The Merli-Missiroli-Pozzi Two-Slit Electron Interference Experiment

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Abstract

In 2002 the readers of the scientific magazine 'Physics World' voted Young's double-slit experiment applied to the interference of single electrons to be 'the most beautiful experiment in physics'; this experiment, in truth, had already been carried out 30 years beforehand. The present article aims to re-examine the latter real experiment and put it into its proper historical perspective. Even though the experiment was not afforded the importance it perhaps deserved among philosophers, its philosophical mplications add new arguments to the already far-reaching debate triggered off by the ideal experiment. Within the context of quantum mechanics in particular, the experiment revealed for the first time the importance that ought to be attributed at the empirical level to single-case probability, that is, to the probability of a single electron's reaching the screen.
I investigate how the empirical significance of the experimental results comes within the framework of the debate over the propensity interpretation of probability in quantum mechanics. I argue that the experiment, when examined in all its technical details does in fact throw light on the evidence for the propensity, as a physical property, of micro-objects.

Keywords:	Single electron experiment; Electron interference; Propensities; Statistical stability; History of Physics
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