Measurement, Luders and von Neumann Projections and Nonlocality

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Abstract

The nature of the Luders projection and its relationship with the von Neumann projection are clarified. It is shown that these two postulates apply under mutually exclusive and complementary conditions. It is then shown that Luders transformations can also be obtained by unitary transformations for single and product states, but not entangled states. Several examples are given to illustrate this. The distinction between the two projections is further clarified by analyses of the violation of Einstein locality for both single particle and entangled states. A possible experimental test of the Luders postulate is also proposed.