



**Chesapeake Section of the
American Association of Physics Teachers
Fall 2021 Virtual Meeting**

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Type: **Talk**

Interpreting Reality - Bell's Test

Saturday, October 23, 2021 10:30 AM (15 minutes)

Albert Einstein and Neils Bohr held a friendly debate for years on the nature of physical reality. Bohr, true to quantum theory (QT), swore that reality only existed after one “observed” the latter. Einstein believed the QT to be incomplete and that reality existed independent of our observation, because of some “hidden variables”, which, if discovered, could remove the probabilistic nature of QT and give reality a meaning.

This dispute climaxed in the Einstein-Podolsky-Rosen paradox that discusses the bizarre, action-at-distance correlation two distinct objects can have on one another despite their inability to communicate.

It was John Steward Bell who proved that if Einstein’s hidden variables did exist, then in real correlation experiments, the measured QT probabilities should satisfy particular inequalities. A famous precision experiment by Alain Aspect, in 1982, confirmed that quantum entanglement for twinned photon (light) pairs is irreconcilable with Albert Einstein’s world views.

In this talk I will introduce a simulated “Bell”Test and compare its results to those obtained experimentally by Alain Aspect in 1982 in order to find closure to the Einstein-Bohr debate.

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