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WKB Approximation in Atomic Physics



Springer

Wkb Approximation In Atomic Physics

Mohsen Razavy



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WKB Approximation in Atomic Physics Boris Mikhailovich Karnakov, Vladimir Pavlovich Krainov, 2012-08-28 This book has evolved from lectures devoted to applications of the Wentzel Kramers Brillouin WKB or quasi classical approximation and of the method of $1/N$ expansion for solving various problems in atomic and nuclear physics The intent of this book is to help students and investigators in this field to extend their knowledge of these important calculation methods in quantum mechanics Much material is contained herein that is not to be found elsewhere WKB approximation while constituting a fundamental area in atomic physics has not been the focus of many books A novel method has been adopted for the presentation of the subject matter the material is presented as a succession of problems followed by a detailed way of solving them The methods introduced are then used to calculate Rydberg states in atomic systems and to evaluate potential barriers and quasistationary states Finally adiabatic transition and ionization of quantum systems are covered **Wkb**

Approximation in Atomic Physics Springer, 2012-08-30

Advanced Field-Effect Transistors Dharmendra Singh Yadav, Shiromani Balmukund Rahi, Sukeshni Tirkey, 2023-12-22 Advanced Field Effect Transistors Theory and Applications offers a fresh perspective on the design and analysis of advanced field effect transistor FET devices and their applications The text emphasizes both fundamental and new paradigms that are essential for upcoming advancement in the field of transistors beyond complementary metal oxide semiconductors CMOS This book uses lucid intuitive language to gradually increase the comprehension of readers about the key concepts of FETs including their theory and applications In order to improve readers learning opportunities Advanced Field Effect Transistors Theory and Applications presents a wide range of crucial topics Design and challenges in tunneling FETs Various modeling approaches for FETs Study of organic thin film transistors Biosensing applications of FETs Implementation of memory and logic gates with FETs The advent of low power semiconductor devices and related implications for upcoming technology nodes provide valuable insight into low power devices and their applicability in wireless biosensing and circuit aspects As a result researchers are constantly looking for new semiconductor devices to meet consumer demand This book gives more details about all aspects of the low power technology including ongoing and prospective circumstances with fundamentals of FET devices as well as sophisticated low power applications **Inflationary Cosmology** Martin Lemoine, Jérôme Martin, Patrick Peter, 2007-10-12

Some 25 years after the birth of inflationary cosmology this volume sets out to provide both an authoritative and pedagogical introduction and review of the current state of the field Readers learn about the arguments supporting the many different scenarios of cosmic inflation Articles are written by eminent scientists many of whom have made pioneering contributions to the field of inflationary cosmology **Einstein Equations: Physical and Mathematical Aspects of General Relativity** Sergio

Cacciatori, Batu Güneysu, Stefano Pigola, 2019-11-23 This book is based on lectures given at the first edition of the Domoschool the International Alpine School in Mathematics and Physics held in Domodossola Italy in July 2018 It is divided

into two parts Part I consists of four sets of lecture notes These are extended versions of lectures given at the Domoschool written by well known experts in mathematics and physics related to General Relativity Part II collects talks by selected participants focusing on research related to General Relativity

Many-Particle Spectroscopy of Atoms, Molecules, Clusters, and Surfaces J. Berakdar, J. Kirschner, 2012-12-06 Since the early days of modern physics spectroscopic techniques have been employed as a powerful tool to assess existing theoretical models and to uncover novel phenomena that promote the development of new concepts Conventionally the system to be probed is prepared in a well defined state Upon a controlled perturbation one measures then the spectrum of a single particle electron photon etc emitted from the probe The analysis of this single particle spectrum yields a wealth of important information on the properties of the system such as optical and magnetic behaviour Therefore such analysis is nowadays a standard tool to investigate and characterize a variety of materials However it was clear at a very early stage that real physical compounds consist of many coupled particles that may be excited simultaneously in response to an external perturbation Yet the simultaneous coincident detection of two or more excited species proved to be a serious technical obstacle in particular for extended electronic systems such as surfaces In recent years however coincidence techniques have progressed so far as to image the multi particle excitation spectrum in an impressive detail Correspondingly many body theoretical concepts have been put forward to interpret the experimental findings and to direct future experimental research This book gives a snapshot of the present status of multi particle coincidence studies both from a theoretical and an experimental point of view It also includes selected topical review articles that highlight the achievements and the power of coincident techniques

Advances in One-Dimensional Wave Mechanics Zhuangqi Cao, Cheng Yin, 2014-01-16 Advances in One Dimensional Wave Mechanics provides a comprehensive description of the motion of microscopic particles in one dimensional arbitrary shaped potentials based on the analogy between Quantum Mechanics and Electromagnetism Utilizing a deeper understanding of the wave nature of matter this book introduces the concept of the scattered sub waves and a series of new analytical results using the Analytical Transfer Matrix ATM method This work will be useful for graduate students majoring in physics mainly in basic quantum theory as well as for academic researchers exploring electromagnetism particle physics and wave mechanics and for experts in the field of optical waveguide and integrated optics Prof Zhuangqi Cao is a Professor of Physics at Shanghai Jiao Tong University China Dr Cheng Yin is a teacher at Jiangsu Key Laboratory of Power Transmission and Distribution Equipment Technology Hohai University China

The WKB Approximation and the Inverse Scattering Problem in Nuclear Physics Daniel Molapo Mafokwane, 1900

Quantum Theory Of Tunneling (2nd Edition) Mohsen Razavy, 2013-12-17 In this revised and expanded edition in addition to a comprehensible introduction to the theoretical foundations of quantum tunneling based on different methods of formulating and solving tunneling problems different semiclassical approximations for multidimensional systems are presented Particular attention is given to the tunneling of composite systems with examples taken from

molecular tunneling and also from nuclear reactions The interesting and puzzling features of tunneling times are given extensive coverage and the possibility of measurement of these times with quantum clocks are critically examined In addition by considering the analogy between evanescent waves in waveguides and in quantum tunneling the times related to electromagnetic wave propagation have been used to explain certain aspects of quantum tunneling times These topics are treated in both non relativistic as well as relativistic regimes Finally a large number of examples of tunneling in atomic molecular condensed matter and nuclear physics are presented and solved

A Tutorial on the WKB Approximation for Innovative Dirac Materials Andrii Iurov, 2024-08-30 This textbook serves to supplement existing quantum mechanics courses with the WKB Wentzel Kramers Brillouin theory for recently discovered Dirac materials such as graphene a dice lattice and alpha T3 materials This includes finding the semiclassical wave function coordinate dependent momentum semiclassical action the complete set of transport equations and applicability conditions for the approximation The discovery of graphene and its unique electronic behavior has transformed research in condensed matter physics over the last 10 15 years but core curriculum in standard graduate level physics courses still does not reflect these new developments and this book intends to close this gap With a clear focus on various types of Dirac Hamiltonians the multidimensional theory is only a small part of the book The derivation of the WKB equations for novel Dirac materials and their applications to electron tunneling turning points and classically forbidden regions resonances and localized states and many other crucial physical problems are methodically presented This textbook aims to expand the existing approach to presenting the WKB approximation and covers recent developments in its applications This book also includes many informative graphics as well as problems and exercises with hints at the end of each chapter Additional detailed mathematical derivations as well as code in Mathematica are added throughout the whole book Ideal for graduate students and researchers in condensed matter physics this textbook serves as a modern guide for learning the WKB theory

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