Radiation Detection and Measurement: Detection of Optical and Infrared Radiation
Detector Systems
Physics for Radiation Protection
Semiconductor Detector Systems
Radiation Detection and Measurement: Basic Health Physics
Advanced Radiation Protection Dosimetry: Solutions Manual to Accompany Measurement and Detection of Radiation
Exercises with Solutions in Radiation Physics
Physics and Engineering of Radiation Detection
Student Solutions Manual to Accompany Radiation Detection and Measurement, 4e
Radiation Sensors with 3D Electrodes
Radiation Detection Systems
Physics and Engineering of Radiation Detection
Compound Semiconductor Radiation Detectors
Radiation Detection for Nuclear Physics
Radiation Detectors for Medical Imaging
Physics and Engineering of Radiation Detection
Semiconductor Radiation Detection Systems
Advanced Materials for Radiation Detection
Techniques for Nuclear and Particle Physics Experiments
An Introduction to the Physics of Nuclear Medicine
Semiconductor Radiation Detectors
Evolution of Ionizing Radiation Research

Electronics for Radiation Detection: Although many radiation protection scientists and engineers use dose coefficients, few know the origin of those dose coefficients. This is the first book in over 40 years to address the topic of radiation protection dosimetry in intimate detail. Advanced Radiation Protection Dosimetry covers all methods used in radiation protection dosimetry, including advanced external and internal radiation dosimetry concepts and regulatory applications. This book is an ideal reference for both scientists and practitioners in radiation protection and students in graduate health physics and medical physics courses. Features: A much-needed book filling a gap in the market in a rapidly expanding area Contains the history, evolution, and the most up-to-date computational dosimetry models Authored and edited by internationally recognized authorities and subject area specialists Interrogates both the origins and methodologies of dose coefficient calculation Incorporates the latest international guidance for radiation dosimetry and protection

Measurement and Detection of Radiation, 2nd Edition
Radiation Detection: Concepts, Methods, and Devices provides a modern overview of radiation detection devices and radiation measurement methods. The book topics have been selected on the basis of the authors’ many years of experience designing radiation detectors and teaching radiation detection and measurement in a classroom environment. This book is designed to give the reader more than a glimpse at radiation detection devices and a few packaged equations. Rather it seeks to provide an understanding that allows the reader to choose the appropriate detection technology for a particular application, to design detectors, and to competently perform radiation measurements. The authors describe assumptions used to derive frequently encountered equations used in radiation detection and measurement, thereby providing insight when and when not to apply the many approaches used in different aspects of radiation detection. Detailed in many of the chapters are specific aspects of radiation detectors, including comprehensive reviews of the historical development and current state of each topic. Such a review necessarily entails citations to many of the important discoveries, providing a resource to find quickly additional and
more detailed information. This book generally has five main themes: Physics and Electrostatics needed to Design Radiation Detectors Properties and Design of Common Radiation Detectors Description and Modeling of the Different Types of Radiation Detectors Radiation Measurements and Subsequent Analysis Introductory Electronics Used for Radiation Detectors Topics covered include atomic and nuclear physics, radiation interactions, sources of radiation, and background radiation. Detector operation is addressed with chapters on radiation counting statistics, radiation source and detector effects, electrostatics for signal generation, solid-state and semiconductor physics, background radiations, and radiation counting and spectroscopy. Detectors for gamma-rays, charged-particles, and neutrons are detailed in chapters on gas-filled, scintillator, semiconductor, thermoluminescence and optically stimulated luminescence, photographic film, and a variety of other detection devices.

Radiation Detection and Measurement

Detection of Optical and Infrared Radiation Assuming a basic knowledge of calculus, differential equations and some atomic physics, this classic bestseller enables students to select the proper detector, analyze the results of counting experiments, and perform radiation measurements following proper health physics procedures. Examples and problems in each chapter ensure that students understand the concepts presented. The book cover long-range alpha detector LRAD, pure geranium detectors, magnetic and electrostatic spectrometers, position-sensitive detectors, the LSL-M2 unfolding code, compensated ion chambers, self-powered neutron detectors, new protection guides, and exposure limits. A solutions manual is available for qualifying instructors.

