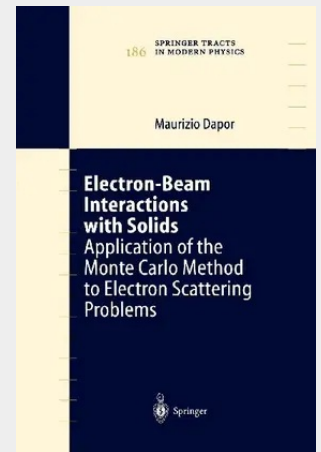


Electron-Beam Interactions with Solids

Application of the Monte Carlo Method to Electron Scattering Problems

The interaction of an electron beam with a solid target has been studied since the early part of the past century. Since 1960, the electron-solid interaction has become the subject of a number of investigators' work owing to its fundamental role in scanning electron microscopy, in electron-probe microanalysis, in Auger electron spectroscopy, in electron-beam lithography and in radiation damage. The interaction of an electron beam with a solid target has often been investigated theoretically by using the Monte Carlo method, a numerical procedure involving random numbers that is able to solve mathematical problems. This method is very useful for the study of electron penetration in matter. The probabilistic laws of the interaction of an individual electron with the atoms constituting the target are well known. Consequently, it is possible to compute the macroscopic characteristics of interaction processes by simulating a large number of real trajectories, and then averaging them. The aim of this book is to study the probabilistic laws of the interaction of individual electrons with atoms (elastic and inelastic cross-sections); to investigate selected aspects of electron interaction with matter (backscattering coefficients for bulk targets, absorption, backscattering and transmission for both supported and unsupported thin films, implantation profiles, secondary electron emission, and so on); and to introduce the Monte Carlo method and its applications to compute the macroscopic characteristics of the interaction processes mentioned above. The book compares theory, computational simulations and experimental data in order to offer a more global vision.

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