Effective Computation In Physics

Computational Physics: 2nd edition
Introduction to Topological Quantum Computation
Quantum Field Theory and the Standard Model
Principles of Environmental Physics
Python and HDF5
Condensed Matter Field Theory
Effective FORTRAN 77
Computational Physics
Effective Computation in Physics
Computational Multiscale Modeling of Fluids and Solids
Feynman Lectures On Computation
A Survey of Computational Physics
String Theory and Particle Physics
Astrophysics Of Gas Nebulae and Active Galactic Nuclei
Computation and Its Limits
Information, Physics, and Computation
Computational Problems for Physics
Bridging the Time Scales
Physics and Computation
Effective Computation in Physics
Computational Physics
Computational Complexity
Computational Statistical Mechanics
Introduction to Elementary Particle Physics
Computation In Modern Physics (Third Edition)
The Beginning of Infinity
A New Kind of Science
The Nature of Computation
An Advanced Course in Computational Nuclear Physics
An Introduction to Computational Physics
Introduction to Computational Science
Python for Scientists
Physics of Light and Optics (Black & White)
A Primer on Scientific Programming with Python
Computational Physics
The Physics of Quantum Mechanics
Computational Modeling and Visualization of Physical Systems with Python
Python Data Science Handbook
Introduction to Effective Field Theory

YOSELIN RILEY

Computational Physics:

2nd edition Cambridge University Press
This graduate-level text

collects and synthesizes a series of ten lectures on the nuclear quantum many-body problem. Starting from our current understanding of the underlying forces, it presents recent advances within the field of lattice quantum chromodynamics before going on to discuss effective field theories, central many-body methods like Monte Carlo methods, coupled cluster theories, the similarity renormalization group approach, Green's function methods and large-scale diagonalization approaches. Algorithmic and computational advances show particular promise for breakthroughs in predictive power, including proper error estimates, a better understanding of the underlying effective degrees of freedom and of the respective forces at play. Enabled by recent improvements in theoretical, experimental and numerical techniques, the state-of-the art applications considered in this volume span the entire range, from our smallest components – quarks and gluons as the mediators of the strong force – to the computation of the equation of state for neutron star matter. The lectures presented provide an in-depth exposition of the underlying theoretical and algorithmic approaches as well details of the numerical implementation of the methods discussed. Several also include links to numerical software and benchmark calculations, which readers can use to develop their own programs for tackling challenging nuclear many-body problems.

Introduction to Topological Quantum Computation Penguin UK

The Standard Model is the most comprehensive physical theory ever developed. This textbook conveys the basic elements of the Standard Model using elementary concepts, without the theoretical rigor found in most other texts on this subject. It contains examples of basic experiments, allowing readers to see how measurements and theory interplay in the development of physics. The author examines leptons, hadrons and quarks, before presenting the dynamics and the surprising properties of the charges of the different forces. The textbook concludes with a brief discussion on the discoveries of physics beyond the Standard Model, and its connections with cosmology. Quantitative examples are given, and the reader is guided through the necessary calculations. Each chapter ends in the exercises, and solutions to some problems are included in the book. Complete solutions are available to instructors at www.cambridge.org/9781107406094.

Quantum Field Theory and the Standard Model John Wiley & Sons

For many researchers, Python is a first-class tool mainly because of its libraries for storing, manipulating, and gaining insight from data. Several resources exist for individual pieces of this data science stack, but only with the Python Data Science Handbook do you get them all—IPython, NumPy, Pandas, Matplotlib, Scikit-Learn, and other related tools. Working scientists and data crunchers familiar with reading and writing Python code will find this comprehensive desk reference ideal for tackling day-to-day issues: manipulating, transforming, and cleaning data; visualizing

different types of data; and using data to build statistical or machine learning models. Quite simply, this is the must-have reference for scientific computing in Python. With this handbook, you'll learn how to use: IPython and Jupyter: provide computational environments for data scientists using Python NumPy: includes the ndarray for efficient storage and manipulation of dense data arrays in Python Pandas: features the DataFrame for efficient storage and manipulation of labeled/columnar data in Python Matplotlib: includes capabilities for a flexible range of data visualizations in Python Scikit-Learn: for efficient and clean Python implementations of the most important and established machine learning algorithms

Principles of Environmental Physics Springer Science & Business Media

A modern introduction to quantum field theory for graduates, providing intuitive, physical explanations supported by real-world applications and homework problems.

Python and HDF5 "O'Reilly Media, Inc."

Scientific Python is taught from scratch in this book via copious, downloadable, useful and adaptable code snippets. Everything the working scientist needs to know is covered, quickly providing researchers and research students with the skills to start using Python effectively.

"O'Reilly Media, Inc."

