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| 1. Record Nr.           | UNINA9910300405503321   |
| Autore                  | Wiedemann Helmut  |
| Titolo                  | Particle Accelerator Physics [[electronic resource] /] / by Helmut Wiedemann  |
| Pubbl/distr/stampa      | Springer Nature, 2015<br>Cham : , : Springer International Publishing : , : Imprint : Springer, , 2015  |
| ISBN                    | 3-319-18317-6   |
| Edizione                | [4th ed. 2015.]   |
| Descrizione fisica      | 1 online resource (XXIX, 1021 p. 259 illus., 16 illus. in color.)   |
| Collana                 | Graduate Texts in Physics, , 1868-4513  |
| Disciplina              | 539.73  |
| Soggetti                | Particle acceleration<br>Continuum physics<br>Physical measurements<br>Measurement<br>Particle Acceleration and Detection, Beam Physics<br>Classical and Continuum Physics<br>Measurement Science and Instrumentation   |
| Lingua di pubblicazione | Inglese   |
| Formato                 | Materiale a stampa  |
| Livello bibliografico   | Monografia  |
| Note generali           | Bibliographic Level Mode of Issuance: Monograph   |
| Nota di contenuto       | Part I Introduction -- Introduction to Accelerator Physics -- Linear Accelerators -- Circular Accelerators -- Part II Tools we need -- Elements of Classical Mechanics -- Particle Dynamics in Electromagnetic Fields -- Electromagnetic Fields -- Part III Beam Dynamics -- Single Particle Dynamics -- Particle Beams and Phase Space -- Longitudinal Beam Dynamics -- Periodic Focusing Systems -- Part IV Beam Parameters -- Vlasov and Fokker-Planck Equations -- Equilibrium Particle Distribution -- Beam Emittance and Lattice Design -- Part V Perturbations -- Perturbations in Beam Dynamics -- Hamiltonian Resonance Theory -- Hamiltonian Nonlinear Beam Dynamics -- Part VI Acceleration -- Charged Particle Acceleration -- Beam-Cavity Interaction -- Part VII Coupled Motion -- Dynamics of Coupled Motion -- Part VIII Intense Beams -- Statistical and Collective Effects -- Wake Fields and Instabilities -- Part IX Synchrotron Radiation -- Fundamental Processes -- Overview of Synchrotron Radiation -- |

Sommario/riassunto

This book by Helmut Wiedemann is a well-established, classic text, providing an in-depth and comprehensive introduction to the field of high-energy particle acceleration and beam dynamics. The present 4th edition has been significantly revised, updated and expanded. The newly conceived Part I is an elementary introduction to the subject matter for undergraduate students. Part II gathers the basic tools in preparation of a more advanced treatment, summarizing the essentials of electrostatics and electrodynamics as well as of particle dynamics in electromagnetic fields. Part III is an extensive primer in beam dynamics, followed, in Part IV, by an introduction and description of the main beam parameters and including a new chapter on beam emittance and lattice design. Part V is devoted to the treatment of perturbations in beam dynamics. Part VI then discusses the details of charged particle acceleration. Parts VII and VIII introduce the more advanced topics of coupled beam dynamics and describe very intense beams – a number of additional beam instabilities are introduced and reviewed in this new edition. Part IX is an exhaustive treatment of radiation from accelerated charges and introduces important sources of coherent radiation such as synchrotrons and free-electron lasers. The appendices at the end of the book gather useful mathematical and physical formulae, parameters and units. Solutions to many end-of-chapter problems are given. This textbook is suitable for an intensive two-semester course starting at the senior undergraduate level.

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