

## **Book Review: *Statistical Mechanics***

**Statistical Mechanics.** F. Schwabl, Trans. W. Brewer, Springer, New York, 2002.

This book is intended to be a text for advanced students of physics and other natural sciences. It is more or less self-contained and starts with elementary principles of statistical mechanics and thermodynamics and ends with modern advanced topics in these disciplines. The author uses a deductive approach for equilibrium statistical mechanics based on the form of the microcanonical density matrix and also treats some non-equilibrium phenomena.

The book treats a wide variety of subjects starting with basic principles, equilibrium ensembles, thermodynamics, and ideal and real quantum and classical gases. It then moves on to discuss magnetism, phase transitions, static scaling, renormalization theory, Ginzburg–Landau theory, and percolation. Finally, it treats Brownian motion, the Boltzmann equation, and some general topics in irreversibility and the approach to equilibrium. In each of the chapters, there are some interesting problems.

There have been a plethora of recent texts and monographs on statistical mechanics. Each has its advantages and disadvantages. The advantages of the present text are its clear descriptions, calculations carried out in full detail, and problems at the ends of the chapters which are chosen felicitously. It is relatively easy to read.

Unfortunately, the pedagogy has led the author to underplay many of the subtleties of ensemble theory and thermodynamics. It would have been better if the author provided more physical insight throughout the book but in particular in the chapters on time-dependent phenomena. It is not made clear under what physical conditions the Langevin equation, the Boltzmann equation, and the hydrodynamic equations are valid and what the corrections to these equations might be.

Despite these caveats, I think this is a useful textbook when used by a knowledgeable instructor.

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