This Element has three main aims. First, it aims to help the reader understand the concept of computation that Turing developed, his corresponding results, and what those results indicate about the limits of computational possibility. Second, it aims to bring the reader up to speed on analyses of computation in physical systems which provide the most general characterizations of what it takes for a physical system to be a computational system. Third, it aims to introduce the reader to some different kinds of quantum computers, describe quantum speedup, and present some explanation sketches of quantum speedup. If successful, this Element will equip the reader with a basic knowledge necessary for pursuing these topics in more detail.

Condensed Matter Field Theory Princeton University Press

The behaviour of many complex materials extends over time- and lengthscales well beyond those that can normally be described using standard molecular dynamics or Monte Carlo simulation techniques. As progress is coming more through refined simulation methods than from increased computer power, this volume is intended as both an introduction and a review of all relevant modern methods that will shape molecular simulation in the forthcoming decade. Written as a set of tutorial reviews, the book will be of use to specialists and nonspecialists alike.

Effective FORTRAN 77 Cambridge University Press

This advanced textbook provides an introduction to the basic methods of computational physics.

Computational Physics Princeton University Press

This primer is aimed at elevating graduate students of condensed matter theory to a level where they can engage in independent research. Topics covered include second quantisation, path and functional field integration, mean-field

theory and collective phenomena.
Effective Computation in Physics CRC Press
Gain hands-on experience with HDF5 for storing scientific data in Python. This practical guide quickly gets you up to speed on the details, best practices, and pitfalls of using HDF5 to archive and share numerical datasets ranging in size from gigabytes to terabytes. Through real-world examples and practical exercises, you'll explore topics such as scientific datasets, hierarchically organized groups, user-defined metadata, and interoperable files. Examples are applicable for users of both Python 2 and Python 3. If you're familiar with the basics of Python data analysis, this is an ideal introduction to HDF5. Get set up with HDF5 tools and create your first HDF5 file Work with datasets by learning the HDF5 Dataset object Understand advanced features like dataset chunking and compression Learn how to work with HDF5's hierarchical structure, using groups Create self-describing files by adding metadata with HDF5 attributes Take advantage of HDF5's type system to create interoperable files Express relationships among data with references, named types, and dimension scales Discover how Python mechanisms for writing parallel code interact with HDF5
Computational Multiscale Modeling of Fluids and Solids Pearson Education India
This textbook is suitable for two courses in computational physics. The first is at an advanced introductory level and is appropriate for seniors or first year graduate students. The student is introduced to integral and differential techniques, Monte Carlo integration, basic computer architecture, linear algebra, finite element techniques, digital signal processing and chaos. In this first part of the book, no knowledge of quantum mechanics is assumed. The third edition has expanded treatments of the subjects in each of the first nine chapters and a new section on modern parallel computing, in particular, Beowulf clusters.The second course (the last four chapters) deals with problems in the strong interaction using quantum mechanical techniques, with emphasis on solutions of many-body scattering problems and several-body bound state calculations with Monte Carlo techniques. It also contains a chapter dealing with the numerical summation of divergent series.
Feynman Lectures On Computation Cambridge University Press
Computation is essential to our modern understanding of nuclear systems. Although simple analytical models might guide our intuition, the complex ity of the nuclear many-body problem and the ever-increasing precision of experimental results require large-scale numerical studies for a quantitative understanding. Despite their importance, many nuclear physics computations remain something of a black art. A practicing nuclear physicist might be familiar with one or another type of computation, but there is no way to systemati cally acquire broad experience. Although computational methods and results are often presented in the literature, it is often difficult to obtain the working codes. More often than not, particular numerical expertise resides in one or a few individuals, who must be

contacted informally to generate results; this option becomes unavailable when these individuals leave the field. And while the teaching of modern nuclear physics can benefit enormously from realistic computer simulations, there has been no source for much of the important material. The present volume, the second of two, is an experiment aimed at address ing some of these problems. We have asked recognized experts in various aspects of computational nuclear physics to codify their expertise in indi vidual chapters. Each chapter takes the form of a brief description of the relevant physics (with appropriate references to the literature), followed by a discussion of the numerical methods used and their embodiment in a FOR TRAN code. The chapters also contain sample input and test runs, as well as suggestions for further exploration.

A Survey of Computational Physics

"O'Reilly Media, Inc." Computational Physics. Selected Methods, Simple Exercises, Serious Applications is an overview written by leading researchers of a variety of fields and developments. Selected Methods introduce the reader to current fields, including molecular dynamics, hybrid Monte-Carlo algorithms, and neural networks. Simple Exercises give hands-on advice for effective program solutions from a small number of lines to demonstration programs with elaborate graphics. Serious Applications show how questions concerning, for example, aging, many-minima optimisation, or phase transitions can be treated by appropriate tools. The source code and demonstration graphics are included on a 3.5" MS-DOS diskette.

