AGPhil 9: Foundations of Quantum Mechanics 2

Zeit: Mittwoch 14:00–15:30 Raum: SR 113

AGPhil 9.1 Mi 14:00 SR 113

Experiments thought to prove non * locality may be artifacts — •Karl Otto Greulich — Beutenbergstr, 11 D 07745 Jeba

Detecting non-locality via entanglement, reflected by the instantaneous transfer of quantum properties over a large distance, requires almost ideal experimental conditions * ideal sources for entangled photon pairs and ideal detectors. Deviations from this ideal situation may critically hamper interpretations of experiments on non-locality or entanglement. Of two major known loopholes, the detector loophole is not yet unequivocally closed. Now another loophole emerges: When in such experiments downconverting crystals with lasers as primary light sources are used, exceeding threshold values in the Bell inequalities, i.e. their violation, can be caused by so far not fully recognized problems in the generation and detection of photon pairs. Taken together, nonlocality is still not yet unequivocally proven. Thus, one of the most serious experimental challenges of causality is on brittle ground.

References: K.O. Greulich , Another loophole for the Bell inequalities Proc. of SPIE Vol 7421 * 08, (2009) ; K.O. Greulich Proc. of SPIE Vol 8121-15, (2011); for downloads see, http://www.fli-leibniz.de/www_kog/ then klick *Physics*

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Methodological Testing: are Fast Quantum Computers Illusions — •Steven Meyer — Tachyon Design Automation, San Francisco, USA

Popularity of the idea for computers constructed from the principles of QM started with Feynman's 'Lectures On Computation', but he called the idea crazy and dependent on statistical mechanics. In 1987, Feynman published a paper in 'Quantum Implications - Essays in Honor of David Bohm' on negative probabilities which he said gave him cultural shock. The problem with imagined fast quantum computers (QC) is that speed requires both statistical behavior and truth of the mathematical formalism. The Swedish Royal Academy 2012 Nobel Prize in physics press release touted the discovery of methods to control "individual quantum systems", to "measure and control very fragile quantum states" which enables "first steps towards building a new type of super fast computer based on quantum physics." A number of examples where widely accepted mathematical descriptions have turned out to be problematic are examined: Problems with the use of Oracles in P=NP computational complexity, Paul Finsler's proof of the continuum hypothesis, and Turing's Enigma code breaking versus William tutte's Colossus. I view QC research as faith in computational oracles with wished for properties. Arther Fine's interpretation in 'The Shaky Game' of Einstein's skepticism toward QM is discussed. If Einstein's reality as space-time curvature is correct, then space-time computers will be the next type of super fast computer.

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The Concept of Motion in Modern Physics — •Michael Vogt — HfBK Dresden, Kunstbezogene Wissenschaften, Güntzstr. 34, 01307 Dresden

Since ancient Greece physics can be understand as the science of moving things, change of beings, or motion in general. The way, how a theory has access to its specific subject, determines the concept of reality. The physical concept of motion, therefore determines physical reality.

For the identification of the characteristic difference between classical physics and quantum physics it is necessary to establish a term of motion with extended comprehension. Analysing the Physics of Aristotle under this point of view provides us with an appropriate concept of motion. It will be shown that within the modern physics, there is initially a reduction of all types of motions to continuous locomotion. However, by introducing discontinuity in the change of state within quantum mechanics we no longer can believe, that there is continuity in all kinds of changes or motions. Therefore, the reduction to continuous locomotion is no longer possible in the quantum world.

Utilizing the Aristotelian concept of coming-to-be and perishing it is possible to develop a specific new concept of motion, which is suitable for quantum physics. Thus, the relation between classical and quantum physics can be elucidated in a novel way.