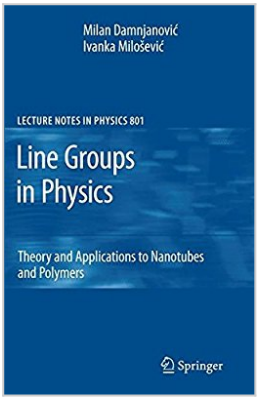

Line Groups in Physics: Theory and Applications to Nanotubes and Polymers (Lecture Notes in Physics, Vol. 801)

By Milan Damnjanovic, Ivanka Milosevic

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Over last decades low-dimensional materials are in focus of physics and chemistry as well as of material and other natural sciences. Like Vitaly Ginzburg has foreseen 30 years ago, low dimensionality offers physical phenomena and properties unseen in three-dimensional world. To see how thin ?lms and monomolecular layers realize such a prediction it suf?ces only to observe intensity of research devoted to recently synthesized graphene. Still, quasi-one-dimensional compounds are over long period established as the origin of the most important and most interesting discoveries of material science and solid state physics. To mention only deoxyribonucleic acid, the most important molecule in nature, and diversity of nanotubes and nanowires, the cornerstones of the present and future nanotechnology. Line groups, describing symmetry of quasi-one-dimensional materials, offer the deepest insight to their characteristic properties. Underlying many of the laws, they are very useful, but far from simple. This book is intended to explain them, their properties, and their most common applications. In particular, it is important to understand that the line groups are much wider class of symmetries than the well-known rod groups. While the latter describe only translationally periodical objects, line groups include symmetries of incommensurate periodical structures.

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Editorial Review

Review

From the reviews:

“The key words ‘line groups’ in the monograph’s title point to the coverage of the study, by group theoretical methods, of the symmetry of quasi-one-dimensional physical systems, the structure of which shows two distinct features … . In view of the huge rise of interest during the last decade in the investigation of such low-dimensional finite ‘nano’-systems … the monograph under review is a timely publication. … Well-done illustrative color figures help the reader to assimilate the arid evidence collected in the tables.” (Gh. Adam, Mathematical Reviews, Issue 2011 f)

From the Back Cover

This volume gives a detailed and up-to-date overview of the line groups, the groups that describe the symmetry of quasi-one dimensional crystals. Nanotubes, nanowires, nanosprings, nanorods, and polymers are examples remarkable enough to have kept nanoscience as a leading field within material science and solid state physics for more than fifteen years now. The authors present the mathematical foundations, including classifications of the line groups, quasi one-dimensional crystals and quantum numbers, together with important applications. Extensive illustrations related to the physics of nanotubes make the book essential reading in this field above all. The book clearly demonstrates how symmetry is a most profound property of nature and contains valuable results that are published here for the first time.

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Date of birth: 28 December 1962

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