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Shielding Techniques for Radiation Oncology Facilities Artech House

Proton Therapy Physics goes beyond current books on proton therapy to provide an

in-depth overview of the physics aspects of this radiation therapy modality, eliminating the need to dig through information scattered in the medical physics literature. After tracing the history of proton therapy, the book summarizes the atomic and nuclear physics background necessary for understanding proton interactions with tissue. It describes the physics of proton accelerators, the parameters of clinical proton beams, and the mechanisms to generate a conformal dose distribution in a patient. The text then covers detector systems and measuring techniques for reference dosimetry, outlines basic quality assurance and commissioning

guidelines, and gives examples of Monte Carlo simulations in proton therapy. The book moves on to discussions of treatment planning for single- and multiple-field uniform doses, dose calculation concepts and algorithms, and precision and uncertainties for nonmoving and moving targets. It also examines computerized treatment plan optimization, methods for in vivo dose or beam range verification, the safety of patients and operating personnel, and the biological implications of using protons from a physics perspective. The final chapter illustrates the use of risk models for common tissue

complications in treatment optimization. Along with exploring quality assurance issues and biological considerations, this practical guide collects the latest clinical studies on the use of protons in treatment planning and radiation monitoring. Suitable for both newcomers in medical physics and more seasoned specialists in radiation oncology, the book helps readers understand the uncertainties and limitations of precisely shaped dose distribution.

Linear Accelerators for Radiation Therapy World Scientific

Nearly 20 million nuclear medicine procedures are carried out each year in the

United States alone to diagnose and treat cancers, cardiovascular disease, and certain neurological disorders. Many of the advancements in nuclear medicine have been the result of research investments made during the past 50 years where these procedures are now a routine part of clinical care. Although nuclear medicine plays an important role in biomedical research and disease management, its promise is only beginning to be realized. *Advancing Nuclear Medicine Through Innovation* highlights the exciting emerging opportunities in nuclear medicine, which include assessing the efficacy of new drugs in development,

individualizing treatment to the patient, and understanding the biology of human diseases. Health care and pharmaceutical professionals will be most interested in this book's examination of the challenges the field faces and its recommendations for ways to reduce these impediments.

A Study Guide World Scientific

Appraising cancer as a major medical market in the 2010s, Wall Street investors placed their bets on single-technology treatment facilities costing \$100-\$300 million each. Critics inside medicine called the widely-publicized proton-center boom "crazy medicine and unsustainable public policy." There was no

valid evidence, they claimed, that proton beams were more effective than less costly alternatives. But developers expected insurance to cover their centers' staggeringly high costs and debts. Was speculation like this new to health care? Cancer, Radiation Therapy, and the Market shows how the radiation therapy specialty in the United States (later called radiation oncology) coevolved with its device industry throughout the twentieth-century. Academic engineers and physicians acquired financing to develop increasingly powerful radiation devices, initiated companies to manufacture the devices competitively,

and designed hospital and freestanding procedure units to utilize them. In the process, they incorporated market strategies into medical organization and practice. Although palliative benefits and striking tumor reductions fueled hopes of curing cancer, scientific research all too often found serious patient harm and disappointing beneficial impact on cancer survival. This thoroughly documented and provocative inquiry concludes that public health policy needs to re-evaluate market-driven high-tech medicine and build evidence-based health care systems.

Cancer as a Case Study : Hearing Before the Subcommittee on

Technology, Environment, and Aviation of the Committee on Science, Space, and Technology, U.S. House of Representatives, One Hundred Third Congress, Second Session, February 2, 1994 Adaptive Radiation Therapy

Radiation oncology for physicians and residents needing a multidisciplinary, treatment-focused resource; this updated edition provides the latest knowledge in this consistently growing field. You will broaden your understanding of the basic biology of disease processes, and access updated treatment algorithms, information on techniques, and state-of-the-art modalities.

Textbook of

Radiation Oncology

Frontiers Media SA

This updated Fourth Edition provides comprehensive coverage of the biology of gynecologic cancer, the therapeutic modalities available, and the diagnosis and treatment of site-specific malignancies. Because of the importance of multimodality treatment, the site-specific chapters are co-authored by a surgical oncologist, a medical oncologist, a radiation oncologist, and a pathologist. A significant portion of this edition focuses on monoclonal antibodies, vaccines, and gene directed therapies and how they can greatly improve treatment outcomes. A new chapter on end-of-life care is also included.

