



The Message of Quantum Science [Attempts Towards a Synthesis /

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Physics

Quantum theory

Physics

Quantum Physics

Quantum

Computing

Mathematical Physics

Quantum Information Technology,

Spintronics

Monografía

This collection of essays is above all intended to pay tribute to the fact that while QM today is a refined and incredibly successful instrument, many issues concerning the internal consistency and the interpretation of this theory are still not nearly as well understood as they ought to be. In addition, whenever possible these essays take the opportunity to link foundational issues to the many exciting developments that are often linked to major experimental and technological breakthroughs in exploiting the electromagnetic field and, in particular, its quantum properties and its interactions with matter, as well as to advances in solid state physics (such as new quantum Hall liquids, topological insulators and graphene). The present volume also focuses on various areas, including new interference experiments with very large molecules passing through double-slits, which test the validity of the Kochen-Specker theorem; new tests of the violation of Bell(QA(B(3I(Bs inequalities and the consequences of entanglement; new non-demolition measurements and tests of (QA(B(3L(Bwave-function collapse(QA(B(3M (Bto name but a few. These experimental developments have raised many challenging questions for theorists, leading to a new surge of interest in the foundations of QM, which have puzzled physicists ever since this theory was pioneered almost ninety years ago. The outcome of a seminar program of the same name on foundational issues in quantum physics (QM), organized by the editors of this book, and addressing newcomers to the field and more seasoned specialists alike, this volume provides a pedagogically inspired snapshot view of many of the unresolved issues in the field of foundational QM

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Newtonian nonlocality to quantum nonlocality and beyond -- Faces of Quantum Physics -- Computation through Neuronal Oscillations -- Local properties, Growth and Transport of Entanglement -- Unavoidable decoherence in matter wave interferometry -- Classical-like trajectories of a quantum particle in a cloud chamber -- Quantum Mechanics of Time -- Localization and Entanglement in Relativistic Quantum Physics

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