Radiation Detection Systems Physics and Engineering of Radiation Detection 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. The second edition is fully revised and provides the latest developments in detector technology and analyses software. Also, more material related to measurements in particle physics and a complete solutions manual have been added. Discusses the experimental techniques and instrumentation used in different detection systems in a very practical way without sacrificing the physics content Provides useful formulae and explains methodologies to solve problems related to radiation measurements Contains many worked-out examples and end-of-chapter problems Detailed discussions on different detection media, such as gases, liquids, liquefied gases, semiconductors, and scintillators Chapters on statistics, data analysis techniques, software for data analysis, and data acquisition systems

Physics for Radiation Protection Integrating aspects of engineering, application physics, and medical science, Solid-State Radiation Detectors: Technology and Applications offers a comprehensive review of new and emerging solid-state materials-based technologies for radiation detection. Each chapter is structured to address the current advantages and challenges of each material and technology presented, as well as to discuss novel research and applications. Featuring contributions from leading experts in industry and academia, this authoritative text: Covers modern semiconductors used for radiation monitoring Examines CdZnTe and CdTe technology for imaging applications including three-dimensional capability detectors Highlights interconnect technology for current pixel detectors Describes hybrid pixel detectors and their characterizations Tackles the integrated analog signal processing read-out front ends for particle detectors Considers new organic materials with direct bandgap for direct energy detection Summarizes recent developments involving lanthanum halide and cerium bromide scintillators Analyzes the potential of recent progress in the field of crystallogenensis, quantum dots, and photonics crystals toward a new concept of x- and gamma-ray detectors based on metamaterials.
Explores position-sensitivity photomultipliers and silicon photomultipliers for scintillation crystals Solid-State Radiation Detectors: Technology and Applications provides a valuable reference for engineers and scientists looking to enhance the performance of radiation detector technology for medical imaging and other applications.

Semiconductor Detector Systems Radiation Detectors for Medical Imaging discusses the current state of the art and future prospects of photon-counting detectors for medical imaging applications. Featuring contributions from leading experts and pioneers in their respective fields, this book: describes x-ray spectral imaging detectors based on cadmium zinc telluride (CdZnTe) and cadmium telluride (CdTe) materials presents novel computed tomography (CT) and x-ray clinical applications of photon-counting detectors considers the future use of CT scanners as both an anatomical and a functional modality in areas typically reserved for nuclear medicine techniques addresses pulse buildup, incomplete charge collection, and other phenomena that can degrade the spectral response of photon-counting detectors examines silicon photomultipliers used in single-photon emission computed tomography (SPECT) and positron emission tomography (PET) systems.

Radiation on Detection and Measurement Semiconductor Radiation Detection Systems addresses the state-of-the-art in the design of semiconductor detectors and integrated circuit design, in the context of medical imaging using ionizing radiation. It addresses exciting new opportunities in X-ray detection, computer tomography (CT), bone dosimetry, and nuclear medicine (PET, SPECT). In addition to medical imaging, the book explores other applications of semiconductor radiation detection systems in security applications such as luggage scanning, dirty bomb detection, and border control. Features a chapter written by well-known Gamma-Ray Imaging authority Tadayuki Takahashi Assembled by a combination of top industrial experts and academic professors, this book is more than just a product manual. It is practical enough to provide a solid explanation of presented technologies, incorporating material that offers an optimal balance of scientific and academic theory. With less of a focus on math and physical details, the author concentrates more on exploring exactly how technologies are being used. With its combined coverage of new materials and innovative new system approaches, as well as a succinct overview of recent developments, this book is an invaluable tool for any engineer, professional, or student working in electronics or an associated field.

