

Abstract Submitted
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A local realistic explanation of quantum information systems that use the four Bell states. JEFFREY BOYD, Retired — Can quantum computers and other information systems (like cryptography) be explained by local realism? The consensus is NO. Thirty years of Bell test experiment proved that the Einstein, Podolsky and Rosen (EPR) picture is wrong. Unknown to most physicists a new form of realism has arisen, drastically different than EPR. The Theory of Elementary Waves (TEW) proposes that two entangled particles are both following the same elementary bi-ray. What is an elementary ray and bi-ray? In TEW waves and particles usually travel in opposite directions. In entanglement experiments the picture is more complex. A bi-ray consists of two coaxial elementary rays, traveling at the speed of light in opposite directions. In all Bell test experiments TEW and QM make the same predictions. There are other types of experiments in which their predictions differ, and experiments so far are consistent with TEW but inconsistent with QM. Such bi-rays can explain all four Bell states on the basis of local realism. The word nonlocal needs to be replaced with the term elementary bi-ray, which is a more accurate and fertile descriptor of the same phenomena. TEW provides a solid foundation for quantum informational sciences. It involves a profound change of starting assumptions.

Jeffrey Boyd
Retired

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