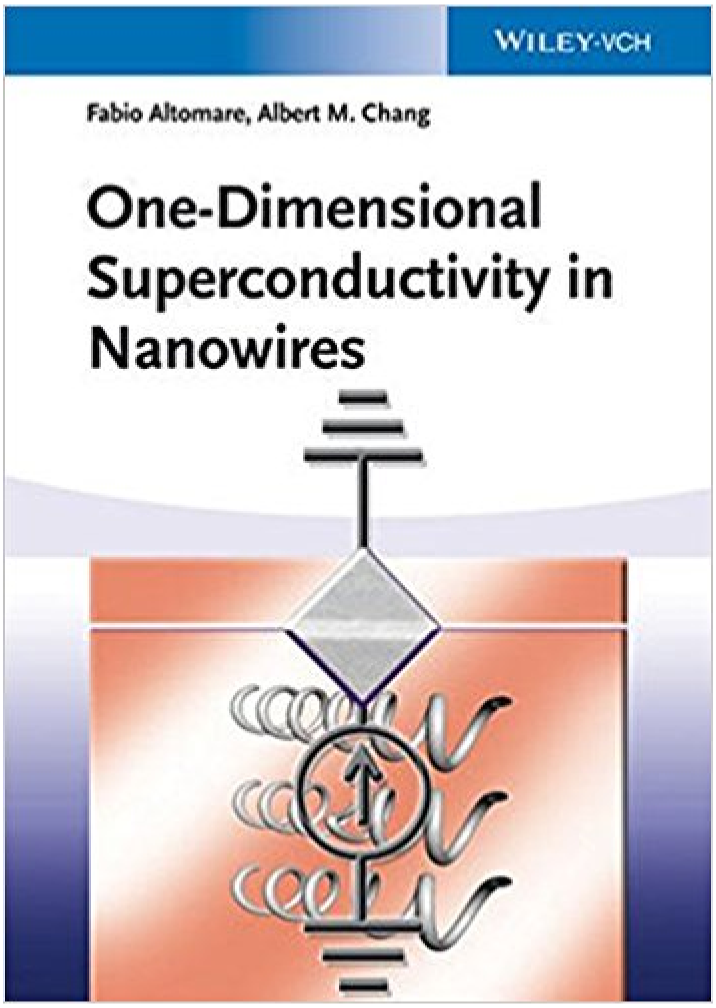
One-Dimensional Superconductivity In Nanowires



Synopsis

The book introduces scientists and graduate students to superconductivity, and highlights the differences arising from the different dimensionality of the sample under study. It focuses on transport in one-dimensional superconductors, describing relevant theories with particular emphasis on experimental results. It closely relates these results to the emergence of various novel fabrication techniques. The book closes by discussing future perspectives, and the connection and relevance to other physical systems, including superfluidity, Bose-Einstein condensates, and possibly cosmic strings.

Book Information

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Customer Reviews

The emergence of novel fabrication techniques in the last decade has allowed the fabrication of superconducting nanowires which are 1-dimensional. These nanowires allowed the exploration of a superconducting regime previously not accessible. The nanowires exhibit a variety of behaviors depending on material, size, type of electrical contacts. These behaviors include macroscopic quantum tunneling, superconductor-insulator transition, superconductor-metal transition, anti-proximity effect. The book introduces superconductivity and highlights the key differences introduced by the 1-dimensionality of the sample under study, compared to conventional 3-dimensional bulk samples. The focus of the book is the transport in 1-dimensional superconductors. Theories relevant to experiment are described and emphasis placed on experimental results and their connection to the theoretical predictions. The experimental results obtained in the last years are tightly related to the emergence of novel fabrication techniques which are also described. From the contents: Part I: Theoretical Aspects of Superconductivity in 1D Nanowires Ã¢â ¬Â¢ Superconductivity: Basics and Formulation Ã¢â ¬Â¢ 1D Superconductivity: Basic Notions Ã¢â ¬Â¢ Quantum Phase Slips and Quantum Phase Transitions Ã¢â ¬Â¢ Duality Ã¢â ¬Â¢ Proximity Related Phenomena Part II: Review of Experiments on 1D Superconductivity Ã¢â ¬Â¢ Experimental Technique for Nanowire Fabrication Ã¢â ¬Â¢ Experimental Review of Experiments on 1D Superconducting Nanowires Ã¢â ¬Â¢ Coherent Quantum Phase Slips Ã¢â ¬Â¢ 1D Superconductivity in Related System

Fabio Altomare works as Experimental Physicist at D-Wave Systems where he is involved in the practical implementation of an adiabatic quantum processor. He received his Ph.D. from Purdue University in 2004 studying superconductivity in 1-dimensional nanowire. Before his current appointment, he worked as Postdoctoral Research Associate at Duke University, where he studied transport in dilute magnetic semiconductors, and at the National Institute of Standards and Technology in Boulder, where he worked on coupled superconducting qubits. His interests include device fabrication, superconductivity in 1-dimension, and superconducting qubits.Albert M. Chang is Professor at the Department of Physics at Duke University since 2003. He received his Ph.D. from Princeton University and spent a large part of his career at Bell Laboratories. Prior to his current appointment, he was professor at Purdue University. He has been an APS fellow since 2000 for experimental studies of quantum Hall edge states and Luttinger liquids. Current interests include transport in quantum dots and dilute magnetic semiconductors, superconductivity in 1-dimension, scanning hall probe microscopy, fractional charges and statistics in the fractional quantum hall effect, and 1D Wigner-crystal-like states in ballistic quantum point contacts.

(Advanced Books Classics) RF Superconductivity: Science, Technology and Applications (v. 2) High-Temperature Superconductivity: An Introduction Theory Of Superconductivity (Advanced Books Classics) The Path of No Resistance: The Story of the Revolution in Superconductivity Superconductors. Superconductivity : Easy course for understanding superconductors (What is a superconductor) One-Dimensional Man: Studies in the Ideology of Advanced Industrial Society, 2nd Edition One-Block Wonders: One Fabric, One Shape, One-of-a-Kind Quilts The Art of Drawing Optical Illusions: How to draw mind-bending illusions and three-dimensional trick art in graphite and colored pencil