

1. Record Nr.	UNINA9910451798203321
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Titolo	ABC of physics [[electronic resource] ] : a very brief guide / / Lev Okun
Pubbl/distr/stampa	Singapore, : World Scientific Pub. Co., 2012
ISBN	981-4397-28-8
Descrizione fisica	1 online resource (169 p.)
Disciplina	530
Soggetti	Physics Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	0.1 For whom this book is written*; Preface; 0.2 On the contents of some of the chapters; 0.3 Two beacons*; 0.4 Acknowledgments; Contents; 8.7 The emission and absorption of light; 1. The Fundamentals; 1.1 On intuition; 1.2 Space and time*; 1.3 Matter and substance*; 1.4 Motion*; 2. Units*; 2.1 Standards; 2.2 Circle and angles; 2.3 Units of time and length; 3. A Minimum of Mathematics; 3.1 Four operations of school mathematics and the imaginary unit*; 3.2 Powers of ten*; 3.3 Prefixes of the powers of ten; 3.4 Differentiation and integration; 3.5 Matrices; 4. Translational Motion* 4.1 Free particle4.2 Maximum velocity c; 4.3 Energy and momentum of a particle; 4.4 Kinetic and potential energy in Newtonian mechanics; 4.5 Momentum in Newtonian mechanics; 4.6 Space and time in relativistic mechanics; 4.7 Energy and momentum in relativistic mechanics; 4.8 Particle's mass; 4.9 Rest energy; 4.10 Massless photon; 4.11 Masses of electron and proton; 5. Rotation and Quantization; 5.1 The spin and orbital rotation*; 5.2 About vectors and tensors; 5.3 The orbital angular momentum in theory of relativity; 5.4 Identity of particles*; 5.5 Quantization of S and L* 5.6 More about spin*5.7 Fermions and bosons*; 5.8 Elementary quantum state*; 5.9 Bound states*; 6. Particles as Corpuscles and Waves; 6.1 Wave vector*; 6.2 The wave function*; 6.3 Probability amplitude*; 6.4 The role of chance in the decay*; 6.5 The role of chance in the two-slit experiments; 6.6 Uncertainty relations*; 6.7 "Correct" and "incorrect" questions*; 6.8 Schrodinger equation; 6.9 The

Klein-Fock-Gordon equation; 6.10 Dirac equation; 6.11 Action; 7. More About Units\*; 7.1 Units: experiment and theory; 7.2 About SI system of units; 7.3 Electron-volt; 7.4 Units in which  $c, \hbar = 1$ ; 7.5 On choosing the system of units; 8. The Hydrogen Atom\*; 8.1 On potential energy; 8.2 Electron-proton interaction; 8.3 Principal quantum number; 8.4 Mass of quantum state; 8.5 Orbital quantum number; 8.6 The projections of L and S; 9. Periodic Table of Chemical Elements; 9.1 From protons to nucleons\*; 9.2 Pauli exclusion principle. Fermions and bosons\*; 9.3 Horizontal periods of the periodic table of elements\*; 9.4 First period; 9.5 The second and third periods; 9.6 The fourth and fifth periods; 9.7 The sixth and seventh periods; 9.8 8 groups and 18 vertical columns of the table; 10. Substance; 10.1 Molecules\*; 10.2 Gases\*; 10.3 Loschmidt number\*; 10.4 Temperature\*; 10.5 More on universal constants; 10.6 Condensed matter\*; 10.7 Crystallization\*; 10.8 Phase transitions\*; 10.9 Superfluidity and superconductivity; 10.10 Quasiparticles; 11. Quantum Electrodynamics - QED; 11.1 QED from Dirac to Feynman\*; 11.2 Lamb shift; 11.3 Positron and other antiparticles\*; 11.4 Feynman diagrams\*; 11.5 Backward in time; 11.6 Antiparticles\*; 11.7 Positronium\*; 11.8 Normal magnetic moment of the electron; 11.9 Anomalous magnetic moment of the electron:  $g-2$ ; 11.10 Running coupling constant; 11.11 Renormalizability of QED

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## Sommario/riassunto

This little book concentrates on the foundations of modern physics (its "ABC's") and its most fundamental constants:  $c$  - the velocity of light and  $\hbar$  - the quantum of action. First of all, the book is addressed to professional physicists, but in order to achieve maximal concentration and clarity it uses the simplest (high school) mathematics. As a result many pages of the book will be useful to college students and may appeal to a more general audience.

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