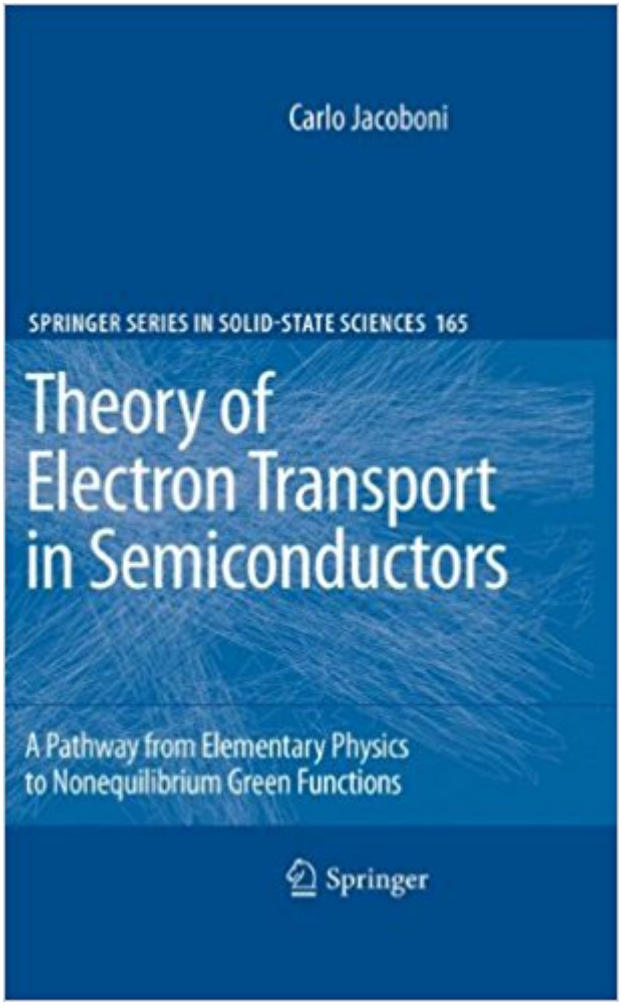
Theory Of Electron Transport In Semiconductors: A Pathway From Elementary Physics To Nonequilibrium Green Functions (Springer Series In Solid-State Sciences)

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Synopsis

This book originated out of a desire to provide students with an instrument which might lead them from knowledge of elementary classical and quantum physics to moderntheoreticaltechniques for the analysisof electrontransport in semiconductors. The book is basically a textbook for students of physics, material science, and electronics. Rather than a monograph on detailed advanced research in a speci?c area, it intends to introduce the reader to the fascinating ?eld of electron dynamics in semiconductors, a ?eld that, through its applications to electronics, greatly contributed to the transformationof all our lives in the second half of the twentieth century, and continues to provide surprises and new challenges. The ?eld is so extensive that it has been necessary to leave aside many subjects, while others could be dealt with only in terms of their basic principles. The book is divided into ?ve major parts. Part I moves from a survey of the fundamentals of classical and quantum physics to a brief review of basic semiconductor physics. Its purpose is to establish a common platform of language and symbols, and to make the entire treatment, as far as pos- ble, self-contained. Parts II and III, respectively, develop transport theory in bulk semiconductors in semiclassical and quantum frames. Part IV is devoted to semiconductor structures, including devices and mesoscopic coherent s- tems. Finally, Part V develops the basic theoretical tools of transport theory within the modern nonequilibrium Green-function formulation, starting from an introduction to second-quantization formalism.

Book Information

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Customer Reviews

This book describes in details the theory of the electron transport in the materials and structures at the basis of modern micro- and nano-electronics. ItÂ leads and accompanies the reader, through a step-by-step derivation of all calculations, from the basic laws of classical and quantum physics up to the most modern theoretical techniques, such as nonequilibrium Green functions, to study transport properties of both semiconductor materials and modern low-dimensional and mesoscopic structures.

PhD in Solid-state Physics at Purdue University (Indiana, USA) in 1969. Since then at the University of Modena with successive positions from research-assistant to Dean of the School of Sciences. Published 3 books and about 170 papers in the field of semiclassical and quantum theory of electron transport in semiconductors. His main contributions are related to the Monte Carlo simulation of electron transport in materials and devices, and to the application of the Wigner-function formalism to quantum transport.

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