# A GUIDE TO

# Quantum Groups

$$V \otimes U \otimes W$$

$$U \otimes V \otimes W \qquad V \otimes W \otimes U$$

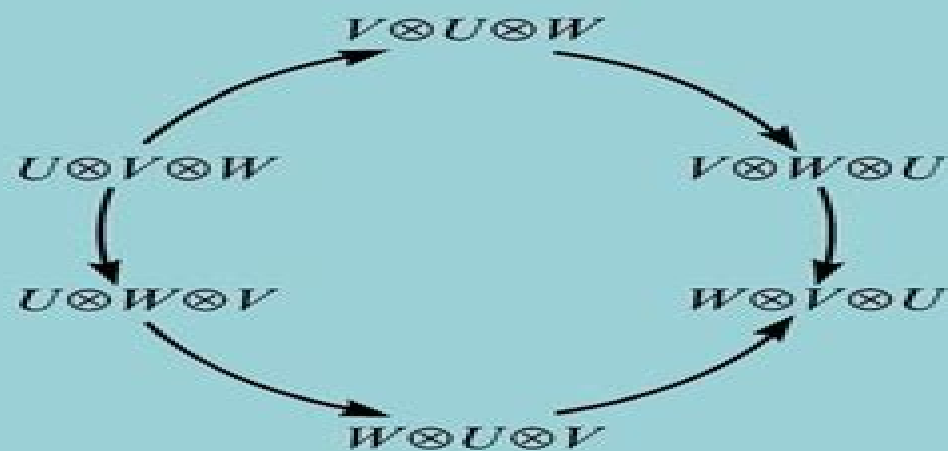$$U \otimes W \otimes V \qquad W \otimes V \otimes U$$

$$W \otimes U \otimes V$$

Vyjayanthi Chari and Andrew Pressley

# [Guide To Quantum Groups](#)

Atsuo Kuniba

**Guide To Quantum Groups:**

*A Guide to Quantum Groups* Vyjayanthi Chari,Andrew N. Pressley,1995-07-27 Since they first arose in the 1970s and early 1980s quantum groups have proved to be of great interest to mathematicians and theoretical physicists The theory of quantum groups is now well established as a fascinating chapter of representation theory and has thrown new light on many different topics notably low dimensional topology and conformal field theory The goal of this book is to give a comprehensive view of quantum groups and their applications The authors build on a self contained account of the foundations of the subject and go on to treat the more advanced aspects concisely and with detailed references to the literature Thus this book can serve both as an introduction for the newcomer and as a guide for the more experienced reader All who have an interest in the subject will welcome this unique treatment of quantum groups      *A Guide to Quantum Groups* Vyjayanthi Chari,1995

*Introduction to Quantum Groups* Teo Banica,2023-01-01 This book introduces the reader to quantum groups focusing on the simplest ones namely the closed subgroups of the free unitary group Although such quantum groups are quite easy to understand mathematically interesting examples abound including all classical Lie groups their free versions half liberations other intermediate liberations anticommutation twists the duals of finitely generated discrete groups quantum permutation groups quantum reflection groups quantum symmetry groups of finite graphs and more The book is written in textbook style with its contents roughly covering a one year graduate course Besides exercises the author has included many remarks comments and pieces of advice with the lone reader in mind The prerequisites are basic algebra analysis and probability and a certain familiarity with complex analysis and measure theory Organized in four parts the book begins with the foundations of the theory due to Woronowicz comprising axioms Haar measure Peter Weyl theory Tannakian duality and basic Brauer theorems The core of the book its second and third parts focus on the main examples first in the continuous case and then in the discrete case The fourth and last part is an introduction to selected research topics such as toral subgroups homogeneous spaces and matrix models Introduction to Quantum Groups offers a compelling introduction to quantum groups from the simplest examples to research level topics      *Quantum Groups* Vladimir K. Dobrev,2017-07-10 With applications in quantum field theory general relativity and elementary particle physics this three volume work studies the invariance of differential operators under Lie algebras quantum groups and superalgebras This second volume covers quantum groups in their two main manifestations quantum algebras and matrix quantum groups The exposition covers both the general aspects of these and a great variety of concrete explicitly presented examples The invariant q difference operators are introduced mainly using representations of quantum algebras on their dual matrix quantum groups as carrier spaces This is the first book that covers the title matter applied to quantum groups Contents Quantum Groups and Quantum Algebras Highest Weight Modules over Quantum Algebras Positive Energy Representations of Noncompact Quantum Algebras Duality for Quantum Groups Invariant q Difference Operators Invariant q Difference Operators Related to GLq n q Maxwell Equations Hierarchies

