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Book Review

Statistical Physics, Part II, Third Edition. E. M. Lifshitz and L. P. Pitaevskii. Oxford: Pergamon Press, 1980.

The book *Statistical Physics* by L. D. Landau and E. M. Lifshitz which first appeared in English in 1959 has become a modern classic in the field of statistical mechanics. It is devoted to equilibrium phenomena in a variety of systems and includes subjects not readily found in other texts. In particular, the discussion on equilibrium phase transitions is unexcelled anywhere for its depth and clarity. Much of the discussion on phase transitions is based on original work by Landau, and the book as a whole reflects his deep insight into the workings of physical phenomena.

This book has now been revised by E. M. Lifshitz and L. P. Pitaevskii and the new third edition has been divided into two parts. Part I contains the same material found in the second edition, except that the sections on quantum fluids have been removed and the sections on lattice vibrations, liquid crystals, and critical phenomena has been expanded. Part II, the subject of this review, is devoted to the quantum theory of condensed matter with major emphasis on the theory of fermion and boson liquids as originally developed by Landau. Except for a few sections, it is composed of material not found in earlier editions. It contains excellent discussions of Fermi liquid theory, superfluidity, and the Ginzberg–Landau theory of superconductors. Also included is a discussion of electrons in crystal lattices as viewed as a Fermi liquid and the theory of magnons in ferro- and antiferromagnets. Parallel to a phenomenological discussion of these various subjects, the authors have included derivations of the spectral properties of excitations in these systems in terms of Greens functions. Most of the material on Greens functions can be found in other books, but it is useful to the student to see Greens function techniques accompanying more phenomenological theories and discussions. Finally, the authors have included a section on hydrodynamic fluctuations and electromagnetic fluctuations.

The third edition, Part II is written in the same style and format as

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previous editions. It contains a sprinkling of worked problems but no unworked problems, which might be a disadvantage if one wishes to use it as a text. One strange and striking fact about the third edition, Part II is that except for a few sections, it could have been written in 1961. It contains very few references to work done later than that and it draws largely from the work of Landau and his students prior to that time. Also it contains very little reference to experiment. Thus, after reading it one is left wondering what, if anything has been done in the field during the last 20 years. To summarize, this edition may be viewed, for the most part, as an excellent review of the quantum theory of condensed fluids as developed by Landau and his students prior to 1961.

L. E. Reichl
Center for Statistical Mechanics,
University of Texas at Austin