

Abstract Submitted
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Exploring the foundations of quantum mechanics using Monte Carlo simulations of the Freedman-Clauser experimental test of Bell's Inequality STEPHEN FOULKES, RCK Properties, Inc. — Monte Carlo simulations of the Freedman-Clauser experiment are used to test the Copenhagen interpretation and a local realistic interpretation of Quantum Mechanics. The simulated results are compared to the actual results of the experiment which confirmed the quantum mechanical calculation for nine different relative angles between the two polarization analyzers. For each simulation 5×10^7 total simulated photon pairs were generated at each relative angle. The Copenhagen interpretation model closely followed the general shape of the theoretical calculation but differed from the calculated values by 2.5% to 3.3% for angles less than or equal to $\pi/8$ and differed by 15.0% to 52.5% for angles greater than or equal to $3\pi/8$. The local realistic interpretation model did not replicate the experimental results but was generally within 1% of a classical calculation for all analyzer angles. An alternative, “fuzzy polarization” interpretation wherein the photon polarization is not assumed to have a fixed value, yielded values within 1% of the quantum mechanical calculation.

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