**Quantum Groups and Their Representations** Anatoli Klimyk,Konrad Schmüdgen,2012-12-06 This book start with an introduction to quantum groups for the beginner and continues as a textbook for graduate students in physics and in mathematics It can also be used as a reference by more advanced readers The authors cover a large but well chosen variety of subjects from the theory of quantum groups quantized universal enveloping algebras quantized algebras of functions and q deformed algebras q oscillator algebras their representations and corepresentations and noncommutative differential calculus The book is written with potential applications in physics and mathematics in mind The basic quantum groups and quantum algebras and their representations are given in detail and accompanied by explicit formulas A number of topics and results from the more advanced general theory are developed and discussed *Quantum Groups and Lie Theory* Andrew Pressley,2001 Leading researchers discuss quantum groups and integrable systems for graduates and researchers

*Quantum Groups and Noncommutative Geometry* Yuri I. Manin,2018-10-11 This textbook presents the second edition of Manin s celebrated 1988 Montreal lectures which influenced a new generation of researchers in algebra to take up the study of Hopf algebras and quantum groups In this expanded write up of those lectures Manin systematically develops an approach to quantum groups as symmetry objects in noncommutative geometry in contrast to the more deformation oriented approach due to Faddeev Drinfeld and others This new edition contains an extra chapter by Theo Raedschelders and Michel Van den Bergh surveying recent work that focuses on the representation theory of a number of bi and Hopf algebras that were first introduced in Manin s lectures and have since gained a lot of attention Emphasis is placed on the Tannaka Krein formalism which further strengthens Manin s approach to symmetry and moduli objects in noncommutative geometry **Lectures on Algebraic Quantum Groups** Ken Brown,Ken R. Goodearl,2012-12-06 In September 2000 at the Centre de Recerca Matematica in Barcelona we pre sented a 30 hour Advanced Course on Algebraic Quantum Groups After the course we expanded and smoothed out the material presented in the lectures and inte grated it with the background material that we had prepared for the participants this volume is the result As our title implies our aim in the course and in this text is to treat selected algebraic aspects of the subject of quantum groups Sev eral of the words in the previous sentence call for some elaboration First we mean to convey several points by the term algebraic that we are concerned with algebraic objects the quantized analogues of classical algebraic objects in contrast for example to quantized versions of continuous function algebras on compact groups that we are interested in algebraic aspects of the structure of these objects and their representations in contrast for example to applications to other areas of mathematics and that our tools will be drawn primarily from noncommutative algebra representation theory and algebraic geometry Second the term quantum groups itself This label is attached to a large and rapidly diversifying field of mathematics and mathematical physics originally launched by developments around 1980 in theoretical physics and statistical me chanics It is a field driven much more by examples than by axioms and so resists attempts at concise description but see Chapter 1 1 and the references therein

