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Quantum Phase Transitions
By S. SACHDEV

2000, £55.00, $90.00 (hbk), pp. xiv+ 353. Cambridge University Press, ISBN 0 521 58254 7. Scope: text. Level: postgraduate and specialist.

This is a very interesting book on the new topic of quantum phase transitions. It studies fundamental changes in the macroscopic nature of matter at zero temperature, due to small variations in some external parameter. They are associated with quantum fluctuations, which occur even at zero temperature. The book presents both theoretical and experimental results in this area and is suitable for postgraduate students and researchers in condensed matter and other related areas.

The first part of the book (chapters 1–3) is an introduction which explains the concept of quantum phase transitions. The second part discusses the quantum Ising and various rotor models. It also discusses (in chapter 9) inelastic collision-dominated quantum transport. This is relevant to clean systems where the inelastic scattering time is shorter than the elastic scattering time associated with disorder. This is to be compared and contrasted with the mesoscopic systems techniques which apply to systems where the inelastic scattering time is large.

The third part of the book discusses other models like the Boson Hubbard model, dilute Fermi and Bose gases, ferromagnets and antiferromagnets, Fermi liquids, quantum spin glasses, etc. The various approximations are carefully discussed and the regions of their validity are clearly explained. The mathematical work is complemented with a clear physical discussion of the results.

The book is clearly written and contains an extensive list of references. There have been excellent review articles in the last few years in this area (e.g. that by Sondhi *et al.*). However a well-written book like this, which starts from the basic material and reviews in a comprehensive way all the recent literature on the subject, is very useful for both the expert and the newcomer who wants to be introduced into this exciting area. The book is a timely contribution to the research literature and is strongly recommended to all researchers in physics and other related areas.

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