String Theory and Particle Physics Oxford University Press, USA

More physicists today are taking on the role of software developer as part of their research, but software development isnâ??t always easy or obvious, even for physicists. This practical book teaches essential software development skills to help you automate and accomplish nearly any aspect of research in a physics-based field. Written by two PhDs in nuclear engineering, this book includes practical examples drawn from a working knowledge of physics concepts. Youâ??ll learn how to use the Python programming language to perform everything from collecting and analyzing data to building software and publishing your results. In four parts, this book includes: Getting Started: Jump into Python, the command line, data containers, functions, flow control and logic, and classes and objects Getting It Done: Learn about regular expressions, analysis and visualization, NumPy, storing data in files and HDF5, important data structures in physics, computing in parallel, and deploying software Getting It Right: Build pipelines and software, learn to use local and remote version control, and debug and test your code Getting It Out There: Document your code, process and publish your findings, and collaborate efficiently; dive into software licenses, ownership, and copyright procedures

Astrophysics Of Gas Nebulae and Active Galactic Nuclei Cambridge University Press

More physicists today are taking on the role of software developer as

part of their research, but software development isnâ??t always easy or obvious, even for physicists. This practical book teaches essential software development skills to help you automate and accomplish nearly any aspect of research in a physics-based field. Written by two PhDs in nuclear engineering, this book includes practical examples drawn from a working knowledge of physics concepts. Youâ??ll learn how to use the Python programming language to perform everything from collecting and analyzing data to building software and publishing your results. In four parts, this book includes: Getting Started: Jump into Python, the command line, data containers, functions, flow control and logic, and classes and objects Getting It Done: Learn about regular expressions, analysis and visualization, NumPy, storing data in files and HDF5, important data structures in physics, computing in parallel, and deploying software Getting It Right: Build pipelines and software, learn to use local and remote version control, and debug and test your code Getting It Out There: Document your code, process and publish your findings, and collaborate efficiently; dive into software licenses, ownership, and copyright procedures

Computation and Its Limits Springer

Effective Computation in Physics"O'Reilly Media, Inc."

Information, Physics, and Computation Cambridge University Press

Computational Statistical Mechanics describes the use of fast computers to simulate the equilibrium and nonequilibrium properties of gases, liquids, and solids at, and away from equilibrium. The underlying theory is developed from basic principles and illustrated by applying it to the simplest possible examples. Thermodynamics, based on the ideal gas thermometer, is related to Gibb's statistical mechanics through the use of Nosé-Hoover heat reservoirs. These reservoirs use integral feedback to control temperature. The same approach is carried through to the simulation and analysis of nonequilibrium mass, momentum, and energy flows. Such a unified approach makes possible consistent mechanical definitions of temperature, stress, and heat flux which lead to a microscopic demonstration of the Second Law of Thermodynamics directly from mechanics. The intimate connection linking Lyapunov-unstable microscopic motions to macroscopic dissipative flows through multifractal phase-space structures is illustrated with many examples from the recent literature. The book is well-suited for undergraduate courses in advanced thermodynamics, statistical mechanic and transport theory, and graduate courses in physics and chemistry.

Computational Problems for Physics Cambridge University Press

This work presents a series of dramatic discoveries never before made public. Starting from a collection of simple computer experiments---illustrated in the book by striking computer graphics---Wolfram shows how their unexpected results force a whole new way of looking at the operation of our universe. Wolfram uses his approach to tackle a remarkable array of

fundamental problems in science: from the origin of the Second Law of thermodynamics, to the development of complexity in biology, the computational limitations of mathematics, the possibility of a truly fundamental theory of physics, and the interplay between free will and determinism.

Bridging the Time Scales Createspace Independent Publishing Platform

A very active field of research is emerging at the frontier of statistical physics, theoretical computer science/discrete mathematics, and coding/information theory. This book sets up a common language and pool of concepts, accessible to students and researchers from each of these fields.

Physics and Computation Cambridge University Press

Combining physics, mathematics and computer science, topological quantum computation is a rapidly expanding research area focused on the exploration of quantum evolutions that are immune to errors. In this book, the author presents a variety of different topics developed together for the first time, forming an excellent introduction to topological quantum computation. The makings of anyonic systems, their properties and their computational power are presented in a pedagogical way. Relevant calculations are fully explained, and numerous worked examples and exercises support and aid understanding. Special emphasis is given to the motivation and physical intuition behind every mathematical concept. Demystifying difficult topics by using accessible language, this book has broad appeal and is ideal for graduate students and researchers from various disciplines who want to get into this new and exciting research field.