

<<多层纳米结构中的输运>>

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内容概要

为有力推动我国物理学研究、加快相关学科的建设与发展，特别是展现近年来中国物理学者的研究水平和成果，北京大学出版社在国家出版基金的支持下推出了《中外物理学精品书系》，试图对以上难题进行大胆的尝试和探索。

《中外物理学精品书系·引进系列(3)·多层纳米结构中的输运：动力学平均场方法(影印版)》编委会集结了数十位来自内地和香港顶尖高校及科研院所的知名专家学者。他们都是目前该领域十分活跃的专家，确保了整套丛书的权威性和前瞻性。

《中外物理学精品书系·引进系列(3)·多层纳米结构中的输运：动力学平均场方法(影印版)》内容丰富，涵盖面广，可读性强，其中既有对我国传统物理学发展的梳理和总结，也有对正在蓬勃发展的物理学前沿的全面展示；既引进和介绍了世界物理学研究的发展动态，也面向国际主流领域传播中国物理的优秀专著。

可以说，《中外物理学精品书系》力图完整呈现近现代世界和中国物理科学发展的全貌，是一部目前国内为数不多的兼具学术价值和阅读乐趣的经典物理丛书。

《中外物理学精品书系》另一个突出特点是，在把西方物理的精华要义“请进来”的同时，也将我国近现代物理的优秀成果“送出去”。

物理学科在世界范围内的重要性不言而喻，引进和翻译世界物理的经典著作和前沿动态，可以满足当前国内物理教学和科研工作的迫切需求。

另一方面，改革开放几十年来，我国的物理学研究取得了长足发展，一大批具有较高学术价值的著作相继问世。

这套丛书首次将一些中国物理学者的优秀论著以英文版的形式直接推向国际相关研究的主流领域，使世界对中国物理学的过去和现状有更多的深入了解，不仅充分展示出中国物理学研究和积累的“硬实力”，也向世界主动传播我国科技文化领域不断创新的“软实力”，对全面提升中国科学、教育和文化领域的国际形象起到重要的促进作用。

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章节摘录

版权页：插图：superconducting pair of electrons is incident from the left. This pair of electrons meets a hole in the normal-metal barrier, leaving an electron behind that moves to the right. That electron travels to the barrier-superconductor interface on the right, and a superconducting pair and a retroreflected hole emerge; the hole travels to the left in the metal, and the superconducting pair travels to the right in the right superconducting lead. The net effect is that a superconducting pair has been carried across the barrier from the left to the right, and there is a localized electron-hole state that remains in the barrier. A similar process can carry current in the opposite direction, and one can view the lack of supercurrent when there is no phase difference across the junction as corresponding to an equal occupation of the left and right current-carrying states. In a one-dimensional system, the Andreev bound state has a well-defined energy, but in a three-dimensional system, because of the possible nonzero value for the transverse (k_x and k_y) momenta, these Andreev bound states appear as finite-width peaks in the DOS. Because the electrons involved in the Andreev bound states have energies close to the chemical potential, we expect these states to be located at an energy below the bulk superconducting gap. When scattering is added to the barrier, we can characterize the level of scattering with the Thouless energy for the diffusive metal barrier (plus the contribution from the contact resistance, of course). When such scattering is included, quasiclassical calculations say there will be a so-called "hard" minigap in the DOS, where the DOS vanishes over a region proportional to $E\tau$ about the chemical potential [Golubov and Kupriyanov (1989); Golubov, Wilhelm and Zaikin (1997); Zhou, et al. (1998); Pilgram, Belzig, and Bruder (2000)]. Since there is no gap when there is no scattering, and the Thouless energy decreases as the thickness of the barrier increases, the gap region is expected to first grow, and then decrease as scattering is turned on. Since a ballistic-metal-barrier junction has a nonzero Thouless energy, this analysis cannot be consistent with the Thouless energy solely determining the minigap, but most quasiclassical approaches ignore the contact resistance contribution to the Thouless energy, so from their perspective, the Thouless energy vanishes for a ballistic-metal-barrier junction, and the analysis is consistent.

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编辑推荐

《多层纳米结构中的输运:动力学平均场方法(影印版)》可以作为相关领域研究生的教材，也可作为科研工作者的参考书。

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