

Statistical Physics An Introductory Course

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Statistical Physics An Introductory Course

Course Description. This course offers an introduction to probability, statistical mechanics, and thermodynamics. Numerous examples are used to illustrate a wide variety of physical phenomena such as magnetism, polyatomic gases, thermal radiation, electrons in solids, and noise in electronic devices. This course is an elective subject in MIT's undergraduate Energy Studies Minor.

Statistical Physics I | Physics | MIT OpenCourseWare

Statistical Physics An Introductory Course # Uploaded by Paulo Coelho, 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

Statistical Physics An Introductory Course [PDF]

David Tong: Lectures on Statistical Physics. This is an introductory course on Statistical Mechanics and Thermodynamics given to final year undergraduates. They were last updated in May 2012. Full lecture notes come in around 190 pages. Individual chapters and problem sets can also be found below. PostScript PDF.

David Tong -- Lectures on Statistical Physics

Preface This book represents an attempt to give an introduction to statistical physics in a form which is suitable for final year under- graduate students. No claim of originality is made for either the content or the mode of presentation but the material has been chosen in order to emphasize the basic methods of statistical physics and those results which are of particular importance for physicists.

Anthony John Pointon - Introduction To Statistical Physics ...

An introduction to this subject from a physicist point of view is provided by the book of Fischer and Hertz (Fischer and Hertz, 1993) or the review by Binder and Young (Binder and Young, 1986). The concept of frustration was introduced in a beautiful paper by Gerard Toulouse (Toulouse, 1977).

Notes There are many good introductory textbooks on ...

Description This course offers an introduction to probability, statistical mechanics, and thermodynamics. Specific topics in probability include random variables, joint and conditional probability densities, and functions of a random variable.

Syllabus | Statistical Physics I | Physics | MIT ...

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.

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Statistical Physics: An Introductory Course Download

About the authors In a comprehensive treatment of Statistical Mechanics from thermodynamics through the renormalization group, this book serves as the core text for a full-year graduate course in statistical mechanics at either the Masters or Ph.D. level.

Statistical Mechanics - An Introductory Graduate Course ...

This is the introductory lecture of a undergraduate class on thermal and statistical physics I taught in 2013. Link to the presentation slides: <https://drive...>

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.

In a comprehensive treatment of Statistical Mechanics from thermodynamics through the renormalization group, this book serves as the core text for a full-year graduate course in statistical mechanics at either the Masters or Ph.D. level. Each chapter contains numerous exercises, and several chapters treat special topics which can be used as the basis for student projects. The concept of scaling is introduced early and used extensively throughout the text. At the heart of the book is an extensive treatment of mean field theory, from the simplest decoupling approach, through the density matrix formalism, to self-consistent classical and quantum field theory as well as exact solutions on the Cayley tree. Proceeding beyond mean field theory, the book discusses exact mappings involving Potts models, percolation, self-avoiding walks and quenched randomness, connecting various athermal and thermal models. Computational methods such as series expansions and Monte Carlo simulations are discussed, along with exact solutions to the 1D quantum and 2D classical Ising models. The renormalization group formalism is developed, starting from real-space RG and proceeding through a detailed treatment of Wilson's epsilon expansion. Finally the subject of Kosterlitz-Thouless systems is introduced from a historical perspective and then treated by methods due to Anderson, Kosterlitz, Thouless and Young. Altogether, this comprehensive, up-to-date, and engaging text offers an ideal package for advanced undergraduate or graduate courses or for use in self study.

An Introductory Course of Statistical Mechanics introduces the subject to readers without any prior knowledge of the subject. In most textbooks, Statistical Mechanics appears to be a branch of Condensed Matter Physics. This book has a different perspective. It gives great importance to relativistic systems, thus paving the way for various applications of Statistical Mechanics, from nuclear reactions to Astrophysics and Cosmology. Non-relativistic systems and their applications to Condensed Matter Physics are not abandoned either: there are discussions on gases, liquids and magnetic systems. The book ends with one chapter on Phase Transitions and one on Boltzmann equation. Overall, the book presents Statistical Mechanics from a broader perspective encompassing many branches of Physics.

