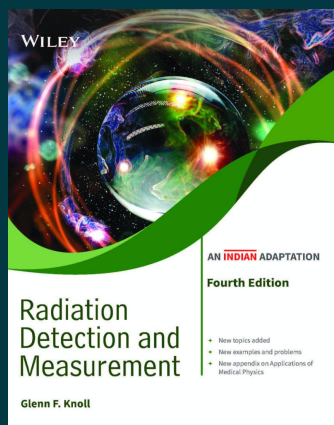




Radiation Detection and Measurement, 4ed (An Indian Adaptation)

By [Glenn F. Knoll](#)

Paperback

9789354644238

₹- Price

Pages: 924

Description

Radiation Detection and Measurement, fourth edition, is a classic textbook which provides the most up-to-date coverage of radiation detection and measurement. Focusing on the technical developments which continue to enhance the instruments and techniques available for the detection and spectroscopy of ionizing radiation, this edition covers many new materials being used as scintillators that can achieve energy resolution that is better by a factor of two compared with traditional materials.

About the Author

Glenn F. Knoll

Glenn Frederick Knoll is Professor of Nuclear Engineering and Radiological Sciences in the College of Engineering at the University of Michigan.

A.M. Vinodkumar

Department of Physics

University of Calicut, Kerala

Table of Contents

Dedication

Preface to the Adapted Edition

Preface to the US Edition

About the Author

Chapter 1 Radiation Sources

I. Units and Definitions

II. Fast Electron Sources

III. Heavy Charged Particle Sources

IV. Sources of Electromagnetic Radiation

V. Neutron Sources

Chapter 2 Radiation Interactions

I. Interaction of Heavy Charged Particles

II. Interaction of Fast Electrons

III. Interaction of Gamma Rays

IV. Interaction of Neutrons

V. Radiation Dosimetry

VI. Radiation Handling and Precautions

Chapter 3 Counting Statistics and Error Prediction

I. Characterization of Data

II. Statistical Models

III. Applications of Statistical Models

IV. Error Propagation

V. Optimization of Counting Experiments

VI. Limits of Detectability

VII. Distribution of Time Intervals

Chapter 4 General Properties of Radiation Detectors

I. Simplified Detector Model

II. Modes of Detector Operation

III. Pulse Height Spectra

IV. Counting Curves and Plateaus

V. Energy Resolution

VI. Detection Efficiency

VII. Dead Time

Chapter 5 Ionization Chambers

I. The Ionization Process in Gases

II. Charge Migration and Collection

III. Design and Operation of DC Ion Chambers

IV. Radiation Dose Measurement with Ion Chambers

V. Applications of DC Ion Chambers

VI. Pulse Mode Operation

Chapter 6 Proportional Counters

I. Gas Multiplication

II. Design Features of Proportional Counters

III. Proportional Counter Performance

IV. Detection Efficiency and Counting Curves

V. Variants of the Proportional Counter Design

VI. Micropattern Gas Detectors and Microchannel Plates

Chapter 7 Geiger-Mueller Counters

I. The Geiger Discharge

II. Fill Gases

III. Quenching

IV. Time Behavior

V. The Geiger Counting Plateau

VI. Design Features

VII. Counting Efficiency

VIII. Time-to-First-Count Method

IX. G-M Survey Meters

Chapter 8 Scintillation Detector Principles

I. Organic Scintillators

II. Inorganic Scintillators

III. Light Collection and Scintillator Mounting

Chapter 9 Photomultiplier Tubes and Photodiodes

I. Introduction

II. The Photocathode

III. Electron Multiplication

IV. Photomultiplier Tube Characteristics

V. Ancillary Equipment Required with Photomultiplier Tubes

VI. Photodiodes as Substitutes for Photomultiplier Tubes

VII. Scintillation Pulse Shape Analysis

VIII. Hybrid Photomultiplier Tubes

IX. Position-Sensing Photomultiplier Tubes

X. Photoionization Detectors

Chapter 10 Radiation Spectroscopy with Scintillators

I. General Considerations in Gamma-Ray Spectroscopy

