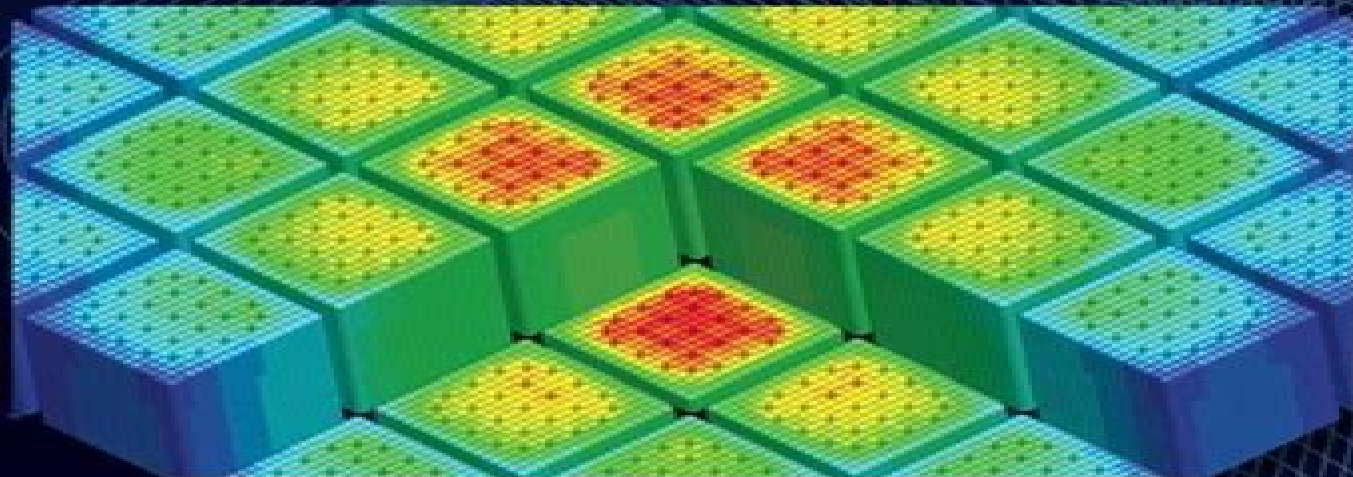


# Monte Carlo Methods for Particle Transport

SECOND EDITION



**Alireza Haghighat**



CRC Press  
Taylor & Francis Group

# Monte Carlo Methods For Particle Transport

**L Reisser**



## **Monte Carlo Methods For Particle Transport:**

**Monte Carlo Particle Transport Methods** I. Lux, 2018-05-04 With this book we try to reach several more or less unattainable goals namely To compromise in a single book all the most important achievements of Monte Carlo calculations for solving neutron and photon transport problems To present a book which discusses the same topics in the three levels known from the literature and gives us useful information for both beginners and experienced readers It lists both well established old techniques and also newest findings

**Monte Carlo Methods for Particle Transport** Alireza Haghighat, 2015 The Monte Carlo method has become the de facto standard in radiation transport Although powerful if not understood and used appropriately the method can give misleading results Monte Carlo Methods for Particle Transport teaches appropriate use of the Monte Carlo method explaining the method s fundamental concepts as well as its limitations Concise yet comprehensive this well organized text introduces the particle importance equation and its use for variance reduction describes general and particle transport specific variance reduction techniques presents particle transport eigenvalue issues and methodologies to address these issues explores advanced formulations based on the author s research activities discusses parallel processing concepts and factors affecting parallel performance

**Advanced Monte Carlo for Radiation Physics, Particle Transport Simulation and Applications** Andreas Kling, Fernando J.C. Barao, Masayuki Nakagawa, Luis Tavora, Pedro Vaz, 2014-02-22 This book focusses on the state of the art of Monte Carlo methods in radiation physics and particle transport simulation and applications the latter involving in particular the use and development of electron gamma neutron gamma and hadronic codes Besides the basic theory and the methods employed special attention is paid to algorithm development for modeling and the analysis of experiments and measurements in a variety of fields ranging from particle to medical physics

**Particle-transport simulation with the Monte Carlo method** Leland L. Carter, 1975

**Particle Transport Simulation with the Monte Carlo Method** Leland Lavele Carter, E. D. Cashwell, 1975

**Particle-transport Simulation with the Monte Carlo Method** , 1975 Attention is focused on the application of the Monte Carlo method to particle transport problems with emphasis on neutron and photon transport Topics covered include sampling methods mathematical prescriptions for simulating particle transport mechanics of simulating particle transport neutron transport and photon transport A literature survey of 204 references is included GMT

*PARTICLE-TRANSPORT SIMULATION WITH THE MONTE CARLO METHOD* Leland L. Carter, Edmond Darrell Cashwell, 1975

Computational Many-Particle Physics Holger Fehske, Ralf Schneider, Alexander Weiße, 2007-12-07 Looking for the real state of play in computational many particle physics Look no further This book presents an overview of state of the art numerical methods for studying interacting classical and quantum many particle systems A broad range of techniques and algorithms are covered and emphasis is placed on their implementation on modern high performance computers This excellent book comes complete with online files and updates allowing readers to stay right up to date

**Modified Monte Carlo Procedure for**

**Particle Transport Problems**, 1978      Monte Carlo Particle Transport H. Scott, N. Gentile, R. Procassini, 2005 Monte Carlo methods are frequently used for neutron and radiation transport. These methods have several advantages such as relative ease of programming and dealing with complex meshes. Disadvantages include long run times and statistical noise. Monte Carlo photon transport calculations also often suffer from inaccuracies in matter temperature due to the lack of implicitness. In this paper we discuss the Monte Carlo algorithm as it is applied to neutron and photon transport, detail the differences between neutron and photon Monte Carlo, and give an overview of the ways the numerical method has been modified to deal with issues that arise in photon Monte Carlo simulations.

