1. Record Nr. UNINA9910819779303321 Autore Toptygin I. N (Igor Nikolaevich) Titolo Foundations of classical and quantum electrodynamics / / Igor N. **Toptygin** Pubbl/distr/stampa Somerset County, New Jersey:,: Wiley-VCH,, [2013] 2014 **ISBN** 3-527-67751-8 3-527-68042-X 3-527-67749-6 Descrizione fisica 1 online resource (734 p.) Collana New York Academy of Sciences 530.1433 Disciplina Soggetti Quantum electrodynamics Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Description based upon print version of record. Note generali Nota di bibliografia Includes bibliographical references and index. Nota di contenuto Cover -- Title Page -- Contents -- Preface -- Fundamental Constants and Frequently Used Numbers -- Basic Notation -- 1 The Mathematical Methods of Electrodynamics -- 1.1 Vector and Tensor Algebra -- 1.1.1 The Definition of a Tensor and Tensor Operations -- 1.1.2 The Principal Values and Invariants of a Symmetric Tensor of Rank 2 --1.1.3 Covariant and Contravariant Components -- 1.1.4 Tensors in Curvilinear and Nonorthogonal Systems of Coordinates -- 1.2 Vector and Tensor Calculus -- 1.2.1 Gradient and Directional Derivative. Vector Lines -- 1.2.2 Divergence and Curl. Integral Theorems -- 1.2.3 Solenoidal and Potential (Curl-less) Vectors -- 1.2.4 Differential Operations of Second Order -- 1.2.5 Differentiating in Curvilinear Coordinates -- 1.2.6 Orthogonal Curvilinear Coordinates -- 1.3 The Special Functions of Mathematical Physics -- 1.3.1 Cylindrical Functions -- 1.3.2 Spherical Functions and Legendre Polynomials --1.3.3 Dirac Delta Function -- 1.3.4 Certain Representations of the Delta Function -- 1.3.5 The Representation of the Delta Function through Loop Integrals in a Complex Plane -- 1.3.6 Expansion in Total Systems of Orthogonal and Normalized Functions. General Considerations --1.3.7 Fourier Series -- 1.3.8 Fourier Integral -- 1.4 Answers and Solutions -- 2 Basic Concepts of Electrodynamics: The Maxwell

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This advanced textbook covers many fundamental, traditional and new branches of electrodynamics, as well as the related fields of special relativity, quantum mechanics and quantum electrodynamics. The book introduces the material at different levels, oriented towards 3rd-4th year bachelor, master, and PhD students. This is so as to describe the whole complexity of physical phenomena, instead of a mosaic of

disconnected data. The required mathematical background is collated in Chapter 1, while the necessary physical background is included in the main text of the corresponding chapters and a

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