

Entanglement and disentanglement on particle separation

by

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In 1935 it was Schrödinger who first introduced the term entanglement and disentanglement in his discussion of the EPR paradox and the theory of quantum measurement. Today by virtue of Bell's inequalities; the Aspect experiments; and evidence for quantum "teleportation", it appears that quantum correlations due to the persistence of entanglement after particles have separated is well established. Although this talk does not question quantum non-locality, it is shown that the two main experimental results, which appear to prove quantum non-locality, can be explained without using entangled states. Using the notion of disentanglement upon particle separation, it is shown that a different correlation, local in origin, is sufficient to explain all the existing data. The consequences are that the Aspect experiments prove only that quantum mechanics is correct. These experiments do not show conclusively that Bell's inequalities are violated. In addition, it is shown that quantum "teleportation" is unlikely to occur.

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