<<统计力学>>

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内容概要

For this new edition， each chapter was revised and improved, typos corrected and figures added， some in response to many helpful comments on the first edition. We especially thank Professor Milton W. Cole for his correction of a factor 2 in the specific heat of a 1D hard-core Bose gas. Additionally， solutions to some representative problems have been included in an Appendix.

But， more t.han mere revision and expansion of the material， it is the wit and knowledge of a new co-author that has greatly improved the present text. Thanks to this couaboration the topics of renormalization group and Monte-Carlo numerical techniques could be treated on a par with more conventional elements of statistical thermodynamics. The addition of these important subjects and the expansion of topics that previously had been just many-body theory and phase transitions. We present this new edition in the hope it will better serve the contemporary student while offering to the instructor a wider， more useful choice of lecture materials.

作者简介

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书籍目录

章节摘录

版权页： 插图： 6.14. Contemporary Developments in Superconductivity The interest surrounding the BCS theory stimulated numerous discoveries,including the pair-breaking effects of magnetic impurities that can significantly decrease the energy gap Δ and to a lesser degree, Tc' The discovery of type Ⅱ superconductors that magnetic fields could penetrate by creating arrays of vortices with nonsuperconducting cores added to the general excitement. Inhomogeneities of this type became understood with the aid of semiphenomenological Landau-Ginsberg equations, once these equations were mated to the BCS theory.o The Josephson effect and numerous other tunneling phenomena soon became major concerns,r although the real push was on to raise Tc to where practical applications might ensue. For a period of 3 decades all known superconducting materials were alloyed and mixed with one another in a futile attempt to raise Tc above some 25 K. In fact, a number of theoretical speculations (too erudite to repeat) purported to show that Tc = 30 K could never be exceeded by the mechanism of the electron-phonon interaction alone. The situation changed dramatically in late 1986 and the Nobel prize was awarded to J. Bednorz and K. M ü ller shortly thereafter for their discovery of the first "high-temperature superconductor" -- doped lanthanum copper oxide, a layered mineral belonging to the perovskite family, exhibiting type Ⅱ superconductivity up to T = 35 K. Numerous other minerals, all containing layers of the two-dimensional spin-1/2 antiferromagnet CuO2, were soon developed in a frantic search for successively higher Tc. Interestingly, the normal conductivity in these materials is highly anisotropic: highly conductive in the ab plane, they are approximately semiconductors along the perpendicular crystallographic c-axis. On the other hand the superconducting phase is quasi-isotropic, possibly owing to Josephson tunneling between planes that is lacking in the normal phase. Critical temperatures upwards of 160 K have already been attained (or at least, reported) and at the date of writing, some hope remains that a room-temperature superconductor will be found. It is not far-fetched to say that such a discovery would soon revolutionize contemporary electronics, electrical engineering and perhaps all of technology.

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