Special Issue

Quantum Darwinism, Decoherence, and the Randomness of Quantum Jump: Fundamentals and Applications

Message from the Guest Editor

Among the many symmetries present in all physical theories, one of the deepest and most fundamental is the one contained in the postulate that the time evolution of a closed quantum system is described by a unitary transformation of the initial state. Thus, the complete reversibility of, at least in principle, all the processes described by the laws of quantum mechanics is established. At the same time, there is an obvious conflict of the mentioned postulate with the observation that, for all practical purposes, each quantum measurement necessarily leads to a projection of the previous quantum state on one of the eigenvalues ⊠of the observable under consideration. From this follows the loss of all other features of this quantum state and, consequently, loss of the reversibility and time symmetry of the quantum evolution. One of the leading approaches to solving the above tension is the theory of decoherence and quantum Darwinism, explaining the emergence of classical information and irreversibility in individual subsystems while maintaining the unitarity of the evolution of the complete system...

Guest Editor

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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