Solutions Manual to Accompany Radiation Detection and Measurement The industrial and medical applications of radiation have been augmented and scientific insight into mechanisms for radiation action notably progressed. In addition, the public concern about radiation risk has also grown extensively. Today the importance of risk communication among stakeholders involved in radiation-related issues is emphasized much more than any time in the past. Thus, the circumstances of radiation research have drastically changed, and the demand for a novel approach to radiation-related issues is increasing. It is thought that the publication of the book Evolution of Ionizing Radiation Research at this time would have enormous impacts on the society. The editor believes that technical experts would find a variety of new ideas and hints in this book that would be helpful to them to tackle ionizing radiation.

Radiation Detection and Measurement This text treats the fundamentals of optical and infrared detection in terms of the behavior of the radiation field, the physical properties of the detector, and the statistical behavior of the detector output. Both incoherent and coherent detection are treated in a unified manner, after which selected applications are analyzed, following an analysis of atmospheric effects and signal statistics. The material was developed during a one-semester course at M.I.T. in 1975, revised and presented
again in 1976 at Lincoln Laboratory, and rewritten for publication in 1977. Chapter 1 reviews the derivation of Planck's thermal radiation law and also presents several fundamental concepts used throughout the text. These include the three thermal distribution laws (Boltzmann, Fermi-Dirac, Bose Einstein), spontaneous and stimulated emission, and the definition and counting of electromagnetic modes of space. Chapter 2 defines and analyzes the perfect photon detector and calculates the ultimate sensitivity in the presence of thermal radiation. In Chapter 3, we turn from incoherent or power detection to coherent or heterodyne detection and use the concept of orthogonal spatial modes to explain the antenna theorem and the mixing theorem. Chapters 4 through 6 then present a detailed analysis of the sensitivity of vacuum and semiconductor detectors, including the effects of amplifier noise.

Basic Health Physics The aim of this book is to educate the reader on radiation detectors, from sensor to read-out electronics to application. Relatively new detector materials, such as CdZTe and Cr compensated GaAs, are introduced, along with emerging applications of radiation detectors. This X-ray technology has practical applications in medical, industrial, and security applications. It identifies materials based on their molecular composition, not densities as the traditional transmission equipment does. With chapters written by an international selection of authors from both academia and industry, the book covers a wide range of topics on radiation detectors, which will satisfy the needs of both beginners and experts in the field.

Advanced Radiation Protection Dosimetry There is a growing need to understand and combat potential radiation damage problems in semiconductor devices and circuits. Assessing the billion-dollar market for detection equipment in the context of medical imaging using ionizing radiation, Electronics for Radiation Detection presents valuable information that will help integrated circuit (IC) designers and other electronics professionals take full advantage of the tremendous developments and opportunities associated with this burgeoning field. Assembling contributions from industrial and academic experts, this book—Addresses the state of the art in the design of semiconductor detectors, integrated circuits, and other electronics used in radiation detection—Analyzes the main effects of radiation in semiconductor devices and circuits, paying special attention to degradation observed in MOS devices and circuits when they are irradiated—Explains how circuits are built to deal with radiation, focusing on practical information about how they are being used, rather than mathematical details Radiation detection is critical in space applications, nuclear physics, semiconductor processing, and medical imaging, as well as security, drug development, and modern silicon processing techniques. The authors discuss new opportunities in these fields and address emerging detector technologies, circuit design techniques, new materials, and innovative system approaches. Aimed at postgraduate researchers and practicing engineers, this book is a must for those serious about improving their understanding of electronics used in radiation detection. The information presented here can help you make optimal use of electronic detection equipment and stimulate further interest in its development, use, and benefits.