*Quantum Groups and Their Applications in Physics* Società italiana di fisica,1996 This book focuses on quantum groups i e continuous deformations of Lie groups and their applications in physics These algebraic structures have been studied in the last decade by a growing number of mathematicians and physicists and are found to underlie many physical systems of interest They do provide in fact a sort of common algebraic ground for seemingly very different physical problems As it has happened for supersymmetry the q group symmetries are bound to play a vital role in physics even in fundamental theories like gauge theory or gravity In fact q symmetry can be considered itself as a generalization of supersymmetry evident in the q commutator formulation The hope that field theories on q groups are naturally regularized begins to appear founded and opens new perspectives for quantum gravity The topics covered in this book include conformal field theories and quantum groups gauge theories of quantum groups anyons differential calculus on quantum groups and non commutative geometry poisson algebras 2 dimensional statistical models 2 1 quantum gravity quantum groups and lattice physics inhomogeneous q groups q Poincaregroup and deformed gravity and gauging of W algebras     *Recent Advances in Representation Theory, Quantum Groups, Algebraic Geometry, and Related Topics* Pramod M. Achar,Dijana Jakelić,Kailash C. Misra,Milen Yakimov,2014-08-27 This volume contains the proceedings of two AMS Special Sessions Geometric and Algebraic Aspects of Representation Theory and Quantum Groups and Noncommutative Algebraic Geometry held October 13 14 2012 at Tulane University New Orleans Louisiana Included in this volume are original research and some survey articles on various aspects of representations of algebras including Kac Moody algebras Lie superalgebras quantum groups toroidal algebras Leibniz algebras and their connections with other areas of mathematics and mathematical physics     **Stochastic Processes and Operator Calculus on Quantum Groups** U. Franz,René Schott,2013-03-14 This book aims to present several new developments on stochastic processes and operator calculus on quantum groups Topics which are treated include operator calculus dual representations stochastic processes and diffusions Appell polynomials and systems in connection with evolution equations Audience This volume contains introductory material for graduate students who are new to the field as well as more advanced material for specialists in probability theory algebraic structures representation theory mathematical physics and theoretical physics     **Quantum Groups in Three-Dimensional Integrability** Atsuo Kuniba,2022-09-25 Quantum groups have been studied intensively in mathematics and have found many valuable applications in theoretical and mathematical physics since their discovery in the mid 1980s Roughly speaking there are two prototype examples of quantum groups denoted by Uq and Aq The former is a deformation of the universal enveloping algebra of a Kac Moody Lie algebra whereas the latter is a deformation of the coordinate ring of a Lie group Although they are dual to each other in principle most of the applications so far are based on Uq and the main targets are solvable lattice models in 2 dimensions or quantum field theories in 1 1 dimensions This book aims to present a unique approach to 3 dimensional integrability based on Aq It starts from the tetrahedron equation a 3 dimensional analogue of the Yang Baxter equation and its solution due to work by

Kapranov Voevodsky 1994 Then it guides readers to its variety of generalizations relations to quantum groups and applications They include a connection to the Poincar Birkhoff Witt basis of a unipotent part of Uq reductions to the solutions of the Yang Baxter equation reflection equation G2 reflection equation matrix product constructions of quantum R matrices and reflection K matrices stationary measures of multi species simple exclusion processes etc These contents of the book are quite distinct from conventional approaches and will stimulate and enrich the theories of quantum groups and integrable systems      <u>Hopf Algebras and Quantum Groups</u> Stefaan Caenepeel,Freddy Van Oystaeyen,2019-05-07 This volume is based on the proceedings of the Hopf Algebras and Quantum Groups conference at the Free University of Brussels Belgium It presents state of the art papers selected from over 65 participants representing nearly 20 countries and more than 45 lectures on the theory of Hopf algebras including multiplier Hopf algebras and quantum g      *Quantum Groups, Integrable Statistical Models And Knot Theory - The Fifth Nankai Workshop* Mo-lin Ge,H J De Vega,1993-06-30 The lectures in this volume discuss topics in statistical mechanics the geometric and algebraic approaches to q deformation theories two dimensional gravity and related problems of mathematical physics including Vassiliev invariants and the Jones polynomials the R matrix with Z symmetry reflection equations and quantum algebra W geometry braid linear algebra holomorphic q difference systems and q Poincar algebra      *Complex Semisimple Quantum Groups and Representation Theory* Christian Voigt,Robert Yuncken,2020-09-24 This book provides a thorough introduction to the theory of complex semisimple quantum groups that is Drinfeld doubles of q deformations of compact semisimple Lie groups The presentation is comprehensive beginning with background information on Hopf algebras and ending with the classification of admissible representations of the q deformation of a complex semisimple Lie group The main components are a thorough introduction to quantized universal enveloping algebras over general base fields and generic deformation parameters including finite dimensional representation theory the Poincar Birkhoff Witt Theorem the locally finite part and the Harish Chandra homomorphism the analytic theory of quantized complex semisimple Lie groups in terms of quantized algebras of functions and their duals algebraic representation theory in terms of category O and analytic representation theory of quantized complex semisimple groups Given its scope the book will be a valuable resource for both graduate students and researchers in the area of quantum groups      **Quantum Groups** Heinz Dietrich Doebner,1990 A thorough analysis of exactly soluble models in nonlinear classical systems and in quantum systems as well as recent studies in conformal quantum field theory have revealed the structure of quantum groups to be an interesting and rich framework for mathematical and physical problems In this book for the first time authors from different schools review in an intelligible way the various competing approaches inverse scattering methods 2 dimensional statistical models Yang Baxter algebras the Bethe ansatz conformal quantum field theory representations braid group statistics noncommutative geometry and harmonic analysis      **Algebras of Functions on Quantum Groups: Part I** Leonid I. Korogodski,Yan S. Soibelman,1998 The text is devoted to the study of algebras of

