Electrical Transport in Nanoscale Systems

By Massimiliano Di Ventra

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This graduate textbook provides an in-depth description of the transport phenomena relevant to systems of nanoscale dimensions. The different theoretical approaches are critically discussed, with emphasis on their basic assumptions and approximations. The book also covers information content in the measurement of currents, the role of initial conditions in establishing a steady state, and the modern use of density-functional theory. Topics are introduced by simple physical arguments, with particular attention to the non-equilibrium statistical nature of electrical conduction, and followed by a detailed formal derivation. This textbook is ideal for graduate students in physics, chemistry, and electrical engineering.

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About the Author
Massimiliano Di Ventra is Professor of Physics at the University of California, San Diego. He has published over 70 papers in refereed journals, co-edited the textbook Introduction to Nanoscale Science and Technology (Springer, 2004), and has delivered more than 100 invited talks worldwide on the subject of this book.

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