Three distinguished new editors—Richard R. Barakat, MD, Maurie Markman, MD, and Marcus E. Randall, MD—now join the editorial team.

Adaptive Radiation Therapy Springer

Surface Guided Radiation Therapy provides a comprehensive overview of optical surface image guidance systems for radiation therapy. It serves as an introductory teaching resource for students and trainees, and a valuable reference for medical physicists, physicians, radiation therapists, and administrators who wish to incorporate surface guided radiation therapy (SGRT) into their clinical practice. This is the first book

dedicated to the principles and practice of SGRT, featuring: Chapters authored by an internationally represented list of physicists, radiation oncologists and therapists, edited by pioneers and experts in SGRT Covering the evolution of localization systems and their role in quality and safety, current SGRT systems, practical guides to commissioning and quality assurance, clinical applications by anatomic site, and emerging topics including skin mark-less setups. Several dedicated chapters on SGRT for intracranial radiosurgery and breast, covering technical aspects, risk assessment and outcomes. Jeremy Hoisak, PhD, DABR is

an Assistant Professor in the Department of Radiation Medicine and Applied Sciences at the University of California, San Diego. Dr. Hoisak's clinical expertise includes radiosurgery and respiratory motion management. Adam Paxton, PhD, DABR is an Assistant Professor in the Department of Radiation Oncology at the University of Utah. Dr. Paxton's clinical expertise includes patient safety, motion management, radiosurgery, and proton therapy. Benjamin Waghorn, PhD, DABR is the Director of Clinical Physics at Vision RT. Dr. Waghorn's research interests include intensity modulated radiation therapy, motion management, and surface image guidance systems.

Todd Pawlicki, PhD, DABR, FAAPM, FASTRO, is Professor and Vice-Chair for Medical Physics in the Department of Radiation Medicine and Applied Sciences at the University of California, San Diego. Dr. Pawlicki has published extensively on quality and safety in radiation therapy. He has served on the Board of Directors for the American Society for Radiology Oncology (ASTRO) and the American Association of Physicists in Medicine (AAPM).

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Proceedings of the 1st International Symposium Medical Physics Publishing Corporation

This book is not about

serving ready-made conclusions, or a 'how to'-guide of advanced engineering design. It hopes to serve as a 'sharp radiography' of current practices, being neither the ultimate diagnosis nor a prognosis. It is a reference, a starting point for the kind of questioning and dialectic that makes engineering design such a uniquely fascinating, challenging and rewarding human endeavour.

Clinical Radiation Oncology CRC Press

This book focuses on the state of the art of Monte Carlo methods in radiation physics and particle transport simulation and applications. Special attention is paid to algorithm development for modeling, and the

analysis of experiments and measurements in a variety of fields.

Advances in Radiation Oncology Springer Science & Business Media

Computerized medical imaging and image analysis have been the central focus in diagnostic radiology. They provide revolutionarizing tools for visualization of physiology as well as the understanding and quantitative measurement of physiological parameters. This book provides a unique depth of knowledge from the principles to recent advanced methods in medical imaging instrumentation and techniques as well as multidimensional image analysis and

classification methods for research, education and applications in computer-aided diagnostic radiology. Internationally renowned researchers and experts in their respective areas provide detailed description of the basic foundation as well as the most recent developments in medical imaging. This book helps readers to understand theoretical and advanced concepts for important research and clinical applications.

Energy Research Abstracts Springer Science & Business Media

Details technology associated with radiation oncology, emphasizing design of all equipment allied with radiation treatment. Describes

procedures required to implement equipment in clinical service, covering needs assessment, purchase, acceptance, and commissioning, and explains quality assurance issues. Also addresses less common and evolving technologies. For medical physicists and radiation oncologists, as well as radiation therapists, dosimetrists, and engineering technologists. Includes bandw medical images and photos of equipment. Paper edition (unseen), \$145.95. Annotation copyrighted by Book News, Inc., Portland, OR

