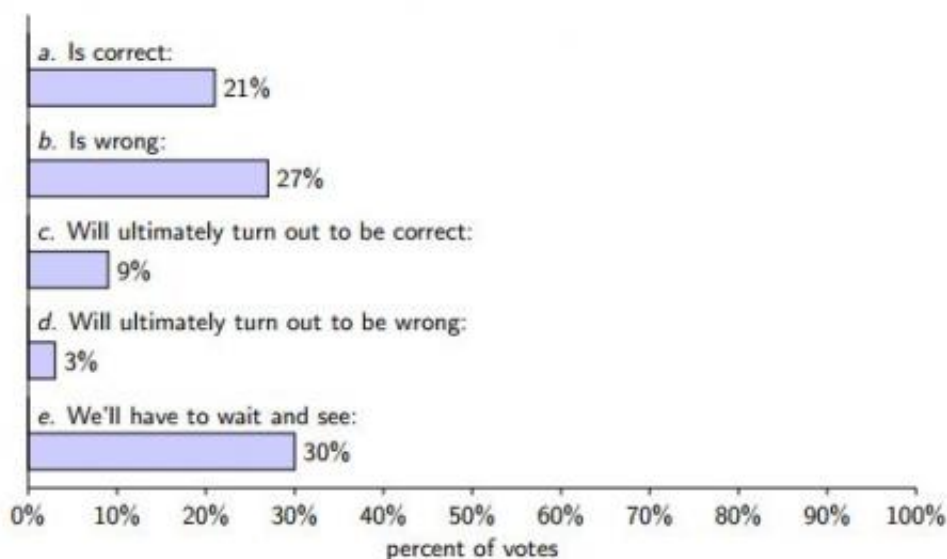


Survey shows physicists can't agree on fundamental questions about quantum mechanics

January 23 2013, by Bob Yirka

Question 4: Bohr's view of quantum mechanics



Credit: arXiv:1301.1069 [quant-ph]

(Phys.org)—A trio of physicists has uploaded a paper to the preprint server *arXiv* describing the results of a survey passed out to attendees at a physics conference held in 2011: *Quantum Physics and the Nature of Reality*. The purpose of the survey was to find out how much agreement or disagreement there is in the physics community regarding the most fundamental ideas of quantum mechanics – surprisingly, the results

showed that there is still very little consensus among physicists regarding some of its most basic principles.

Quantum mechanics at its heart is the study of the [building blocks of the universe](#) – what they are and how they work together to form reality as we are able to interpret it. Its ideas were first developed almost a century ago with such notables as [Albert Einstein](#) and [Niels Bohr](#) developing theories and debating ideas such as whether particles exist at certain places at certain times, or whether they move around constantly with a probability of being someplace at a given moment. The second idea famously led Bohr to conclude that if that were the case than the universe is indeterminate and at its base probabilistic. Refusing to believe such a possibility could be true, Einstein responded with perhaps his most famous quote that "God does not play dice with the universe." Now, nearly a century later, modern [physicists](#) are still just as divided. In the survey, just 42 percent of respondents agreed with Bohrs' assertions – the rest were divided among several other theories. Also likely surprising to those outside the physics community, a full 64 percent of those who bothered to respond to the survey said they believe Einstein's view of the universe "is wrong."

Another idea that appears to still vex the modern physicist is whether quantum objects have the same physical properties as they do when measured. Just over half thought so. Also there is the ongoing argument about the probability of a true quantum computer coming to pass, and if it ever does, when that might happen. The largest number, 42 percent said they believe it will happen 10 to 25 years from now, 30 percent said it would come after that, while just 9 percent said they thought it might happen before then.

Based on the results of the survey, it appears Richard Feynman was right when he once responded to a reporter's question about how well [quantum mechanics](#) is understood by saying that "anyone who claims to

understand quantum theory is either lying or crazy."

More information: A Snapshot of Foundational Attitudes Toward Quantum Mechanics, arXiv:1301.1069 [quant-ph]
arxiv.org/abs/1301.1069

Abstract

Foundational investigations in quantum mechanics, both experimental and theoretical, gave birth to the field of quantum information science. Nevertheless, the foundations of quantum mechanics themselves remain hotly debated in the scientific community, and no consensus on essential questions has been reached. Here, we present the results of a poll carried out among 33 participants of a conference on the foundations of quantum mechanics. The participants completed a questionnaire containing 16 multiple-choice questions probing opinions on quantum-foundational issues. Participants included physicists, philosophers, and mathematicians. We describe our findings, identify commonly held views, and determine strong, medium, and weak correlations between the answers. Our study provides a unique snapshot of current views in the field of quantum foundations, as well as an analysis of the relationships between these views.

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