



# Electronic Structure: Basic Theory and Practical Methods: Basic Theory and Practical Density Functional Appr

By Richard M. Martin

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The study of the electronic structure of materials is at a momentous stage, with the emergence of computational methods and theoretical approaches. Many properties of materials can now be determined directly from the fundamental equations for the electrons, providing insights into critical problems in physics, chemistry, and materials science. This book provides a unified exposition of the basic theory and methods of electronic structure, together with instructive examples of practical computational methods and real-world applications. Appropriate for both graduate students and practising scientists, this book describes the approach most widely used today, density functional theory, with emphasis upon understanding the ideas, practical methods and limitations. Many references are provided to original papers, pertinent reviews, and widely available books. Included in each chapter is a short list of the most relevant references and a set of exercises that reveal salient points and challenge the reader.

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#### Review

'The book places electronic structure in the context of elementary issues in physics, while at the same time emphasising its role in providing useful information on the properties of materials ... unified exposition of the basic theory and methods of electronic structure, together with instructive examples of practical computational methods and actual applications ... aim is to serve graduate students and scientists involved in research while acting as supplementary material for courses on condensed matter physics and material science ... Examples of problems are included in each chapter to bring out salient points and challenge the reader.' Materials World

#### About the Author

Richard Martin is Professor of Physics at the University of Illinois, Urbana-Champaign. He is a recipient of the Alexander von Humboldt Senior Scientist Award, and is a fellow of the American Physical Society (APS) and the American Association for the Advancement of Science. He has served on several editorial boards of the APS, including Physical Review and Physical Review Letters, and Reviews of Modern Physics where he was associate editor for condensed matter theory.

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