# Review of: "The Conservation Laws in Quantum Mechanics"

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Potential competing interests: No potential competing interests to declare.

Bohr renounced the use of physics to describe reality because quantum mechanics introduces a probabilistic barrier between theory and the tangible world. Rather than speculate on the ontological status of the wave function, i.e. the reality of potentiality, he dropped any claim that our concepts apply to nature itself. Einstein insisted, despite the fundamental challenge posed by quantum mechanics, on retaining a realist standpoint, namely a one-to-one correspondence between concepts and reality. Without a discussion of this issue, the author's observations have little relevance. As an example of a book that gives due consideration to the quantum challenge, The Transactional Interpretation of Quantum Mechanics (originally subtitled The Reality of Possibility), might be of use to the author, especially given its focus on the emission and absorption of energy.

I'd like to see a citation on the claim that the Schrödinger equation is believed to prove time-reversal symmetry. As far I know, the equation simply assumes it but only in the context of wave evolution. Once the quantum system is measured, the irreversible outcome removes us from the domain of time-reversible potentiality. The divide between wave-mechanical and classical can't just be brushed aside in favor of a "single reality… embodied in the molecule."

"Although we treat the [Feynman] paths as if they are *possible* trajectories, they are not like anything we have ever experienced for they are unrestricted by the conservation laws. They may form loops, extend to infinity, go backward in time, or exceed the speed of light." It goes without saying that possible trajectories are not like anything we've ever experienced, since all sensory experience consists of actualities. This takes us right to the heart of the quantum challenge, namely the fact that we can't explain the world directly but must contend with a probabilistic "twilight zone." Also, given the randomness of wave function collapse, how can the author assume that nature always selects, of all possible paths, the one involving the least amount of action?

"By demonstrating continuity in the microscopic world view we establish consistency with the well-established general relativistic macroscopic interpretation of the cosmos." GR assumes a spacetime background. In QM the action takes place in high-dimensional Hilbert space, and spacetime – along with tangible objects – seems to be a discontinuous outcome of wave collapse. Harmonizing these theories is the very difficult task of quantum gravity.