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| Nota di contenuto | Front Cover; Physics and Engineering of Radiation Detection; Copyright Page; Contents; Preface; Chapter 1 Properties and Sources of Radiation; 1.1 Types of Radiation; 1.2 Waves or Particles?; 1.3 Radioactivity and Radioactive Decay; 1.3.A: Decay Energy or Q-Value; 1.3.B: The Decay Equation; 1.3.C: Composite Radionuclides; 1.3.D: Radioactive Chain; 1.3.E: Decay Equilibrium; 1.3.F: Branching Ratio; 1.3.G: Units of Radioactivity; 1.4 Activation; 1.5 Sources of Radiation; 1.5.A: Natural Sources; 1.5.B: Man-Made Sources; 1.6 General Properties and Sources of Particles and Waves; 1.6.A: Photons 1.6.B: Electrons 1.6.C: Positrons; 1.6.D: Protons; 1.6.E: Neutrons; 1.6.F: Alpha Particles; 1.6.G: Fission Fragments; 1.6.H: Muons, Neutrinos and other Particles; Chapter 2 Interaction of Radiation with Matter; 2.1 Some Basic Concepts and Terminologies; 2.1.A: Inverse Square Law; 2.1.B: Cross Section; 2.1.C: Mean Free Path; 2.1.D: Radiation Length; 2.1.E: Conservation Laws; 2.2 Types of Particle Interactions; 2.2.A: Elastic Scattering; 2.2.B: Inelastic Scattering; 2.2.C: Annihilation; 2.2.D: Bremsstrahlung; 2.2.E: Cherenkov Radiation; 2.3 Interaction of Photons with Matter 2.3.A: Interaction Mechanisms 2.3.B: Passage of Photons through Matter; 2.4 Interaction of Heavy Charged Particles with Matter; 2.4.A: Rutherford Scattering; 2.4.B: Passage of Charged Particles through |

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| | Matter; 2.4.C: Bragg Curve; 2.4.D: Energy Straggling; 2.4.E: Range and Range Straggling; 2.5 Interaction of Electrons with Matter; 2.5.A: Interaction Modes; 2.5.B: Passage of Electrons through Matter; 2.5.C: Energy Straggling; 2.5.D: Range of Electrons; 2.6 Interaction of Neutral Particles with Matter; 2.6.A: Neutrons; 2.7 Problems; Chapter 3 Gas Filled Detectors 3.1 Production of Electron-Ion Pairs 3.2 Diffusion and Drift of Charges in Gases; 3.2.A: Diffusion in the Absence of Electric Field; 3.2.B: Drift of Charges in Electric Field; 3.2.C: Effects of Impurities on Charge Transport; 3.3 Regions of Operation of Gas Filled Detectors; 3.3.A: Recombination Region; 3.3.B: Ion Chamber Region; 3.3.C: Proportional Region; 3.3.D: Region of Limited Proportionality; 3.3.E: Geiger-Mueller Region; 3.3.F: Continuous Discharge; 3.4 Ionization Chambers; 3.4.A: Current Voltage Characteristics; 3.4.B: Mechanical Design; 3.4.C: Choice of Gas 3.4.D: Special Types of Ion Chambers 3.4.E: Applications of Ion Chambers; 3.4.F: Advantages and Disadvantages of Ion Chambers; 3.5 Proportional Counters; 3.5.A: Multiplication Factor; 3.5.B: Choice of Gas; 3.5.C: Special Types of Proportional Counters; 3.6.B: Dead Time; 3.6.C: Choice of Gas; 3.6.D: Quenching; 3.6.E: Advantages and Disadvantages of GM Counters; 3.7 Sources of Error in Gaseous Detectors; 3.7.A: Recombination Losses; 3.7.B: Effects of Contaminants; 3.7.C: Effects of Space Charge Buildup; 3.8 Detector Efficiency 3.8.A: Signal-to-Noise Ratio |
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| Sommario/riassunto | This book presents an overview of the physics of radiation detection and its applications. It covers the origins and properties of different kinds of ionizing radiation, their detection and measurement, and the procedures used to protect people and the environment from their potentially harmful effects. It details the experimental techniques and instrumentation used in different detection systems in a very practical way without sacrificing the physics content. It provides useful formulae and explains methodologies to solve problems related to radiation measurements. With abundance of worked-ou |