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Book Review: *Statistical Physics: Including Applications to Condensed Matter*

Statistical Physics: Including Applications to Condensed Matter, Claudine Hermann, Springer, New York, 2005.

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This is an interesting book, in part because it presents the subject from a French point of view. As we might expect, this implies an extremely logical approach to the subject and to its applications. It starts from an elementary discussion of statistical physics, thermodynamics, and quantum mechanics and ends with applications to advanced topics such as electrostatic screening/magnetic susceptibility of a quasi-ID conductor, entropies of the HC1 molecule, quantum boxes and optoelectronics, and physical foundations of spintronics. These subjects are treated in exercises and problems and the solutions to those problems.

En route there are chapters on the statistical description of large systems, general methods of treating the different statistical ensembles, thermodynamics and statistical physics, the ideal gas, indistinguishability, and the Pauli principle, general properties of quantum statistics, free Fermion properties, elements of bond theory, and bosons: Helium 4, photons, and thermal radiation. Some of the presentations are well done and the summaries and appendices of the chapters are useful.

There are some places where the discussion has to be made more precise. A system is in an equilibrium state if the properties are time-independent, there are no fluxes, *and* the state can be reached by a variety of paths. There are places where there is confusion between the concepts of assembly and ensemble. An assembly is a collection of weakly interacting systems. An ensemble is a collection of isolated systems whether or not the ensemble is microcanonical, canonical, or grand canonical. The ergodic theorem is mentioned but there is no discussion about the conditions under which time and ensemble averages are the same. The discussions of the second and third laws of thermodynamics are confusing. There are a few misprints in the text, but the most egregious of these occurs on p. 90 where J. W. Gibbs is presented with the given name, John.

The book is intended to be an introductory text for senior undergraduates and graduate students. While I think it is not suitable for that role, it does make interesting reading for practitioners of statistical physics.

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