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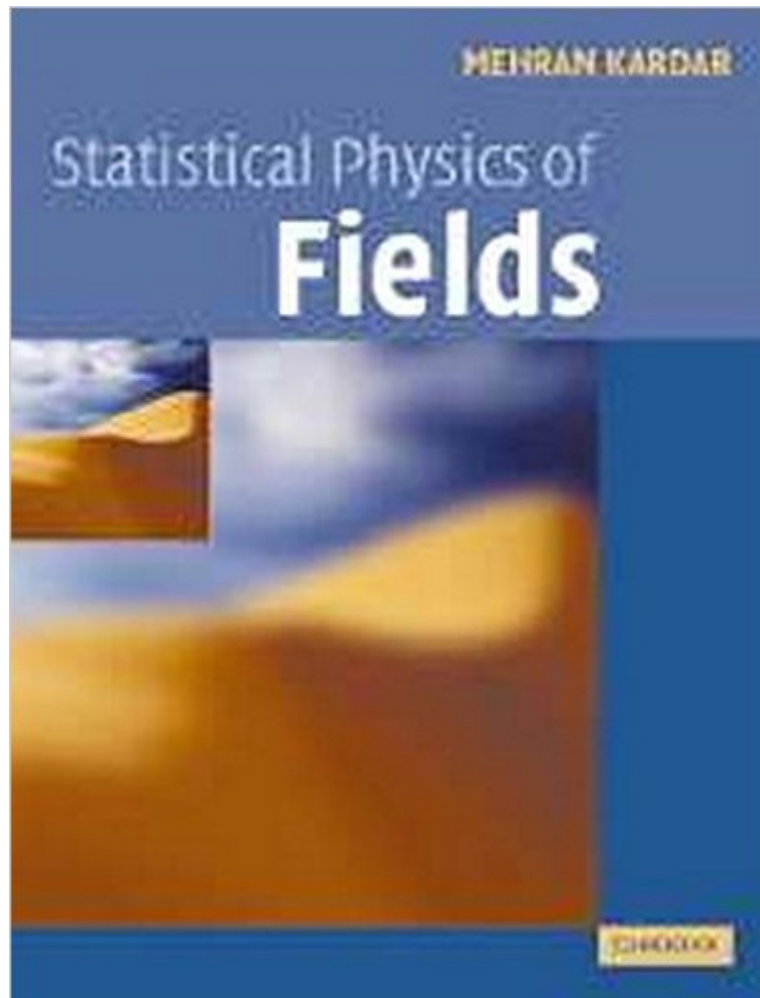
Statistical Physics Of Fields

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.

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Customer Reviews

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 recommend Quantum Field Theory, by K. Huang (at an introductory level similar to that of this book), Statistical Field Theory, by G. Mussardo (at an intermediate level, dealing with complementary subjects), and the monograph Statistical Field Theory by G. Parisi (more advanced, a little bit dated).

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