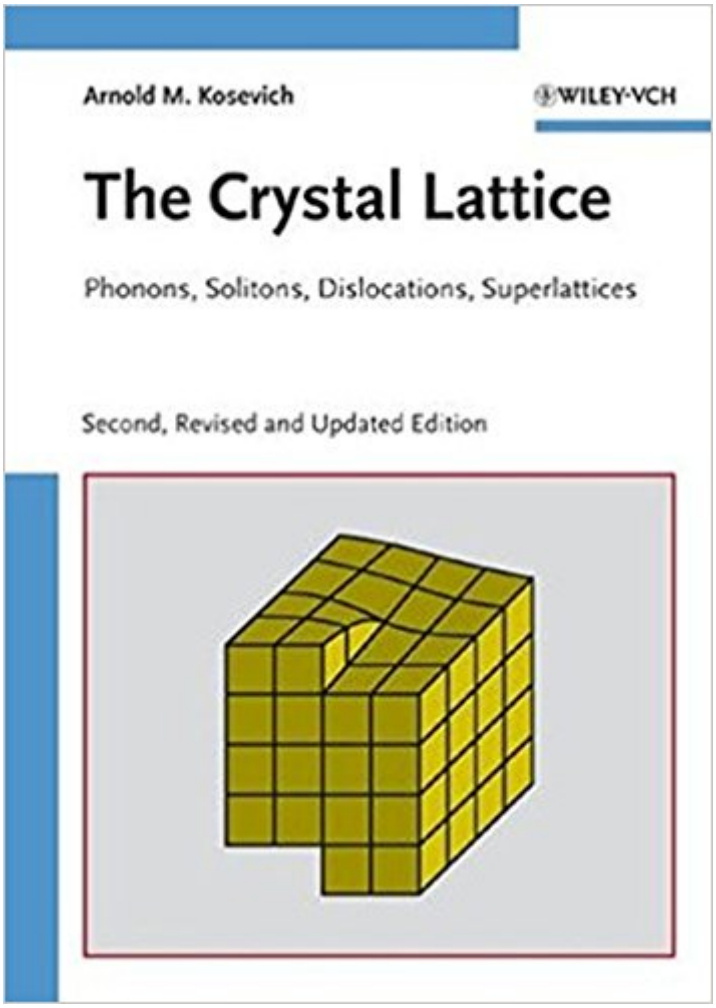
The Crystal Lattice: Phonons, Solitons, Dislocations, Superlattices



Synopsis

The aim of this successful book is to describe and analyse peculiarities of classical and quantum dynamics of a crystal as a spatially periodic structure. In the second revised and updated edition, the author focuses on low-dimensional models of crystals and on superlattices. Both traditional questions like the spectrum of vibrations, the idea of phonon gas, dislocations etc. and new aspects like the theory of quantum crystals, solitons in 1D crystals, dislocation theory of melting of 2D crystals etc. are discussed. The author gives an explanation of a set of phenomena which entered into solid state physics during the last decades. It is shown that the crystal properties are sensitive to the dimension of the crystal and its defect structure, and depend slightly on whether the periodic structure consists of atoms, or electrical dipoles, or magnetic moments (spins). Considerable attention is devoted to the dislocation mechanisms as a basis of the theory of plasticity and numerous technological applications of crystalline materials.

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Customer Reviews

First edition: "...this book...presents a unified treatment of both classical and recent aspects of crystal dynamics....of great help to solid-state physics graduate students, but also to well-trained researchers in this field."Ã¢â ¬â •Gilles Horowitz, Laboratoire des Materiaux Moleculaires CNRS Thiais (Euro Materials)

In Modern optics and electronics, the use of new crystalline materials makes it indispensable not only to know the structure of a device but also to understand the dynamics of Physical processes

occurring within it. This book provides the fundamentals of crystals dynamics. Classical and quantum mechanical models are introduced and both ideal and nonideal crystal lattices are considered. The topics discussed in this book comprise the spectrum of vibrations, the theory of phonon gas, solutions in ID crystals, the theory of quantum crystals, dislocation dynamics, the melting ofÃ Â 2D crystals, second sound in crystals, lattices of magnetic bubbles, and others. The second revised and updated edition contains a completely reorganized chapter on the one-dimensional crystal lattice. Furthermore, a new chapter on elastic superlattices has been added. considerable attention is devoted to the dislocation mechanisms as a basis of the theory of plasticity and numerous technological applications of crystalline materials.

Crystal Enlightenment: The Transforming Properties of Crystals and Healing Stones (Crystal Trilogy, Vol. 1) Song of the Dark Crystal #2 (Jim Henson’s The Dark Crystal)