1. Record Nr. UNINA9910780890603321

Titolo	Medical applications of accelerators [[electronic resource] /] / editors, Alexander W. Chao, Weiren Chou
Pubbl/distr/stampa	Singapore, : World Scientific, 2009
ISBN	9789814299350 (eBook)
Descrizione fisica	1 online resource (320 p.)
Collana	Reviews of accelerator science and technology ; ; v. 2, 2009
Altri autori (Persone)	ChaoAlex ChouWeiren
Disciplina	539.73
Soggetti	Particle accelerators
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Two columns to the page.
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Contents; Editorial Preface; Physical and Biological Basis of Proton and of Carbon Ion Radiation Therapy and Clinical Outcome Data Herman Suit, Thomas F. Delaney and Alexei Trofimov; 1. Introduction; 2. Physics; 2.1. General considerations; 2.2. Need for gantries; 2.3. Penumbra; 2.4. Heterodensities in the beam path a narrow age range. The tumor(s) would be transplanted; 3. Radiation-Biological Considerations; 3.1. Slopes of dose-response curves; 3.2. LET and RBE; 3.3. RBE and dose; 3.4. OER; 4. Clinical Outcome Data; 4.1. Chordoma; 4.2. Chondrosarcoma; 4.3. Uveal melanoma; 4.4. Head and neck 4.5. Non-small-cell lung carcinoma4.6. Hepatocellular carcinoma; 4.7. Prostate carcinoma; 5. Discussion; Acknowledgments; References; The Production of Radionuclides for Radiotracers in Nuclear Medicine Thomas J. Ruth; 1. Introduction; 2. Radioisotope/Radionuclide Production; 2.1. Specific activity [1, 2]; 3. Accelerators; 3.1. Development of the linac; 3.1.1. Principles of operation; 3.1.2. Radio frequency acceleration; 3.1.3. Current linacs; 3.2. Development of the cyclotron; 3.2.1. Principles of cyclotron operation; 3.2.2. Energies and particles; 3.3. Choice of an accelerator 3.3.1. Comparison between cyclotrons and other accelerators [1]4. Medical Applications; 4.1. Historical background [2]; 4.2. Radionuclides for imaging; 4.3. Radionuclides for therapy; 4.4. Radioisotope production rates and yield considerations; 4.5. Generators; 5. Imaging; 5.1. Planar imaging; 5.2. Single photon emission computed

tomography; 5.3. Positron emission tomography; 6. Functional Imaging; 7. Radiotracer and Chemistry Development; 7.1. Radiopharmaceuticals; 8. Future Directions; References
Proton Radiation Therapy in the Hospital Environment: Conception, Development, and Operation of the Initial Hospital-Based Facility James M. Slater, Jerry D. Slater and Andrew J. Wroe1. Introduction; 2. Preparation Phase; 3. Developmental Phase; 3.1. Accelerator performance and maintenance; 4. Clinical Operations; 4.1. The central nervous system and the base of the skull (in adults): stereotactic radiosurgery; 4.2. Fractionated proton therapy for tumors of the central nervous system; 4.3. Diseases of the eye and tumors of the head and neck; 4.4. Lung, breast, and liver cancer
4.5. Cancer of the prostate4.6. Pediatric neoplasms; 4.7. Perspective; 5. Research Activities; 5.1. Research strategies; 5.1.1. Basic physics; 5.1.2. Modifying results of proton irradiation; 5.1.3. Engineering advances; 5.1.4. Protons for non-malignant diseases; 5.1.5. Space-science investigations; 5.2. Future directions; 6. Summary; References;
Microwave Electron Linacs for Oncology David H. Whittum; 1. Introduction; 1.1. Why is an accelerator structure needed?; 1.2. How does an accelerator structure work?; 1.3. Circuit-equivalent model for a standing wave accelerator; 1.4. Cold test
1.5. Multicell accelerator structures

Sommario/riassunto

The theme of this volume, "Medical Applications of Accelerators", is of enormous importance to human health and has a deep impact on our society. The invention of particle accelerators in the early 20th century created a whole new world for producing energetic X-rays, electrons, protons, neutrons and other particle beams. Immediately these beams found revolutionary applications in medicine. There are two important yet distinct medical applications. One is that accelerators produce radioisotopes for various nuclear medicines for millions of patients each year. The other is that accelerators p