

Self-Induced Selection: A New Approach to Quantum Decoherence

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Abstract

According to Zurek, decoherence is a process resulting from the interaction between a quantum system and its environment; this process singles out a preferred set of states, usually called “pointer basis”, that determines which observables will receive definite values. This means that decoherence leads to a sort of selection which precludes all except a small subset of the states in the Hilbert space of the system from behaving in a classical manner: environment-induced-superselection (einselection) is a consequence of the process of decoherence. The aim of this paper is to present a new approach to decoherence, different from the mainstream approach of Zurek and his collaborators. We will argue that this approach offers conceptual advantages over the traditional one when problems of foundations are considered; in particular, from the new perspective, decoherence in closed quantum systems becomes possible and the preferred basis acquires a well founded definition.

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