A local hidden-variable model violating Bell's inequalities

Matzkin, A. (2007) A local hidden-variable model violating Bell's inequalities.

Abstract

A local hidden-variable model for two spin-1/2 particles is shown to reproduce the quantum-mechanical outcomes and expectation values, and hence to violate Bell's inequality. Contrarily to the usual preset hidden-variable (HV) distributions that have been generally considered, we relax the constraint requiring that a given HV distribution should account for the simultaneous reality of quantum-mechanical counterfactual events. We assume instead that a disturbance induced by a measurement on an eigenstate -- which according to Einstein, Podolsky and Rosen hinders the existence of an element of physical reality -- results in a change of the corresponding hidden-variable distribution. We first investigate the one-particle HV-distribution and then tackle in the same way the two-particle problem in the singlet state. The averages of spin measurements along different axes are obtained from the HV distributions without appealing to nonlocal effects.

Keywords:	Nonlocality Local realism Bell inequalities
Subjects:	Specific Sciences: Physics: Quantum Mechanics
ID Code:	3303
Deposited By:	Matzkin, Alex
Deposited On:	18 April 2007