Techniques and Results IOS Press

Linear particle accelerators (linacs) are essential for future

discovery machines as well as many advanced medical and industrial applications. A linac is formed from a set of cascaded RF cavities (cells). For a typical electron linac, such as the SLAC linear accelerator, RF power is fed to the linac from one point and flows to adjacent cells through the beam tunnel. Consequently, the linac design process requires careful consideration of the coupling between adjacent cells. This limits the ability of the designer to optimize the cell shape for high RF-to-beam efficiency and/or craft the field on the surface for high-gradient operation. We introduce a novel particle accelerator technology that utilizes a periodic feeding network to feed every accelerating cell independently. This eliminates the need for the coupling between cells, giving considerable optimization flexibility for the shape of the accelerator cells. This dissertation discusses the concept behind this topology and presents how such a concept is developed and implemented through a set of key research milestones. The theory of the distributed-coupling linac is presented alongside the associated optimization techniques that take full benefit of the resultant design flexibility. Compared to a conventional linac, our designed and tested structures provide approximately double the shunt impedance. A novel

manufacturing technique is enabled by observing that both the cells and the feeding network have planes with no currents passing through them. This allowed the manufacturing of the structure from two blocks. From an economical point of view, this reduces the part count by about two orders of magnitude in comparison to traditional ways of building the structures from half-cell cups. Additionally, this method allows us to assemble the structure without the necessary brazing steps typically needed for traditional linacs. Hence, the copper or doped-copper material hardness properties can be maintained, further enhancing the ability of the surface to resist damage due to cyclic fatigue. Cryogenic operation of normal-conducting linacs substantially reduces their surface resistance and hence improves RF-to-beam efficiency. The reduced losses also reduce the transient temperature rise on the surface, which is the root cause of the surface cyclic fatigue that leads to surface distortions and consequently breakdown events. That cyclic fatigue is further reduced because the copper yield strength is increased at lower temperatures. In this work, we present the first demonstration of high-gradient acceleration of an electron-beam at a cryogenic temperature of 77 K. Experimental

operation of the distributed-coupling structure at 77 K resulted in a reduction in the breakdown rates by two orders of magnitude.

Furthermore, the concept of distributed-coupling is extended to superconducting accelerators.

Compared to conventional designs, the provided optimization flexibility of the distributed-coupling topology leads to optimized geometries with a reduced surface magnetic field and RF power loss. This reduction should allow for high-gradient operation and reduced system cost. We present our initial attempts to build and test a superconducting distributed-coupling linac. Finally, the

concept of distributed-coupling is extended to utilize two accelerating modes that operate simultaneously in the same linac. Dual-mode acceleration enhances the shunt impedance while allowing the structure to operate at much higher gradients. The latter advantage is due to the fact that a given point on the cavity surface does not experience the sum of the peak fields from the two modes at the same time. An extra degree of freedom is obtained by not requiring the operating frequencies to be harmonically related; it is sufficient to have a common sub-harmonic. The value of this sub-harmonic determines the distance between the bunches that can be accelerated. The proposed dual-mode

architecture prevents the leakage of the high-frequency mode through the coupling ports of the low-frequency mode by introducing a choke feature in the low-frequency port. Moreover, this architecture preserves the structure symmetry and allows for manufacturing the structure from quadrant copper blocks.

Tutorials in Radiotherapy Physics
Springer Science & Business Media

This book provides an up-to-date comprehensive overview of the exciting new developments shaping the current and future practice of radiation oncology. Advances in treatment planning and delivery, in

biological targeted therapies combined with radiation and in functional and molecular imaging are all covered in a single volume. All of these advances are discussed by leading experts in the field and with a critical evaluation of their clinical relevance throughout.

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Medical Electron Accelerators CRC Press

This book concisely reviews important advances in radiation oncology, providing practicing radiation oncologists with a fundamental understanding of each topic and an appreciation of its significance for the future of radiation oncology. It explores in detail the impact of newer imaging modalities, such as multiparametric magnetic resonance imaging (MRI) and positron emission tomography (PET) using fluorodeoxyglucose (FDG) and other novel agents, which deliver

improved visualization of the physiologic and phenotypic features of a given cancer, helping oncologists to provide more targeted radiotherapy and assess the response. Due consideration is also given to how advanced technologies for radiation therapy delivery have created new treatment options for patients with localized and metastatic disease, highlighting the increasingly important role of image-guided radiotherapy in treating systemic and oligometastatic disease. Further topics include the potential value of radiotherapy in enhancing immunotherapy thanks to the broader immune-stimulatory effects, how cancer stem cells and the

tumor microenvironment influence response, and the application of mathematical and systems biology methods to radiotherapy.

