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<<相互作用电子和量子磁性>>

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前言

In the excitement and rapid pace of developments, writing pedagogical textshas low priority for most researchers. However, in transforming my lecturenotesI into this book, I found a personal benefit: the organization of what Iunderstand in a （hopefully simple） logical sequence. Very little in this textis my original contribution. Most of the knowledge was collected from theresearch literature. Some was acquired by conversations with colleagues; akind of physics oral tradition passed between disciples of a similar faith.For many years, diagramatic perturbation theory has been the majortheoretical tool for treating interactions in metals, semiconductors, itiner-ant magnets, and superconductors. It is in essence a weak coupling expan-sion about free quasiparticles. Many experimental discoveries during thelast decade, including heavy fermions, fractional quantum Hall effect, high-temperature superconductivity, and quantum spin chains, are not readilyaccessible from the weak coupling point of view. Therefore, recent yearshave seen vigorous development of alternative, nonperturbativc tools forhandling strong electron-electron interactions.I concentrate on two basic paradigms of strongly interacting （or con-strained） quantum systems: the Hubbard model and the Heisenberg model.These models are vehicles for fundamental concepts, such as effective Ha-miltonians, variational ground states, spontaneous symmetry breaking, andquantum disorder. In addition, they are used as test grounds for variousnonperturbative approximation schemes that have found applications indiverse areas of theoretical physics.The level of the text should be appropriate for a graduate student withsome background in solid state physics （single electron theory） and fa-miliarity with second quantization. The exercises vary in difficulty andcomplement the text with specific examples and corollaries. Some of themathematical background material is relegated to the appendices.

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