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Nota di contenuto	Accelerator X-Ray Sources; Contents; Preface; 1 Beams of Electrons or Photons; 1.1 Preview; 1.2 Coordinate Definitions; 1.3 One-dimensional Transverse Propagation Equations; 1.4 Transfer Matrices for Simple Elements; 1.4.1 Drift Space; 1.4.2 Thin Lens; 1.4.3 Thick Lens; 1.4.4 Erect Quadrupole Lens; 1.5 Elliptical (in Phase Space) Beams; 1.6 Beam Envelope E(s); 1.7 Gaussian Beams: their Variances and Covariances; 1.8 Pseudoharmonic Trajectory Description; 1.9 Transfer Matrix Parametrization; 1.10 Reconciliation of Beam and Lattice Parameters; 1.10.1 Beam Evolution Through a Drift Section 1.10.2 Beam Evolution Through a Thin LensReferences; 2 Beams Treated as Waves; 2.1 Preview; 2.2 Scalar Wave Equation; 2.3 The Short Wavelength, Geometric Optics Limit; 2.3.1 Determination of Rays from Wavefronts; 2.3.2 The Ray Equation in Geometric Optics; 2.3.3 Obtaining Phase Information from Intensity Measurement; 2.4 Wave Description of Gaussian Beams; 2.4.1 Gaussian Beam in a Focusing Medium; 2.4.2 Spatial Dependence of a Wave Near a Free Space Focus;

2.4.3 The ABCD Law; 2.4.4 Optics Using Mirrors; 2.4.5 Wave Particle Duality for Electrons; 2.5 Synchrotron Radiation: Waves or Particles? 2.6 X-ray Holography and Phase Contrast and Lens-free ImagingReferences; 3 Synchrotron Radiation From Accelerator Magnets; 3.1 Capsule History of Synchrotron Light Sources; 3.2 Generalities; 3.3 Potentials and Fields; 3.4 Relations Between Observation Time and Retarded Time; 3.5 Evaluation of Electric and Magnetic Fields; 3.5.1 Radial Field Approximation; 3.6 Total Power Radiated and its Angular Distribution; 3.7 Spectral Power Density of the Radiation; 3.7.1 Estimate of Frequency Spectrum from Pulse Duration; 3.7.2 Radial Approximation; 3.7.3 Accurate Formula for Spectral Power Density 3.8 Radiation from Multiple Charges3.9 The Terminology of "Intensity" Measures; 3.10 Photon Beam Features "Inherited from" the Electron Beam; 3.11 Intensity Estimates for Bending Magnet beams; References; 4 Simple Storage Rings; 4.1 Preview; 4.2 The Uniform Field Ring; 4.3 Horizontal Stability; 4.4 Vertical Stability; 4.5 Simultaneous Horizontal and Vertical Stability; 4.6 Dispersion; 4.7 Momentum Compaction; 4.8 Chromaticity; 4.9 Strong Focusing; 5 The Influence of Synchrotron Radiation on a Storage Ring; 5.1 Preview; 5.2 Statistical Properties of Synchrotron Radiation
5.2.1 Total Energy Radiated5.2.2 The Distribution of Photon Energies; "Regularized Treatment"; 5.2.3 Randomness of the Radiation; 5.3 The Damping Rate Sum Rule: Robinson's Theorem; 5.3.1 Vertical Damping; 5.3.2 Longitudinal Damping; 5.3.3 Horizontal Damping and Partition Numbers; 5.4 Equilibrium between Damping and Fluctuation.; 5.5 Horizontal Equilibrium and Beam Width; 5.6 Longitudinal Bunch Distributions; 5.6.1 Energy Spread; 5.6.2 Bunch Length; 5.7 "Thermodynamics" of Wiggler-dominated Storage Rings; 5.7.1 Emittance of Pure Wiggler Lattice; 5.7.2 Thermodynamic Analogy; References
6 Elementary Theory Of Linacs

Sommario/riassunto

This first book to cover in-depth the generation of x-rays in particle accelerators focuses on electron beams produced by means of the novel Energy Recovery Linac (ERL) technology. The resulting highly brilliant x-rays are at the centre of this monograph, which continues where other books on the market stop. Written primarily for general, high energy and radiation physicists, the systematic treatment adopted by the work makes it equally suitable as an advanced textbook for young researchers.