A Historical Survey of Sir Karl Popper's Contribution to Quantum Mechanics

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Abstract

Sir Karl Popper (1902-1994), though not trained as a physicist and embarrassed early in his career by a physics error pointed out by Einstein and Bohr, ultimately made substantial contributions to the interpretation of quantum mechanics. As was often the case, Popper initially formulated his position by criticizing the views of others - in this case Niels Bohr and Werner Heisenberg. Underlying Popper's criticism was his belief that, first, the Copenhagen interpretation of quantum mechanics abandoned scientific realism and second, the assertion that quantum theory was complete (an assertion rejected by Einstein among others) amounted to an unfalsifiable claim. Popper insisted that the most basic predictions of quantum mechanics should continue to be tested, with an eye towards falsification rather than mere adding of decimal places to confirmatory experiments. His persistent attacks on the Copenhagen interpretation were aimed not at the uncertainty principle itself and the formalism from which it was derived, but at the acceptance by physicists of an unclear epistemology and ontology that left critical questions unanswered.

Quanta 2012; 1: 1–12.

Full Text: PDF

DOI: http://dx.doi.org/10.12743/quanta.v1i1.4

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Popper’s propensity interpretation of quantum probability Karl Popper’s propensity interpretation of quantum mechanics is surely his most important contribution to the philosophy of physics. Popper conceived the propensity interpretation of quantum mechanics as both a milestone of his philosophical career, and a key to his philosophical system. He defended it in a large number of his writings, and over a very large period of time (for instance Popper 1957, 1982). It remains possible to apply propensities to quantum mechanics in more cunning ways. In particular propensity accounts could abandon the 3 ideal of interpreting probabilities in general. Rather than interpreting probabilities, propensities can be used to explain certain probabilities.