Solutions Manual to Accompany Measurement and Detection of Radiation This is the resource that engineers turn to in the study of radiation detection. The fourth edition takes into account the technical developments that continue to enhance the instruments and techniques available for the detection and spectroscopy of ionizing radiation. New coverage is presented on ROC curves, micropattern gas detectors, new sensors for scintillation light, and the excess noise factor. Revised discussions are also included on TLDs and cryogenic spectrometers, radiation backgrounds, and the VME standard. Engineers will gain a strong understanding of the field with this updated book.

Exercises with Solutions in Radiation Physics Radiation Detection: Concepts, Methods, and Devices provides a modern overview of radiation detection devices and radiation
measurement methods. The book topics have been selected on the basis of the authors’ many years of experience designing radiation detectors and teaching radiation detection and measurement in a classroom environment. This book is designed to give the reader more than a glimpse at radiation detection devices and a few packaged equations. Rather it seeks to provide an understanding that allows the reader to choose the appropriate detection technology for a particular application, to design detectors, and to competently perform radiation measurements. The authors describe assumptions used to derive frequently encountered equations used in radiation detection and measurement, thereby providing insight when and when not to apply the many approaches used in different aspects of radiation detection. Detailed in many of the chapters are specific aspects of radiation detectors, including comprehensive reviews of the historical development and current state of each topic. Such a review necessarily entails citations to many of the important discoveries, providing a resource to find quickly additional and more detailed information. This book generally has five main themes: Physics and Electrostatics needed to Design Radiation Detectors Properties and Design of Common Radiation Detectors Description and Modeling of the Different Types of Radiation Detectors Radiation Measurements and Subsequent Analysis Introductory Electronics Used for Radiation Detectors Topics covered include atomic and nuclear physics, radiation interactions, sources of radiation, and background radiation. Detector operation is addressed with chapters on radiation counting statistics, radiation source and detector effects, electrostatics for signal generation, solid-state and semiconductor physics, background radiations, and radiation counting and spectroscopy. Detectors for gamma-rays, charged-particles, and neutrons are detailed in chapters on gas-filled, scintillator, semiconductor, thermoluminescence and optically stimulated luminescence, photographic film, and a variety of other detection devices.

Physics and Engineering of Radiation Detection Written by the leading names in this field, this book introduces the technical properties, design and fabrication details, measurement results, and applications of three-dimensional silicon radiation sensors. Such devices are currently used in the ATLAS experiment at the European Centre for Particle Physics (CERN) for particle tracking in high energy physics. These sensors are the radiation hardest devices ever fabricated and have applications in ground-breaking research in neutron detection, medical dosimetry and space technologies and more. Chapters explore the essential features of silicon particle detectors, interactions of radiation with matter, radiation damage effects, and micro-fabrication, in addition to a providing historical overview of the field. This book will be a key reference for students and researchers working with sensor technologies. Features: The first book dedicated to this unique and growing subject area, which is also widely applicable in high-energy physics, medical physics, space science and beyond Authored by Sherwood Parker, the inventor of the concept of 3D detectors; Cinzia Da Vià, who has brought 3DSi technology to application; and Gian-Franco Dalla Betta, a leading figure in the design and fabrication technology of these devices Explains to non-experts the essential features of silicon particle detectors, interactions of radiation with matter, radiation damage effects, and micro-fabrication

Student Solutions Manual to accompany Radiation Detection and Measurement, 4e

Radiation Sensors with 3D Electrodes Radiation detection is key to experimental nuclear physics as well as underpinning a wide range of applications in nuclear decommissioning, homeland security and medical imaging. This book presents the state-of-the-art in radiation detection of light and heavy ions, beta particles, gamma rays and neutrons. The underpinning physics of different detector technologies is presented, and their performance is compared and contrasted. Detector technology likely to be encountered in contemporary international laboratories is also emphasized. There is a strong focus on experimental design and mapping detector technology to the needs of a particular measurement problem. This book will be invaluable to PhD students in experimental
nuclear physics and nuclear technology, as well as undergraduate students encountering projects based on radiation detection for the first time. Part of IOP Series in Nuclear Spectroscopy and Nuclear Structure.

