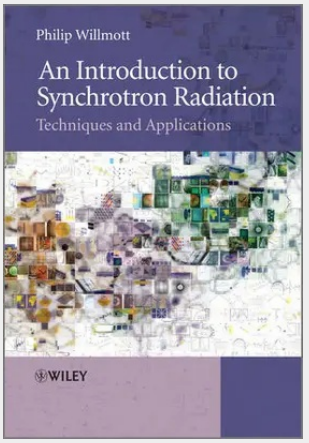
Willmott

An Introduction to Synchrotron Radiation



This book introduces the reader to the basic concepts of the generation and manipulation of synchrotron light, its interaction with matter, and the application of synchrotron light in the "classical" techniques, while including some of the most modern technological developments. As much as possible, complicated mathematical derivations and formulas are avoided. A more heuristic approach is adopted, whereby the general physical reasoning behind the equations is highlighted. Key features: * A general introduction to synchrotron radiation and experimental techniques using synchrotron radiation * Contains many detailed "worked examples" from the literature * Of interest for a broad audience - synchrotrons are possibly one of the best examples of multidisciplinary research * Four-colour presentation throughout

Since the first use of synchrotron light to investigate the properties of materials half a century ago, it has become increasingly recognized as an invaluable research tool by a broad spectrum of scientists, ranging from physicists and chemists, through molecular biologists and environmental scientists, to geologists and archaeologists. This rising demand for access to synchrotron radiation has also expressed itself in a recent increase in the construction of facilities worldwide to accommodate this diverse and burgeoning user community. Modern synchrotron facilities are therefore one of the premier examples of multidisciplinary research. Major applications of synchrotron light include condensed-matter physics, materials science, catalytical chemistry, structural biology, biological and soft-matter imaging, archaeology, and medicine. This book introduces the reader to the basic concepts of the generation and manipulation of synchrotron light, its interaction with matter, and the application of synchrotron light in classical techniques. As well as including fundamentals of the main experimental methods, many of the most recent technological developments are described, especially with regards to detectors, time-resolved studies, and the advent of fourth-generation sources. Detailed descriptions, including full-colour illustrations, of the underlying physics and experimental applications are presented, while worked examples facilitate learning from a practical perspective. Undergraduate and postgraduate students from all areas of natural and physical sciences working with synchrotron light will benefit from this informative text and its heuristic style. In addition, synchrotron scientists and facility staff will find this book a useful reference regarding essential synchrotron radiation techniques and beamline infrastructure, and in optimizing the use of synchrotron light in this rapidly developing multifaceted enterprise.

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