Introductory Statistical Thermodynamics is a text for an introductory one-semester course in statistical thermodynamics for upper-level undergraduate and graduate students in physics and engineering. The book offers a high level of detail in derivations of all equations and results. This information is necessary for students to grasp difficult concepts in physics that are needed to move on to higher level courses. The text is elementary, self contained, and mathematically well-founded, containing a number of problems with detailed solutions to help students to grasp the more difficult theoretical concepts. Beginning chapters place an emphasis on quantum mechanics Includes problems with detailed solutions and a number of detailed theoretical derivations at the end of each chapter Provides a high level of detail in derivations of all equations and results

Sinai's book leads the student through the standard material for ProbabilityTheory, with stops along the way for interesting topics such as statistical mechanics, not usually included in a book for beginners. The first part of the book covers discrete random variables, using the same approach, basedon Kolmogorov's axioms for probability, used later for the general case. The text is divided into sixteen lectures, each covering a major topic. The introductory notions and classical results are included, of course: random variables, the central limit theorem, the law of large numbers, conditional probability, random walks, etc. Sinai's style is accessible and clear, with interesting examples to accompany new ideas. Besides statistical mechanics, other interesting, less common topics found in the book are: percolation, the concept of stability in the central limit theorem and the study of probability of large deviations. Little more than a standard undergraduate course in analysis is assumed of the reader. Notions from measure theory and Lebesgue integration are introduced in the second half of the text. The book is suitable for second or third year students in mathematics, physics or other natural sciences. It could also be usefully more advanced

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.

Four-part treatment covers principles of quantum statistical mechanics, systems composed of independent molecules or other independent subsystems, and systems of interacting molecules, concluding with a consideration of quantum statistics.

"A large number of exercises of a broad range of difficulty make this book even more useful,a good addition to the literature on thermodynamics at the undergraduate level." - Philosophical Magazine Although written on an introductory level, this wide-ranging text provides extensive coverage of topics of current interest in equilibrium statistical mechanics. Indeed, certain traditional topics are given somewhat condensed treatment to allow room for a survey of more recent advances. The book is divided into four major sections. Part I deals with the principles of quantum statistical mechanics and includes discussions of energy levels, states and eigenfunctions, degeneracy and other topics. Part II examines systems composed of independent molecules or of other independent subsystems. Topics range from ideal monatomic gas and monatomic crystals to polyatomic gas and configuration of polymer molecules and rubber elasticity. An examination of systems of interacting molecules comprises the nine chapters in Part III, reviewing such subjects as lattice statistics, imperfect gases and dilute liquid solutions. Part IV covers quantum statistics and includes sections on Fermi-Dirac and Bose-Einstein statistics, photon gas and free-volume theories of quantum liquids. Each chapter includes problems varying in difficulty - ranging from simple numerical exercises to small-scale "research" propositions. In addition, supplementary reading lists for each chapter invite students to pursue the subject at a more advanced level. Readers are assumed to have studied thermodynamics, calculus, elementary differential equations and elementary quantum mechanics. Because of the flexibility of the chapter arrangements, this book especially lends itself to use in a one-or two-semester graduate course in chemistry, a one-semester senior or graduate course in physics or an introductory course in statistical mechanics.

For graduate students unfamiliar with particle physics, An Introductory Course of Particle Physics teaches the basic techniques and fundamental theories related to the subject. It gives students the competence to work out various properties of fundamental particles, such as scattering cross-section and lifetime. The book also gives a lucid summary of the main ideas involved. In giving students a taste of fundamental interactions among elementary particles, the author does not assume any prior knowledge of quantum field theory. He presents a brief introduction that supplies students with the necessary tools without seriously getting into the nitty-gritty of quantum field theory, and then explores advanced topics in detail. The book then discusses group theory, and in this case the author assumes that students are familiar with the basic definitions and properties of a group, and even SU(2) and its representations. With this foundation established, he goes on to discuss representations of continuous groups bigger than SU(2) in detail. The material is presented at a level that M.Sc. and Ph.D. students can understand, with exercises throughout the text at points at which performing the exercises would be most beneficial. Anyone teaching a one-semester course will probably have to choose from the topics covered, because this text also contains advanced material that might not be covered within a semester due to lack of time. Thus it provides the teaching tool with the flexibility to customize the course to suit your needs.

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