

1. Record Nr.	UNINA9910254619603321
Autore	Selinger Jonathan V
Titolo	Introduction to the Theory of Soft Matter : From Ideal Gases to Liquid Crystals // by Jonathan V. Selinger
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2016
ISBN	3-319-21054-8
Edizione	[1st ed. 2016.]
Descrizione fisica	1 online resource (192 p.)
Collana	Soft and Biological Matter, , 2213-1736
Disciplina	530
Soggetti	Amorphous substances Complex fluids Physical chemistry Biomedical engineering Chemometrics Soft and Granular Matter, Complex Fluids and Microfluidics Physical Chemistry Biomedical Engineering and Bioengineering Math. Applications in Chemistry
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Toy Model -- Ising Model for Ferromagnetism -- Gases and Liquids -- Landau Theory -- First Mathematical Interlude: Variational Calculus -- Field Theory for Nonuniform Systems -- Dynamics of Phase Transitions -- Solids: Crystals and Glasses -- second Mathematical Interlude: Tensors -- Liquid Crystals.
Sommario/riassunto	This book presents the theory of soft matter to students at the advanced undergraduate or beginning graduate level. It provides a basic introduction to theoretical physics as applied to soft matter, explaining the concepts of symmetry, broken symmetry, and order parameters; phases and phase transitions; mean-field theory; and the mathematics of variational calculus and tensors. It is written in an informal, conversational style, which is accessible to students from a diverse range of backgrounds. The book begins with a simple "toy

model” to demonstrate the physical significance of free energy. It then introduces two standard theories of phase transitions—the Ising model for ferromagnetism and van der Waals theory of gases and liquids—and uses them to illustrate principles of statistical mechanics. From those examples, it moves on to discuss order, disorder, and broken symmetry in many states of matter, and to explain the theoretical methods that are used to model the phenomena. It concludes with a chapter on liquid crystals, which brings together all of these physical and mathematical concepts. The book is accompanied by a set of “interactive figures,” which allow online readers to change parameters and see what happens to a graph, some allow users to rotate a plot or other graphics in 3D, and some do both. These interactive figures help students to develop their intuition for the physical meaning of equations. This book will prepare advanced undergraduate or early graduate students to go into more advanced theoretical studies. It will also equip students going into experimental soft matter science to be fully conversant with the theoretical aspects and have effective collaborations with theorists.