RF Linear Accelerators
Springer

This volume, consisting of articles written by experts with international reputations and long experience, reviews the state of the art of accelerator physics and technologies and the use of accelerators in research, industry and medicine. It covers a wide range of topics, from basic problems concerning the performance of circular and linear accelerators to technical issues and related fields. Also discussed are recent achievements that are of particular interest

(such as RF quadrupole acceleration, ion sources and storage rings) and new technologies (such as superconductivity for magnets and RF cavities). The book will interest not only researchers and engineers in the field of accelerator development but also users of accelerators in research and industry. Moreover, teachers giving courses on accelerators and their applications will profit by learning about the most recent achievements and future possibilities.

Case Studies in Advanced Engineering Design Springer Science & Business Media

Organized to serve as a ready reference, this book covers the design & principles of

operation of microwave electron linear accelerators for the radiation treatment of cancer. Designed for use by persons without extensive knowledge & experience of accelerator technology, the book assumes a knowledge of elementary physics & mathematics & places its emphasis on how accelerators actually function & how they are used in cancer treatment. Coverage includes the history of development & application, general theory of acceleration, accelerator systems, radiation beam systems & associated equipment, performance characteristics, testing & use. The major modules of a representative medical accelerator are

described, including principles of operation & how these models function collectively to produce electron & X-ray beams for radiotherapy.

RF Linear Accelerators for Medical and Industrial Applications
Springer

Comprehensive Biomedical Physics is a new reference work that provides the first point of entry to the literature for all scientists interested in biomedical physics. It is of particularly use for graduate and postgraduate students in the areas of medical biophysics. This Work is indispensable to all serious readers in this interdisciplinary area where physics is applied in medicine and biology. Written by leading scientists who have evaluated and

summarized the most important methods, principles, technologies and data within the field, Comprehensive Biomedical Physics is a vital addition to the reference libraries of those working within the areas of medical imaging, radiation sources, detectors, biology, safety and therapy, physiology, and pharmacology as well as in the treatment of different clinical conditions and bioinformatics. This Work will be valuable to students working in all aspect of medical biophysics, including medical imaging and biomedical radiation science and therapy, physiology, pharmacology and treatment of clinical conditions and bioinformatics. The most comprehensive

work on biomedical physics ever published Covers one of the fastest growing areas in the physical sciences, including interdisciplinary areas ranging from advanced nuclear physics and quantum mechanics through mathematics to molecular biology and medicine Contains 1800 illustrations, all in full color

Health Care Reform and Possible Effects on Innovative Therapies W B

Saunders Company Stereotactic body radiation therapy (SBRT) has emerged as an important innovative treatment for various primary and metastatic cancers. This book provides a comprehensive and up-to-date account of the physical/technological, biological, and clinical

aspects of SBRT. It will serve as a detailed resource for this rapidly developing treatment modality. The organ sites covered include lung, liver, spine, pancreas, prostate, adrenal, head and neck, and female reproductive tract. Retrospective studies and prospective clinical trials on SBRT for various organ sites from around the world are examined, and toxicities and normal tissue constraints are discussed. This book features unique insights from world-renowned experts in SBRT from North America, Asia, and Europe. It will be necessary reading for radiation oncologists, radiation oncology residents and fellows, medical physicists, medical physics

residents, medical oncologists, surgical oncologists, and cancer scientists.