II. Gamma-Ray Interactions

III. Predicted Response Functions

IV. Properties of Scintillation Gamma-Ray Spectrometers

V. Response of Scintillation Detectors to Neutrons

VI. Electron Spectroscopy with Scintillators

VII. Specialized Detector Configurations Based on Scintillation

Chapter 11 Semiconductor Diode Detectors

I. Semiconductor Properties

II. The Action of Ionizing Radiation in Semiconductors

III. Semiconductors as Radiation Detectors

IV. Semiconductor Detector Configurations

V. Operational Characteristics

VI. Applications of Silicon Diode Detectors

Chapter 12 Germanium Gamma-Ray Detectors

I. General Considerations

II. Configurations of Germanium Detectors

III. Germanium Detector Operational Characteristics

IV. Gamma-Ray Spectroscopy with Germanium Detectors

Chapter 13 Other Solid-State Detectors

I. Lithium-Drifted Silicon Detectors

II. Semiconductor Materials Other Than Silicon or Germanium

III. Avalanche Detectors

IV. Photoconductive Detectors

V. Position-Sensitive Semiconductor Detectors

Chapter 14 Slow Neutron Detection Methods

I. Nuclear Reactions of Interest in Neutron Detection

II. Detectors Based on the Boron Reaction

III. Detectors Based on Other Conversion Reactions

IV. Reactor Instrumentation

Chapter 15 Fast Neutron Detection and Spectroscopy

I. Counters Based on Neutron Moderation

II. Detectors Based on Fast Neutron-Induced Reactions

III. Detectors That Utilize Fast Neutron Scattering

Chapter 16 Pulse Processing

I. Overview of Pulse Processing

II. Device Impedances

III. Coaxial Cables

IV. Linear and Logic Pulses

V. Instrument Standards

VI. Summary of Pulse-Processing Units

VII. Application-Specific Integrated Circuits (ASICs)

VIII. Components Common to Many Applications

Chapter 17 Pulse Shaping, Counting, and Timing

I. Pulse Shaping

II. Pulse Counting Systems

III. Pulse Height Analysis Systems

IV. Digital Pulse Processing

V. Systems Involving Pulse Timing

VI. Pulse Shape Discrimination

Chapter 18 Multichannel Pulse Analysis

I. Single-Channel Methods

II. General Multichannel Characteristics

III. The Multichannel Analyzer

IV. Spectrum Stabilization and Relocation

V. Spectrum Analysis

Chapter 19 Miscellaneous Detector Types

I. Time Projection Chamber

II. Cherenkov Detectors

III. Gas-Filled Detectors in Self-Quenched Streamer Mode

IV. High-Pressure Xenon Spectrometers

V. Liquid Ionization and Proportional Counters

VI. Cryogenic Detectors

VII. Photographic Emulsions

VIII. Thermoluminescent Dosimeters and Image Plates

IX. Track-Etch Detectors

X. Superheated Drop or “Bubble Detectors”

XI. Neutron Detection by Activation

XII. Detection Methods Based on Integrated Circuit Components

XIII. List of Radiation Detector Experimental Facilities in India

Chapter 20 Background and Detector Shielding

I. Sources of Background

II. Background in Gamma-Ray Spectra

III. Background in Other Detectors

IV. Shielding Materials

V. Active Methods of Background Reduction

Problems

References

Appendix A The NIM, CAMAC, and VME Instrumentation Standards

Appendix B Derivation of the Expression for Sample Variance in Chapter 3

Appendix C Statistical Behavior of Counting Data for Variable Mean Value

Appendix D The Shockley-Ramo Theorem for Induced Charge

Appendix E Applications of Medical Physics

Credits

Index

To purchase this product, please visit:

<https://www.wileyindia.com/radiation-detection-and-measurement-4ed-an-indian-adaptation.html>



Scan to buy