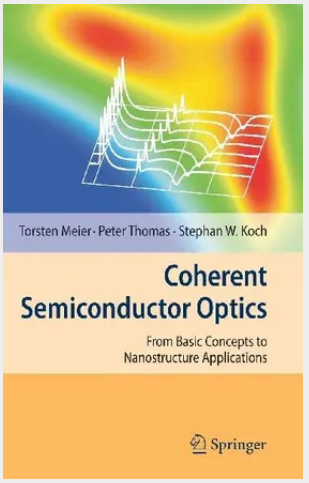
Meier / Thomas / Koch

Coherent Semiconductor Optics

From Basic Concepts to Nanostructure Applications



This is the most instructive textbook on the theory and optical effects of semiconductors. It introduces the basic theoretical concepts required for the analysis of the optical response of semiconductor systems in the coherent regime. Only basic knowledge of quantum mechanics is required for readers to benefit from the results presented in this book. The entire presentation is based on a one-dimensional tight-binding model. Starting with discrete-level systems, increasing complexity is added gradually to the model by including band-structure and many-particle interaction. Various linear and nonlinear optical spectra and temporal phenomena are studied. The analysis of many-body effects in nonlinear optical phenomena covers a major part of the book. The book is well suited as a textbook for advanced classes, for self-study, and for researchers interested in the field of semiconductor optics.

This book could not have been written without the extensive work of many diploma and Ph.D. students in our Theoretical Semiconductor Physics Group at the Philipps-Universit¿ at in Marburg. They have contributed to the f- damental understanding and to many applications in the area of coherent semiconductor optics. The one-dimensional tight-binding model, which is exclusively treated in the present book, has been the basis of many of their diploma and Ph.D. theses. The reader will ?nd references to their results and also their names as authors of the publications listed in the sections "S- gested Reading". In particular, the authors wish to thank Irina Kuznetsova, who prepared a large number of the ?gures and recalculated the underlying data on the basis of the equations presented in this book in cases where parameters or presentation had to be changed and/or optimized. Someoftheproblems,inparticular,thoseconnectedtothemoreintrod- tory chapters, were solved by Swantje Horst and Joachim Kalden. They made valuable suggestions for improved formulation of the problems and pointed out a number of hints we should give our readers in order to help them with the solutions. Furthermore, we wish to thank all our numerous collaborators, together with whom we have performed research in the area of coherent semiconductor optics in the past and present, for many valuable discussions. In particular, without the close cooperation between experiment and theory this research ?eld would not have advanced to the present level.

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