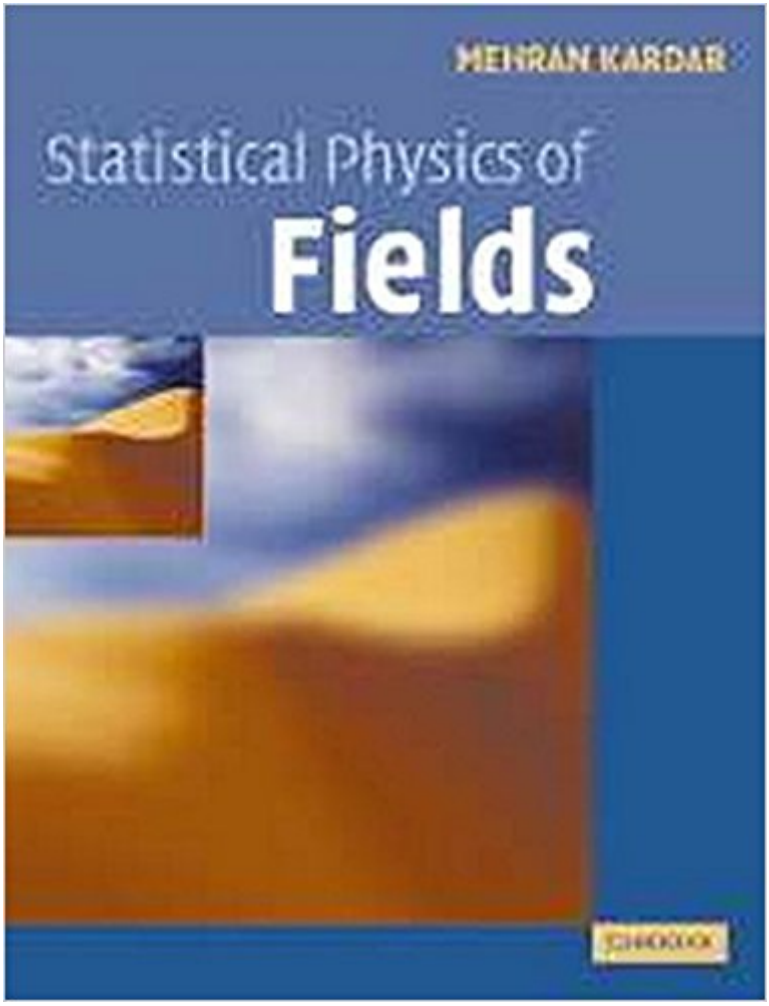
Statistical Physics Of Fields



Synopsis

While many scientists are familiar with fractals, fewer are familiar with scale-invariance and universality which underlie the ubiquity of their shapes. These properties may emerge from the collective behaviour of simple fundamental constituents, and are studied using statistical field theories. Initial chapters connect the particulate perspective developed in the companion volume, to the coarse grained statistical fields studied here. Based on lectures taught by Professor Kardar at MIT, this textbook demonstrates how such theories are formulated and studied. Perturbation theory, exact solutions, renormalization groups, and other tools are employed to demonstrate the emergence of scale invariance and universality, and the non-equilibrium dynamics of interfaces and directed paths in random media are discussed. Ideal for advanced graduate courses in statistical physics, it contains an integrated set of problems, with solutions to selected problems at the end of the book and a complete set available to lecturers at www.cambridge.org/9780521873413.

Book Information

Hardcover: 370 pages

Publisher: Cambridge University Press; 1 edition (June 25, 2007)

Language: English

ISBN-10: 052187341X

ISBN-13: 978-0521873413

Product Dimensions: 7.4 x 0.9 x 9.7 inches

Shipping Weight: 2 pounds (View shipping rates and policies)

Average Customer Review: 4.4 out of 5 stars 4 customer reviews

Best Sellers Rank: #312,356 in Books (See Top 100 in Books) #72 inÃ Â Books > Science & Math > Physics > Waves & Wave Mechanics #179 inÃ Â Books > Science & Math > Physics > Mathematical Physics #1038 inÃ Â Books > Textbooks > Science & Mathematics > Physics

Customer Reviews

In this much-needed modern text, Kardar presents a remarkably clear view of statistical mechanics as a whole, revealing the relationships between different parts of this diverse subject. In two volumes, the classical beginnings of thermodynamics are connected smoothly to a thoroughly modern view of fluctuation effects, stochastic dynamics, and renormalization and scaling theory. Students will appreciate the precision and clarity in which difficult concepts are presented in generality and by example. I particularly like the wealth of interesting and instructive problems inspired by diverse phenomena throughout physics (and beyond!), which illustrate the power and

