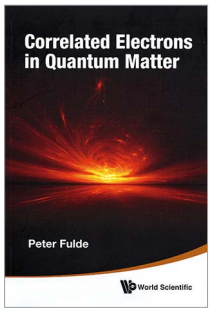
RECENSIONI



PETER FULDE

CORRELATED ELECTRONS IN QUANTUM MATTER

World Scientific, Singapore, 2012

hardcover: pp. 552; £ 139.00
ISBN 978-981-4390-91-0

softcover: £ 56.00
ISBN: 978-981-4390-92-7

ebook: £ 45.00
ISBN: 978-981-4397-22-3

Peter Fulde's book "Correlated Electrons in Quantum Matter" is a welcomed addition to the literature of modern many-body physics. The book is a modernized version of his previous book "Electron Correlations in Molecules and Solids". The part of molecules has been removed, and there are also important revisions regarding the methods. In particular, the present book has a strong focus on wavefunction-based methods and the projection methods. Also density-functional theory is introduced. The main purpose, however, is to introduce the concepts of correlated electrons and wavefunctions and quasiparticle excitations. Some important solid-state systems and phenomena are discussed in detail, in particular transition metals, transition-metal oxides, heavy quasiparticles, fractional-charge excitations, and superconductivity.

The book serves as an excellent source of information for an advanced solid-state physics course at the graduate student level. It can also be used as a textbook in an advanced many-body physics course. Especially the first part of the book (Sects. 1-5) forms a pedagogic introduction to the world of many-electron physics: it starts with independent electrons and homogeneous electron gas, followed by an introduction to two modern theoretical and methodological approaches to many-particle systems, *i.e.*, density-functional theory and wavefunction methods. The next sections serve best as a handbook when specific information is needed. For example, the Kondo effect and the related physics, the Hubbard model and its modern applications, transition metal systems, and superconductivity are treated in excellent mathematical rigour.

In summary, I can highly recommend the book for both scholars and students interested in many-body physics from a mathematical perspective.

Esa Räsänen
Tampere University of Technology, Finland