# Mathematical Foundations of Quantum Information and Computation and Its Applications to Nano- and Bio-systems (Theoretical and Mathematical Physics)

*Masanori Ohya, I. Volovich*

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**Mathematical Foundations of Quantum Information and Computation and Its Applications to Nano- and Bio-systems (Theoretical and Mathematical Physics)** Masanori Ohya, I. Volovich

This monograph provides a mathematical foundation  to  the theory of quantum information and computation, with applications to various open systems including nano and bio systems.

It includes introductory material on algorithm, functional analysis, probability theory, information theory, quantum mechanics and quantum field theory. Apart from standard material on quantum information like quantum algorithm and teleportation, the authors discuss findings on the theory of entropy in C*-dynamical systems, space-time dependence of quantum entangled states, entangling operators, adaptive dynamics, relativistic quantum information, and a new paradigm for quantum computation beyond the usual quantum Turing machine. Also, some important applications of information theory to genetics and life sciences, as well as recent experimental and theoretical discoveries in quantum photosynthesis are described.

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