Asymptotically disjoint quantum states

Primas, Hans (2000) Asymptotically disjoint quantum states.

Full text available as:
PDF - Requires a viewer, such as Adobe Acrobat Reader or other PDF viewer.

Abstract

A clarification of the heuristic concept of decoherence requires a consistent description of the classical behavior of some quantum systems. We adopt algebraic quantum mechanics since it includes not only classical physics, but also permits a judicious concept of a classical mixture and explains the possibility of the emergence of a classical behavior of quantum systems. A nonpure quantum state can be interpreted as a classical mixture if and only if its components are disjoint. Here, two pure quantum states are called disjoint if there exists an element of the center of the algebra of observables such that its expectation values with respect to these states are different. An appropriate automorphic dynamics can transform a factor state into a classical mixture of asymptotically disjoint final states. Such asymptotically disjoint quantum states lead to regular decision problems while exactly disjoint states evoke singular problems which engineers reject as improperly posed.

Keywords:	Emergence of classical behavior. Decoherence. Individual vs. statistical descriptions. Disjoint quantum states. Regular decision problems.
Subjects:	Specific Sciences: Probability/Statistics Specific Sciences: Physics: Quantum Mechanics General Issues: Realism/Anti-realism
ID Code:	949
Deposited By:	Primas, Hans
Deposited On:	28 December 2002