functions on quantum groups The book includes the theory of Poisson Lie algebras quasi classical version of algebras of functions on quantum groups a description of representations of algebras of functions and the theory of quantum Weyl groups It can serve as a text for an introduction to the theory of quantum groups and is intended for graduate students and research mathematicians working in algebra representation theory and mathematical physics     Hopf Algebras, Quantum Groups and Yang-Baxter Equations Florin Felix Nichita,2019-01-31 This book is a printed edition of the Special Issue Hopf Algebras Quantum Groups and Yang Baxter Equations that was published in Axioms     *Elliptic Quantum Groups* Hitoshi Konno,2020-09-14 This is the first book on elliptic quantum groups i e quantum groups associated to elliptic solutions of the Yang Baxter equation Based on research by the author and his collaborators the book presents a comprehensive survey on the subject including a brief history of formulations and applications a detailed formulation of the elliptic quantum group in the Drinfeld realization explicit construction of both finite and infinite dimensional representations and a construction of the vertex operators as intertwining operators of these representations The vertex operators are important objects in representation theory of quantum groups In this book they are used to derive the elliptic q KZ equations and their elliptic hypergeometric integral solutions In particular the so called elliptic weight functions appear in such solutions The author s recent study showed that these elliptic weight functions are identified with Okounkov s elliptic stable envelopes for certain equivariant elliptic cohomology and play an important role to construct geometric representations of elliptic quantum groups Okounkov s geometric approach to quantum integrable systems is a rapidly growing topic in mathematical physics related to the Bethe ansatz the Alday Gaiotto Tachikawa correspondence between 4D SUSY gauge theories and the CFT s and the Nekrasov Shatashvili correspondences between quantum integrable systems and quantum cohomology To invite the reader to such topics is one of the aims of this book     Quantum Group Symmetry And Q-tensor Algebras Lawrence C Biedenharn,Max A Lohe,1995-08-31 Quantum groups are a generalization of the classical Lie groups and Lie algebras and provide a natural extension of the concept of symmetry fundamental to physics This monograph is a survey of the major developments in quantum groups using an original approach based on the fundamental concept of a tensor operator Using this concept properties of both the algebra and co algebra are developed from a single uniform point of view which is especially helpful for understanding the noncommuting co ordinates of the quantum plane which we interpret as elementary tensor operators Representations of the q deformed angular momentum group are discussed including the case where q is a root of unity and general results are obtained for all unitary quantum groups using the method of algebraic induction Tensor operators are defined and discussed with examples and a systematic treatment of the important 3j series of operators is developed in detail This book is a good reference for graduate students in physics and mathematics

**Guide To Quantum Groups** Book Review: Unveiling the Power of Words

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