free will in choosing each detector's setting.

Some people would point out that mysticism, as a form of physics, leaves rather a lot to be desired. For example, “shared past of the detectors” would mean a lot of different variables. If that were the

case, you'd expect considerable variations in results, because detectors could not possibly have common "causal pasts". Every result would be different, and that's just not good enough, even if it's right. Why the difference, to start with?

For a science which traditionally places such high value on its own omniscience to be wallowing in pure speculation tells a tale, too. How can you have an inexplicable range of phenomena, to start with?

MIT has in fact proposed an apparently very necessary, fact-finding mission. To hell with theory. Facts beat theory, any day of the week. Bell raised a point 50 years ago outlining processes which effectively contradict classical physics in multiple ways, and it's taken this long to address it?

Here's an incidence of conceptual entanglement of scientists' relationships with science- Either you're real scientists, looking for facts, or you're not.

Now measure your own reactions. Also note the medium through which you react. It's relevant.