Special Issue

Groups, Geometry and Topology for Quantum Computations

Message from the Guest Editor

In recent work pertaining to digital quantum computations—the quantum parallel to classical computations—algebraic concepts are being introduced as a resource. This goes from an extensive use of group theory (finite groups such as Paulis and Cliffords, free groups with relations, group covariance in generalized quantum measurements, etc.), of geometry (e.g., finite geometries for modeling quantum commutation, entanglement, and contextuality) and of topology for adapting quantum error correction to nonlocality. Further, topological order and braids are being investigated for quantum computing in 2D (in anyons) and in 3D (with 3-manifolds). We welcome papers in the aforementioned and related areas.

Guest Editor

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Message from the Editor-in-Chief

We get more and more evidence that quantum theory is the correct description of nature. It was born a century ago by explaining a few paradoxical results that could not be understood in the framework of classical physics. Today, quantum physics leads technological revolution in metrology, communication, computation, and the design of novel materials. Still it needs more solid foundations, and we need to develop a deeper understanding of how it can be used for new applications.

Quantum Reports is an online, open-access journal providing an advanced forum for clarifying foundations of quantum theory and developing its applications in all fields of physics and technology. *Quantum Reports* is inviting innovative and insightful contributions from the growing community of researchers of quantum science.

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