



Fundamentals of Statistical and Thermal Physics

By Frederick Reif

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Fundamentals of Statistical and Thermal Physics By Frederick Reif

All macroscopic systems consist ultimately of atoms obeying the laws of quantum mechanics. That premise forms the basis for this comprehensive text, intended for a first upper-level course in statistical and thermal physics. Reif emphasizes that the combination of microscopic concepts with some statistical postulates leads readily to conclusions on a purely macroscopic level. The author's writing style and penchant for description energize interest in condensed matter physics as well as provide a conceptual grounding with information that is crystal clear and memorable. Reif first introduces basic probability concepts and statistical methods used throughout all of physics. Statistical ideas are then applied to systems of particles in equilibrium to enhance an understanding of the basic notions of statistical mechanics, from which derive the purely macroscopic general statements of thermodynamics. Next, he turns to the more complicated equilibrium situations, such as phase transformations and quantum gases, before discussing nonequilibrium situations in which he treats transport theory and dilute gases at varying levels of sophistication. In the last chapter, he addresses some general questions involving irreversible processes and fluctuations. A large amount of material is presented to facilitate students later access to more advanced works, to allow those with higher levels of curiosity to read beyond the minimum given on a topic, and to enhance understanding by presenting several ways of looking at a particular question. Formatting within the text either signals material that instructors can assign at their own discretion or highlights important results for easy reference to them. Additionally, by solving many of the 230 problems contained in the text, students activate and embed their knowledge of the subject matter.

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Review

"Waveland has done a fine job in reissuing this classic text. Especially useful for instructors is the disc with Knacke's solutions to Reif's homework problems." --Bernard Weinstein, SUNY Buffalo

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"This is a wonderful textbook that is pedagogically sound and provides a gentle introduction to statistical reasoning in thermodynamics and statistical mechanics. The introduction of the microscopic approach to appreciate thermodynamics is noteworthy. The textbook will adequately serve both undergraduates and beginning graduate students." -- Dilip Asthagiri, *Johns Hopkins University*

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