**Modified Monte Carlo Procedure for Particle Transport Problems** W. Matthes, Commission of the European Communities, 1978      **Monte Carlo Methods in Particle Transport** Rainer Salomaa, 1996      Accelerating Monte Carlo Particle Transport with Adaptively Generated Importance Maps Michel Nowak, 2018 Monte Carlo methods are a reference asset for the study of radiation transport in shielding problems. Their use naturally implies the sampling of rare events and needs to be tackled with variance reduction methods. These methods require the definition of an importance function map. The aim of this study is to propose an adaptive strategy for the generation of such importance maps during the Monte Carlo simulation. The work was performed within TRIPOLI 4, a Monte Carlo transport code developed at the nuclear energy division of CEA in Saclay, France. The core of this PhD thesis is the implementation of a forward weighted adjoint score that relies on the trajectories sampled with Adaptive Multilevel Splitting, a robust variance reduction method. It was validated with the integration of a deterministic module in TRIPOLI 4. Three strategies were proposed for the reintegration of this score as an importance map, and accelerations were observed. Two of these strategies assess the convergence of the adjoint score during exploitation phases by evaluating the figure of merit yielded by the use of the current adjoint score. Finally, the smoothing of the importance map with machine learning algorithms concludes this work with a special focus on Kernel Density Estimators.

*Finite Element Methods for Particle Transport* Ron Tunstall Ackroyd, 1997 Focuses on the transport of neutral particles, neutrons and photons using the finite element method to address practical problems in nuclear power and mineral prospecting. Includes discussions of how the method began and has matured to become a practical tool complementing the stochastic Monte Carlo method, spatial finite elements, examples of calculations, equivalent forms of the Boltzmann equation, neutron streaming in voids, some aspects of discontinuous variational solutions, complementary principles, and benchmarking time dependent transport and modelling three dimensional systems. Double spaced. Annotation copyright by Book News Inc, Portland, OR.

**Monte Carlo Methods for Radiation Transport** Oleg N. Vassiliev, 2016-10-17 This book is a guide to the use of Monte Carlo techniques in radiation transport. This topic is of great interest for medical physicists. Praised as a gold standard for accurate radiotherapy dose calculations, Monte Carlo has stimulated a high level of research activity that has produced thousands of papers within the past few years. The book is designed primarily to address the needs of an academically inclined medical physicist who

wishes to learn the technique as well as experienced users of standard Monte Carlo codes who wish to gain insight into the underlying mathematics of Monte Carlo algorithms The book focuses on the fundamentals giving full attention to and explaining the very basic concepts It also includes advanced topics and covers recent advances such as transport of charged particles in magnetic fields and the grid based solvers of the Boltzmann equation     Application of a Hybrid Monte Carlo Method to Neutral Particle Transport in Slab Geometry Andrew Blaine Collier, Potchefstroom University for Christian Higher Education, 1998     **A Variationally-based Variance Reduction Method for Monte Carlo Particle Transport Problems** Carla Lynn Barrett, 1999     Monte Carlo Techniques in Radiation Therapy Joao Seco, Frank Verhaegen, 2013-03-25 Modern cancer treatment relies on Monte Carlo simulations to help radiotherapists and clinical physicists better understand and compute radiation dose from imaging devices as well as exploit four dimensional imaging data With Monte Carlo based treatment planning tools now available from commercial vendors a complete transition to Monte Carlo based dose calculation methods in radiotherapy could likely take place in the next decade Monte Carlo Techniques in Radiation Therapy explores the use of Monte Carlo methods for modeling various features of internal and external radiation sources including light ion beams The book the first of its kind addresses applications of the Monte Carlo particle transport simulation technique in radiation therapy mainly focusing on external beam radiotherapy and brachytherapy It presents the mathematical and technical aspects of the methods in particle transport simulations The book also discusses the modeling of medical linacs and other irradiation devices issues specific to electron photon and proton ion beams and brachytherapy and the optimization of treatment planning radiation dosimetry and quality assurance Useful to clinical physicists graduate students and researchers this book provides a detailed state of the art guide to the fundamentals application and customization of Monte Carlo techniques in radiotherapy Through real world examples it illustrates the use of Monte Carlo modeling and simulations in dose calculation beam delivery kilovoltage and megavoltage imaging proton radiography device design and much more

*Cosmic Rays and Earth* J.W. Bieber, E. Eroshenko, P. Evenson, E.O. Flückiger, R. Kallenbach, 2013-04-17 The year 1998 marked the 50th anniversary of the invention of the neutron monitor a key research tool in the field of space physics and solar terrestrial relations In honor of this occasion a workshop entitled Cosmic Rays and Earth was organized to review the detection of cosmic rays at the surface and in the lower atmosphere of Earth including the effect that this radiation has on the terrestrial environment A special focus was the role of neutron monitors in the investigation of this radiation on the science enabled by the unique dataset of the worldwide network of neutron monitors and on continuing opportunities to use these data to solve outstanding problems This book is the principal product of that workshop integrating the contributions of all participants Following a general summary of the workshop prepared by the editors the volume leads off with a keynote article by Professor John Simpson describing his invention of the neutron monitor in 1948 and the early scientific discoveries made with this instrument     **Advanced Monte Carlo for Radiation Physics, Particle Transport Simulation and**

**Applications** Andreas Kling, 2001-10-02 This book focuses on the state of the art of Monte Carlo methods in radiation physics and particle transport simulation and applications Special attention is paid to algorithm development for modeling and the analysis of experiments and measurements in a variety of fields

## Whispering the Strategies of Language: An Psychological Journey through **Monte Carlo Methods For Particle Transport**

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