Radiation Detection

Radiation Detection Systems Although elemental semiconductors such as silicon and germanium are standard for energy dispersive spectroscopy in the laboratory, their use for an increasing range of applications is becoming marginalized by their physical limitations, namely the need for ancillary cooling, their modest stopping powers, and radiation intolerance. Compound semiconductor

Physics and Engineering of Radiation Detection Semiconductor sensors patterned at the micron scale combined with custom-designed integrated circuits have revolutionized semiconductor radiation detector systems. Designs covering many square meters with millions of signal channels are now commonplace in high-energy physics and the technology is finding its way into many other fields, ranging from astrophysics to experiments at synchrotron light sources and medical imaging. This book is the first to present a comprehensive discussion of the many facets of highly integrated semiconductor detector systems, covering sensors, signal processing, transistors and circuits, low-noise electronics, and radiation effects. The diversity of design approaches is illustrated in a chapter describing systems in high-energy physics, astronomy, and astrophysics. Finally a chapter "Why things don't work" discusses common pitfalls. Profusely illustrated, this book provides a unique reference in a key area of modern science.

Compound Semiconductor Radiation Detectors The textbook begins with exercises related to radioactive sources and decay schemes. The problems covered include series decay and how to determine the frequency and energy of emitted particles in disintegrations. The next chapter deals with the interaction of ionizing radiation, including the treatment of photons and charged particles. The main focus is on applications based on the knowledge of interaction, to be used in subsequent work and courses. The textbook then examines detectors and measurements, including both counting statistics and properties of pulse detectors. The chapter that follows is dedicated to dosimetry, which is a major subject in medical radiation physics. It covers theoretical applications, such as different equilibrium situations and cavity theories, as well as experimental dosimetry, including ionization chambers and solid state and liquid dosimeters. A shorter chapter deals with radiobiology, where different cell survival models are considered. The last chapter concerns radiation protection and health physics. Both radioecology and radiation shielding calculations are covered. The textbook includes tables to simplify the solutions of the exercises, but the reader is mainly referred to important websites for importing necessary data.

Radiation Detection for Nuclear Physics A highly practical reference for health physicists and other professionals, addressing practical problems in radiation protection, this new edition has been completely revised, updated and supplemented by such new sections as log-normal distribution and digital radiography, as well as new chapters on internal radiation dose and the environmental transport of radionuclides. Designed for readers with limited as well as basic science backgrounds, the handbook presents clear, thorough and up-to-date explanations of the basic physics necessary. It provides an overview of the major discoveries in radiation physics, plus extensive discussion of radioactivity, including sources and materials, as well as calculational methods for radiation exposure, comprehensive appendices and more than 400 figures. The text draws substantially on current resource data available, which is cross-referenced to standard compendiums, providing decay schemes and emission energies for approximately 100 of the most common radionuclides encountered by practitioners. Excerpts from the Chart of the Nuclides, activation cross sections, fission yields, fission-product chains, photon
attenuation coefficients, and nuclear masses are also provided. Throughout, the author emphasizes applied concepts and carefully illustrates all topics using real-world examples as well as exercises. A much-needed working resource for health physicists and other radiation protection professionals.

Radiation Detectors for Medical Imaging Analog Electronics for Radiation Detection showcases the latest advances in readout electronics for particle, or radiation, detectors. Featuring chapters written by international experts in their respective fields, this authoritative text: Defines the main design parameters of front-end circuitry developed in microelectronics technologies Explains the basis for the use of complementary metal–oxide semiconductor (CMOS) image sensors for the detection of charged particles and other non-consumer applications Delivers an in-depth review of analog-to-digital converters (ADCs), evaluating the pros and cons of ADCs integrated at the pixel, column, and per-chip levels Describes incremental sigma-delta ADCs, time-to-digital converter (TDC) architectures, and digital pulse-processing techniques complementary to analog processing Examines the fundamental parameters and front-end types associated with silicon photomultipliers used for single visible-light photon detection Discusses pixel sensors with per-pixel TDCs, channel density challenges, and emerging 3D technologies interconnecting detectors and electronics Thus, Analog Electronics for Radiation Detection provides a single source for state-of-the-art information on analog electronics for the readout of radiation detectors.