Advanced Monte Carlo for Radiation Physics, Particle Transport Simulation and Applications CRC Press

Originally invented for generating the first artificial nuclear reactions, particle accelerators have undergone, during the past 80 years, a fascinating development that is an impressive example of the inventiveness and perseverance of scientists and engineers. Since the early 1980s, accelerator science and technology has been booming. Today, accelerators are the prime tool for high energy physics to probe the structure of matter to an unknown

depth. They are also, as synchrotron radiation sources, the most versatile tool for characterizing materials and processes and for producing micro- and nanostructured devices. The determination of the structure of large biomolecules is presently among the best examples of the application of synchrotron radiation. Finally, accelerators have grown more and more important for medicine, which is relying on them for advanced cancer therapy and radio-surgery. And there are more applications, including the generation of neutrons for materials science, the transmutation of nuclear waste with simultaneous

production of electrical power, the sterilization of medical supplies and of foodstuff, and the inspection of trucks by customs or security services. This book is meant to provide basic training in modern accelerators for students, teachers, and interested scientists and engineers working in other fields. It is a result of the 3rd International Accelerator School, held in 2002 in Singapore under the auspices of the Overseas Chinese Physics Association (OCPA). Reputable experts, including a recent prize-winner, cover the field of cyclic and linear accelerators from the basic theoretical tools to forefront developments such as the X-ray free electron laser or the

latest proton therapy facilities under construction. Accelerators, the art of building them, and the science for understanding their function have become a very exciting field of research. This book conveys the excitement of the experts to the reader. The proceedings have been selected for coverage in: • Index to Scientific & Technical Proceedings® (ISTP® / ISI Proceedings) • Index to Scientific & Technical Proceedings (ISTP CDROM version / ISI Proceedings) • CC Proceedings — Engineering & Physical Sciences Contents: Particle Accelerators: An Introduction (C Zhang) A Guided Survey of Synchrotron Radiation Sources (H O

Moser) Transverse Beam Dynamics: Linear Optics (Q Qin) Transverse Beam Dynamics: Closed Orbit Correction and Injection (C-C Kuo) Transverse Beam Dynamics: Dynamic Aperture (Q Qin) Longitudinal Beam Dynamics — Energy Oscillation in an Electron Storage Ring (Y Jin) Photoinjectors (I Ben-Zvi) Synchrotron Radiation (C T Lee) Lattice Design for Synchrotron Radiation Source Storage Rings (Y Jin) Spallation Neutron Source and Other High Intensity Proton Sources (W Chou) RF Electron Linac and Microton (S-H Wang) Collective Beam Effects in Storage Rings (Z Guo) Designing Superconducting Cavities for Accelerators (H Padamsee) Accelerator Magnets: Dipole, Quadrupole and Sextupole (C S Hwang) Emittance and Cooling (C T Lee) RF Systems for Light Source Storage Rings (Z T Zhao) Vacuum System (J R Chen) RFQ Design and Performance (J Fang) Insertion Devices: Wigglers and Undulators (C S Hwang) Medical and Industrial Applications of Electron Accelerators (Y Lin) High Gain Free Electron Lasers (L H Yu) Proton Therapy: Accelerator Aspects and Procedures (H-U Klein & D Krischel) Introduction to Synchrotron Radiation Applications (H O Moser et al.)

Readership: Researchers, practitioners,

academics and graduate students in accelerator physics. Keywords: Accelerator Physics; Particle Accelerators Synchrotron Radiation; Micro and Nanostructured Devices; Electron Laser X-Ray Free

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REVIEW OF ADVANCES IN MEDICAL LINEAR ACCELERATOR TECHNOLOGY

- I am not an impulse buyer, but I saw this book in the bookstore and knew it was for me. I used to cook big meals every night. But now I keep my grandson, who is nine

months old, and I just do not have the time or energy to cook like I used to. The book is well organized and gives helpful information, even for experienced cooks. There is a lot of variety, which comes in handy when you are cooking every day for a family. The Dijon Chicken and Mushrooms is one of my husband's favorites. The Southwestern Turkey Chili and Cornbread saved the day when friends dropped by to watch the game. My son and grandson love the French Apple Raisin Sandwiches. They don't know I cut corners. They think I make it all from scratch. I am not about to tell. Though I might slip my

daughter-in-law a copy of the book for Christmas. I almost hate to share my secret, but this one is just too good to keep to myself.

- I am 13 and have read Helter Skelter for the first time. The murders were described in extreme detail. I had nightmares every night while reading the book. This book has showed me the horrifying dark side that is in some people, and showed why this monster, (Charles Manson) could have ordered the murders. It was also fascinating that the murderers in Manson's "family" were hypnotized to do Manson's deed. I would recommend this book only to mature readers.