broad applicability of statistical mechanics. Leon Balents, Department of Physics, University of California, Santa Barbara"... Statistical Physics of Fields is the welcome result of an innovative and popular graduate course Kardar has been teaching at MIT for almost twenty years. It is a masterful account of the essentials of a subject which played a vital role in the development of twentieth century physics ... Statistical Physics of Fields builds on the foundation laid by the Statistical Physics of Particles, with an account of the revolutionary developments of the past 35 years, many of which were facilitated by renormalization group ideas. Much of the subject matter is inspired by problems in condensed matter physics, with a number of pioneering contributions originally due to Kardar himself." David R Nelson, Arthur K Solomon Professor of Biophysics, Harvard University"If Landau and Lifshitz were to prepare a new edition of their classic Statistical Physics text they might produce a book not unlike this gem by Mehran Kardar. Indeed, Kardar is an extremely rare scientist, being both brilliant in formalism and an astoundingly careful and thorough teacher. He demonstrates both aspects of his range of talents in this pair of books, which belong on the bookshelf of every serious student of theoretical statistical physics." H Eugene Stanley, Director, Center for Polymer Studies, Boston University"This is one of the most valuable textbook I have seen in a long time. Written by a leader in the field, it provides a crystal clear, elegant and comprehensive coverage of the field of statistical physics. I am sure this book will become the reference for the next generation of researchers, students and practitioners in statistical physics. I wish I had this book when I was a student but I will have the privilege to rely on it for my teaching." Alessandro Vespignani, Center for Biocomplexity, Indiana University"Kardar, who has taught a statistical physics of fields course at MIT for the last 20 years, has finally put the content of his lectures into a single textbook. Designed for advanced students of physics, this book expands upon the notion of fractals, and concentrates on the shape, symmetry and locality of these entities. The author uses his work in particle physics as a foundation to explore statistical fields, fluctuations, the scaling hypothesis, lattice systems, and directed paths in random media." Book News"Over the past two decades, I have admired Kardar’s contributions to theoretical physics, and now I admire his contribution to teaching physics. The first volume, Statistical Physics of Particles, is distinguished by its useful feature of teaching physics by example... the first eight chapters of Statistical Physics of Fields are stunning. With that volume Kardar has produced an excellent and unique textbook that will serve our community well for many years." David Chandler, Physics Today

This textbook demonstrates how statistical field theories are formulated and studied. Initial chapters connect the particulate perspective developed in the companion volume, to the coarse grained

statistical fields studied here. Ideal for advanced graduate courses in statistical physics; some solutions are provided with a full set for lecturers at www.cambridge.org/9780521873413.

This book is extremely careful in its derivations, which makes line by line careful study very helpful. I really like this. Furthermore, it's able to to cover a very large amount of material in very few pages by being as direct as possible... this might seem mathematical to some, but I think it's great because the math is very clear. Ideally, for a first course, I prefer a systematic approach, leaving the intuitive stuff only when it's justified. Beware, however, the problems are very hard, and often require very good command of the material.

Ive always felt that a post-pathria/huang/etc. stat mech book was needed to do a good job on landau theory and perturbation theory for phase transitions...whatever one might call 'statistical field theory.' I found Kardar's lectures (turned into this book) to be exquisitely clear, and everything i'd ever hoped for in the realm of phase transition pedagogy. He has included material beyond the standard m^4 magnetic transition, like the nonlinear sigma model, BKT transition, and random walks. I cannot endorse this book highly enough, and expect it'll become sort of the 'jackson' of stat mech 2.

Ok, this book will make you work for everything, no free stuff here. Chapters give you only basic information, and you have to work out exercises in the end of the chapter to get the details.

The book is certainly a good book to learn statistical field theory from, but the starry reviews by L. Balents, D. Chandler, E. Stanley, and other NSF fellow travelers are way, way too hyped. No, this book does not compare to Landau's books in any form (or contents, for that matters), and no, you will not be led from the student stage to the expert stage by reading this book alone. The book is just another good graduate level textbook; actually, part of the material can be grasped by a motivated senior undergraduate student interested in stat. mech. (and this is a merit of the good pedagogy included in the presentation of the material).If you want to delve into statistical field theory, I recommendÃ Â Quantum Field Theory, by K. Huang (at an introductory level similar to that of this book),Ã Â Statistical Field Theory, by G. Mussardo (at an intermediate level, dealing with complementary subjects), and the monographÃ Â Statistical Field TheoryÃ Â by G. Parisi (more advanced, a little bit dated).

Statistical Physics of Fields Statistical Physics (Student Physics Series) Modern Classical Physics: Optics, Fluids, Plasmas, Elasticity, Relativity, and Statistical Physics Statistical Methods for Data Analysis in Particle Physics (Lecture Notes in Physics) Statistical Physics: Theory of the Condensed State (Course of Theoretical Physics Vol. 9) Fundamentals of Statistical and Thermal Physics (Fundamentals of Physics) Methods of Quantum Field Theory in Statistical Physics (Dover Books on Physics) Mrs. Fields Cookie Book: 100 Recipes from the Kitchen of Mrs. Fields Crystals: The Ultimate Guide To: Energy Fields, Auras, Chakras and Emotional Healing (Aura, Healing Stones, Crystal Energy, Crystal Healing, Energy Fields, Emotional Healing, Gemstone) Fields Virology (Knipe, Fields Virology)-2 Volume Set Analytics: Business Intelligence, Algorithms and Statistical Analysis (Predictive Analytics, Data Visualization, Data Analytics, Business Analytics, Decision Analysis, Big Data, Statistical Analysis) The Solid State: An Introduction to the Physics of Crystals for Students of Physics, Materials Science, and Engineering (Oxford Physics Series) Head First Physics: A learner's companion to mechanics and practical physics (AP Physics B - Advanced Placement) Physics for Scientists and Engineers with Modern Physics: Volume II (3rd Edition) (Physics for Scientists & Engineers) Physics for Kids : Electricity and Magnetism - Physics 7th Grade | Children's Physics Books Six Ideas that Shaped Physics: Unit N - Laws of Physics are Universal (WCB Physics) Quantum Electrodynamics: Gribov Lectures on Theoretical Physics (Cambridge Monographs on Particle Physics, Nuclear Physics and Cosmology) Six Ideas That Shaped Physics: Unit R - Laws of Physics are Frame-Independent (WCB Physics) Problem-Solving Exercises in Physics: The High School Physics Program (Prentice Hall Conceptual Physics Workbook) Physics of the Impossible: A Scientific Exploration into the World of Phasers, Force Fields, Teleportation, and Time Travel