Physics and Engineering of Radiation Detection The advances in semiconductor detectors, scintillators, photodetectors such as silicon photomultipliers (SiPM), and readout electronics have experienced tremendous growth in recent years in terms of basic technologies and variety of applications. The second edition of the book Radiation Detection Systems presents variety of radiation detection systems giving readers a broad view of the state-of-the-art in the design of detectors, front-end electronics and systems offering optimized choices of the detection tools for a particular application. The new edition has been divided into two volumes. This first volume, on Sensor Materials, Systems, Technology and Characterization Measurements puts emphasis on sensor materials, detector structures, front electronics technology and their designs as well as system optimization for different applications. Also, the book include characterization measurements of the developed detection systems. Featuring contributions from leading experts and pioneers in their respective fields, this book describes progress in growth technologies of cadmium zinc telluride (CdZnTe) and cadmium telluride (CdTe) materials shows variety of specific detector structure designs and their integration with front-end amplification/processing electronics presents detection systems based on CdZnTe and CdTe detector technologies that are optimized for specific applications. The designed systems are characterized in terms of their spectral responses, spatial and timing resolutions addresses incomplete charge collection, pulse pileup, charge sharing between neighboring detector pixels and other phenomena that can degrade the spectral response of photon-counting detectors reports new developments of silicon photomultipliers used for reading the light from scintillators that starting to make a big impact particularly in the design concepts of novel medical instrumentation With its combined coverage of new materials and innovative new system approaches, as well as a succinct overview of recent developments, this book is an invaluable tool for any engineer, professional, or student working in electronics or an associated field. Readers can refer to the second book to get a detailed understanding of more specific applications of the detection systems in medical imaging, industrial testing and security applications.

Semiconductor Radiation Detection Systems

Advanced Materials for Radiation Detection 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-out examples and end-of-chapter problems, this book enables the reader to understand the underlying physical principles and their applications. Detailed discussions on different detection media, such as gases, liquids, liquefied gases, semiconductors, and scintillators make this book an excellent source of information for students as well as professionals working in related fields. Chapters on statistics, data analysis techniques, software for data analysis, and data acquisition systems provide the reader with necessary skills to design and build practical systems and perform data analysis. * Covers the modern techniques involved in detection and measurement of radiation and the underlying physical principles * Illustrates theoretical and practical details with an abundance of practical, worked-out examples * Provides practice problems at the end of each chapter

Semiconductor Radiation Detectors This new edition of the methods and instrumentation used in the detection of ionizing radiation has been revised and updated to reflect recent advances. It covers modern engineering practice, provides useful design information and contains an up-to-date review of the literature.

Techniques for Nuclear and Particle Physics Experiments Choice Recommended Title, July 2020 Bringing together material scattered across many disciplines, Semiconductor Radiation Detectors provides readers with a consolidated source of information on the properties of a wide range of semiconductors; their growth, characterization and the fabrication of radiation sensors with emphasis on the X- and gamma-ray regimes. It explores the promise and limitations of both the traditional and new generation of semiconductors and discusses where the future in semiconductor development and radiation detection may lie. The purpose of this book is two-fold; firstly to serve as a text book for those new to the field of semiconductors and radiation detection and measurement, and secondly as a reference book for established researchers working in related disciplines within physics and engineering. Features: The only comprehensive book covering this topic Fully up-to-date with new developments in the field Provides a wide-ranging source of further reference material

An Introduction to the Physics of Nuclear Medicine This book offers readers an overview of some of the most recent advances in the field of advanced materials used for gamma and X-ray imaging. Coverage includes both technology and applications, with an in-depth review of the research topics from leading specialists in the field. Emphasis is on high-Z materials like CdTe, CZT and GaAs, as well as perovskite crystals, since they offer the best implementation possibilities for direct conversion X-ray detectors. Authors discuss material challenges, detector operation physics and technology and readout integrated circuits required to detect signals processes by high-Z sensors. Provides coverage of a broad range of topics, from international experts in academia and industry; Includes in-depth analysis of how to optimize X-ray detection and electronics for X-ray detection; Covers both technology and applications in a number of different domains.

