

About the Book

All solids are composed of atoms or molecules and in order to explain their behavior experiments and came forward. Simultaneously, many new materials were synthetically and systematically developed in the laboratories, properties of which needed to be understood before deploying them in various technologies. It is known that there is a strong correlation between structures and properties of materials. Therefore experiments on solids involve understanding their structure with diffraction techniques using x-rays, electrons or neutrons. The materials may be in different forms like bulk solid, thin films or powders and need to be observed using microscopes. Finally the properties can be correlated to electronic structure which can be deciphered through various spectroscopy techniques. Magnetic measurements give the insight in to electron-electron correlation. The advantages and limitations of the techniques are also spelled out. In words, this book takes into account the unaddressed needs of students and teachers associated with the experimental methods. Its relevance has increased manifold, as it accounts a wide scope of the topics in concise manner. For example, improving signal-to-noise ratio, cryogenic methods, vacuum science, sources and detectors for electrons photos (from Infra-red to gamma rays), error analysis, statistical handling of data are needed to be known by a good experimentalist and usually are not covered in any single book like present book.

Contents:

1. Introduction
2. Improving signal-to-noise ratio
3. Vacuum science and technology
4. Photons and electrons: sources, monochromators and detectors
5. Nuclear accelerators and detectors
6. Diffraction methods
7. Microscopy
8. Electron and optical spectroscopy
9. Magnetic spectroscopy, nuclear spectroscopy and magnetization measurements
10. Cryogenic temperature methods
11. Error analysis and statistical methods