Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

A local realistic model of quantum information systems explaining the four Bell states JEFFREY BOYD, Retired — Can quantum computers and other information systems (like cryptography) be explained by local realism? The overwhelming consensus is NO. Thirty years of Bell test experiments proved Einstein, Podolsky and Rosen (EPR) wrong. Unknown to most physicists a new form of local 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. The same Bell test experiments that invalidate EPR, validate TEW. What is an elementary 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, moving in opposite directions. Such bi-rays can explain all four Bell states on the basis of this peculiar form of local realism. Bell theory would classify TEW as nonlocal, even though it is local and realistic. The word nonlocal needs to be discarded, since elementary bi-ray is a more accurate and fertile descriptor of the same phenomena. TEW explains entanglement swapping heralding entanglement between distant spinning electrons in NV cavities, or trapped ions. The question is: So what? Would anything in quantum information science change if TEW were true? We think not.

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Date submitted: 05 Nov 2015 Electronic form version 1.4