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in a Uniform Magnetic Field

2.5.4 Charged Particle Motion in a Radial Electric Field2.5.5 The Harmonic Oscillator; Reference; Problems; 3 Beam Optics and Focusing Systems without Space Charge; 3.1 Beam Emittance and Brightness; 3.2 Liouville's Theorem; 3.3 The Paraxial Ray Equation for Axially Symmetric Systems; 3.3.1 Series Representation of Axisymmetric Electric and Magnetic Fields; 3.3.2 Derivation of the Paraxial Ray Equation; 3.3.3 General Properties of the Solutions of the Paraxial Ray Equations; 3.4 Axially Symmetric Fields as Lenses; 3.4.1 General Parameters and Transfer Matrix of a Lens

3.8.1 Periodic Focusing with Thin Lenses3.8.2 General Theory of Courant and Snyder; 3.8.3 The FODO Quadrupole Channel; 3.8.4 Sector-Focusing Cyclotrons; 3.8.5 Strong-Focusing Synchrotrons; 3.8.6 Resonances in Circular Accelerators; 3.9 Adiabatic Damping of the Betatron Oscillation Amplitudes; References; Problems; 4 Linear Beam Optics with Space Charge; 4.1 Theoretical Models of Beams with Space Charge; 4.2 Axisymmetric Beams in Drift Space; 4.2.1 Laminar Beam with Uniform Density Profile; 4.2.2 Beam Envelope with Self Fields and Finite Emittance

4.2.3 Limitations of the Uniform Beam Model and Limiting Currents

Sommario/riassunto

This indispensable work offers a broad synoptic description of beams, applicable to a wide range of other devices, such as low-energy focusing and transport systems and high-power microwave sources. The monograph develops the material from the basic principles in a systematic way and discusses the underlying physics and validity of theoretical relationships, design formulas and scaling laws. Assumptions and approximations are clearly indicated throughout. This new, revised and updated edition has 10% additional content, and features, among others, a new chapter on beam physics research from 19