Semiconductor Radiation Detectors The complexity and vulnerability of the human body has driven the development of a diverse range of diagnostic and therapeutic techniques in modern medicine. The Nuclear Medicine procedures of Positron Emission Tomography (PET), Single Photon Emission Computed Tomography (SPECT) and Radionuclide Therapy are well-established in clinical practice and are founded upon the principles of radiation physics. This book will offer an insight into the physics of nuclear medicine by explaining the principles of radioactivity, how radionuclides are produced and administered as
radiopharmaceuticals to the body and how radiation can be detected and used to produce images for diagnosis. The treatment of diseases such as thyroid cancer, hyperthyroidism and lymphoma by radionuclide therapy will also be explored.

Solid-State Radiation Detectors A straightforward presentation of the broad concepts underlying radiological physics and radiation dosimetry for the graduate-level student. Covers photon and neutron attenuation, radiation and charged particle equilibrium, interactions of photons and charged particles with matter, radiotherapy dosimetry, as well as photographic, calorimetric, chemical, and thermoluminescence dosimetry. Includes many new derivations, such as Kramers X-ray spectrum, as well as topics that have not been thoroughly analyzed in other texts, such as broad-beam attenuation and geometrics, and the reciprocity theorem. Subjects are laid out in a logical sequence, making the topics easier for students to follow. Supplemented with numerous diagrams and tables.

Analog Electronics for Radiation Detection The advances in semiconductor detectors, scintillators, photodetectors such as silicon photomultipliers (SiPM), and readout electronics have experienced tremendous growth in recent years in terms of basic technologies and a variety of applications. The second edition of Radiation Detection Systems presents variety of radiation detection systems, giving readers a broad view of the state-of-the-art in the design of detectors, front-end electronics, and systems offering optimized choices of the detection tools for a particular application. The new edition has been divided into two volumes. This volume on Medical Imaging, Industrial Testing, and Security Applications presents specific applications of the detection systems in medical imaging, industrial testing, and security applications. These newly developed technologies play a vital role in the detection, diagnosis, and treatment of major human diseases. Featuring contributions from leading experts and pioneers in their respective fields, this book: Describes new advances in development of detection systems based on CdZnTe (CZT) and CdTe detectors utilizing a direct conversion of radiation to electric signals Reports a recent progress in technologies and performance of SiPM used for reading the light from scintillators Explores exciting new application opportunities created by development of the cutting-edge detection technologies in X-ray spectroscopy, computed tomography (CT), bone dosimetry, and nuclear medicine (PET, SPECT) Considers the future use of photon-counting detectors in clinical CT scanners providing K-edge imaging to reduce the amount of contrast agents and ultimately offering both an anatomical and a functional information Describes, uses of radiation detection systems in security applications such as luggage scanning, dirty bomb detection, and border control With its combined coverage of new materials and innovative new system approaches, as well as a succinct overview of recent developments, this book is an invaluable tool for any engineer, professional, or student working in electronics or an associated field. Readers can refer to the other volume, Sensor Materials, Systems, Technology, and Characterization Measurements, which puts emphasis on sensor materials, detector structures, front electronics technology, and their designs and system optimization for different applications.

