

Statistical Physics:An Introductory Course

By Daniel J Amit, Yosef Verbin

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This invaluable textbook is an introduction to statistical physics that has been written primarily for self-study. It provides a comprehensive approach to the main ideas of statistical physics at the level of an introductory course, starting from the kinetic theory of gases and proceeding all the way to Bose–Einstein and Fermi–Dirac statistics. Each idea is brought out with ample motivation and clear, step-by-step, deductive exposition. The key points and methods are presented and discussed on the basis of concrete representative systems, such as the paramagnet, Einstein's solid, the diatomic gas, black body radiation, electric conductivity in metals and superfluidity.

The book is written in a stimulating style and is accompanied by a large number of exercises appropriately placed within the text and by self-assessment problems at the end of each chapter. Detailed solutions of all the exercises are provided.

Contents:

- ***The Kinetic Theory of Gases:***
  - Velocity and Position Distributions of Molecules in a Gas
  - Brownian Motion
  - Transport Coefficients
- ***Statistical Physics of a Paramagnets:***
  - Essential Background in Thermodynamics
  - Thermodynamics with Magnetic Variables
  - Microscopic States and Averages
  - Isolated Paramagnet — Microcanonical Ensemble
  - Isolated Paramagnet — Subsystems and Temperature
  - Paramagnet at a Given Temperature
  - Order, Disorder and Entropy
  - Comparison with Experiment
- ***Statistical Physics and Thermodynamics:***
  - The Canonical Ensemble and Thermodynamics
  - Harmonic Oscillator and Einstein Solid
  - Statistical Mechanics of Classical Systems
  - Statistical Mechanics of an Ideal Gas
  - The Gibbs Paradox and the Third Law
  - Fluctuations and Thermodynamic Quantities

- ***From Ideal Gas to Photon Gas:***
  - An Ideal Gas of Molecules with Internal Degrees of Freedom
  - Gases in Chemical Reactions
  - Phonon Gas and the Debye Model
  - Thermodynamics of Electromagnetic Radiation
- ***Of Fermions and Bosons:***
  - Grand Canonical Ensemble
  - Statistical Mechanics of Identical Quantum Particles
  - Electrical Conductivity in Metals
  - Boson Gas

Readership: Undergraduate and graduate students in physics and engineering.

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Editorial Review

Review
"The coverage of the material is reasonably complete and on the whole clearly explained ... In many ways, it is admirable and provides a refreshing and sometimes subtle and careful introduction to statistical mechanics."

About the Author
Amit is a Professor at the Racah Institute of Physics, Hebrew University, Jerusalem.

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