Terekhovich Vladislav,
Ph.D. (Candidate of Science in Philosophy),

E-mail: v.terekhovich@gmail.com

Explanatory Potential of Mathematics in Quantum Physics

One of the amazing properties of the equations of motion is that real systems follow them with unexplained persistence. This is the part of an overall problem of "unreasonable effectiveness of mathematics" to describe the observable reality. In classical physics, most of the equations of motion correspond to one of the physical theories, which offer models and interpretations connecting these equations with reality. In quantum physics, they use the notions of possible, alternative, virtual, or imaginary trajectories and histories that are not related to physical reality. My report is devoted to the explanatory potential of these notions in some interpretations of quantum mechanics and Feynman path integral formalism.

On the one hand, it is widely accepted that possible trajectories and histories are merely formal mathematical tools used for calculation. On the other hand, physicists often unwittingly borrow these notions from mathematics and metaphysics without a proper criticism. Modern authors take very different attitudes to the reality of the possible trajectories and histories in the mathematical formalisms of quantum physics. Recently, there has been a growing interest in a realistic interpretation of the Feynman paths and alternative quantum histories in addressing the problem of quantum reality. There are several interesting attempts to combine possible histories in quantum physics and metaphysics. However, scholars have not yet adequately addressed two central questions: Are the possible histories real? What is common and different between the possible histories in mathematics, classical physics, quantum physics, and metaphysics?