Measurement and Detection of Radiation The second edition of a bestseller, this book presents the latest innovative research methods that help break new ground by applying patterns, reuse, and design science to research. The book relies on familiar patterns to provide the solid fundamentals of various research philosophies and techniques as touchstones that demonstrate how to innovate research methods. Filled with practical examples of applying patterns to IT research with an emphasis on reusing research activities to save time and money, this book describes design science research in relation to other information systems research paradigms such as positivist and interpretivist research.
American Board of Health Physics Comprehensive examination (Part I) and other certification examinations, this monograph introduces professionals in the field to radiation protection principles and their practical application in routine and emergency situations. It features more than 650 worked examples illustrating concepts under discussion along with in-depth coverage of sources of radiation, standards and regulations, biological effects of ionizing radiation, instrumentation, external and internal dosimetry, counting statistics, monitoring and interpretations, operational health physics, transportation and waste, nuclear emergencies, and more. Reflecting for the first time the true scope of health physics at an introductory level, Basic Health Physics: Problems and Solutions gives readers the tools to properly evaluate challenging situations in all areas of radiation protection, including the medical, university, power reactor, fuel cycle, research reactor, environmental, non-ionizing radiation, and accelerator health physics.

Introduction to Radiological Physics and Radiation Dosimetry A treatment of the experimental techniques and instrumentation most often used in nuclear and particle physics experiments as well as in various other experiments, providing useful results and formulae, technical know-how and informative details. This second edition has been revised, while sections on Cherenkov radiation and radiation protection have been updated and extended.

Radiation Detection This is the resource that engineers turn to in the study of radiation detection. The fourth edition takes into account the technical developments that continue to enhance the instruments and techniques available for the detection and spectroscopy of ionizing radiation. New coverage is presented on ROC curves, micropattern gas detectors, new sensors for scintillation light, and the excess noise factor. Revised discussions are also included on TLDs and cryogenic spectrometers, radiation backgrounds, and the VME standard. Engineers will gain a strong understanding of the field with this updated book.

An Introduction to Radiation Protection Physics and Engineering of Radiation Detection 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. The second edition is fully revised and provides the latest developments in detector technology and analyses software. Also, more material related to measurements in particle physics and a complete solutions manual have been added. Discusses the experimental techniques and instrumentation used in different detection systems in a very practical way without sacrificing the physics content Provides useful formulae and explains methodologies to solve problems related to radiation measurements Contains many worked-out examples and end-of-chapter problems Detailed discussions on different detection media, such as gases, liquids, liquefied gases, semiconductors, and scintillators Chapters on statistics, data analysis techniques, software for data analysis, and data acquisition systems

Radiation Detection Systems The advances in semiconductor detectors, scintillators, photodetectors such as SiPM, and readout electronics in the past decades have led to significant progress in terms of performance and greater choice of the detection tools in many applications. This second edition of Radiation Detection Systems presents the state-of-the-art in the design of detectors and integrated circuit design, in the context of medical imaging using ionizing radiation. The material in the book has been divided into two volumes. The first volume on Sensor Materials, Systems, Technology and Characterization Measurements puts more emphasis on sensor materials, detector and front electronics technology and designs as well as system optimization for different applications. It also includes characterization measurements of the developed detection systems. The second volume on Medical Imaging, Industrial Testing and Security Applications is devoted to more
specific applications of detection systems in medical imaging, industrial testing and security applications. However, there is an unavoidable certain overlap in topics between both volumes. With its combined coverage of new materials and innovative new system approaches, as well as a succinct overview of recent developments, this two volumes set is an invaluable tool for any engineer, professional, or student working in electronics or an associated field.

Semiconductor Radiation Detectors

Evolution of Ionizing Radiation Research Starting from basic principles, this book describes the rapidly growing field of modern semiconductor detectors used for energy and position measurement radiation. The author, whose own contributions to these developments have been significant, explains the working principles of semiconductor radiation detectors in an intuitive way. Broad coverage is also given to electronic signal readout and to the subject of radiation damage.

Copyright code: 96a1bbd6e2da15e6c973a3005d0705fc