



# Reconstructive Phase Transitions

By Vladimir Dmitriev

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This book deals with the phenomenological theory of first-order structural phase transitions, with a special emphasis on reconstructive transformations in which a group-subgroup relationship between the symmetries of the phases is absent. It starts with a unified presentation of the current approach to first-order phase transitions, using the more recent results of the Landau theory of phase transitions and of the theory of singularities. A general theory of reconstructive phase transitions is then formulated, in which the structures surrounding a transition are expressed in terms of density-waves, providing a natural definition of the transition order-parameters, and a description of the corresponding phase diagrams and relevant physical properties. The applicability of the theory is illustrated by a large number of concrete examples pertaining to the various classes of reconstructive transitions: allotropic transformations of the elements, displacive and order-disorder transformations in metals, alloys and related structures, crystal-quasicrystal transformations.

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## Reconstructive Phase Transitions By Vladimir Dmitriev Bibliography

- Rank: #7007336 in Books
- Brand: Brand: World Scientific Pub Co Inc
- Published on: 1996-01-15
- Original language: English
- Number of items: 1
- Dimensions: 8.50" h x 1.05" w x 6.30" l, 1.51 pounds
- Binding: Hardcover
- 397 pages

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### Editorial Review

#### About the Author

Pierre Toledano is Professor of Physics at the University of Amiens, France, where he started his academic career in 1990, after graduating from the University of Paris. Since obtaining his PhD in 1979, he has been Visiting Professor at the Universities of Stanford (1982) and Geneva (1984-85) before creating the Laboratory of Phase Transitions in Amiens. His research interests are in several areas of the theory of phase transitions: strongly first-order transitions in crystals and quasicrystals; phase transitions in liquid crystals and complex fluids; magnetic transitions in rare earth and actinide compounds; and unconventional superconductivity. He is the author, in collaboration with his brother Jean-Claude, of *The Landau Theory of Phase Transitions* (World Scientific Publishing, 1987).

Vladimir Dmitriev is Professor of Physics at the University of Rostov on the Don, Russia, where he graduated in 1971 and obtained his PhD in 1979. After a postdoctoral stay at the University of Liubliyana (1983-84) he created, at the Institute of Physics of the University of Rostov on the Don, the Laboratory of Raman and Infrared Spectroscopy. His research interests are both experimental and theoretical; spectrometric studies of ferroelectric-ferroelastic superionic compounds; theoretical models of structural phase transitions; and quasicrystalline materials.

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