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Quantum Linear Groups and Representations of $GL_n(\mathbb{F}_q)$

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American Mathematical Society

Quantum Linear Groups And Representations Of GL_n

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Quantum Linear Groups And Representations Of $GL_n(F_q)$:

Quantum Linear Groups and Representations of $GL_n(\mathbb{F}_q)$ Jonathan Brundan, Richard Dipper, Aleksandr Sergeevich Kleshchëv, 2001 We give a self contained account of the results originating in the work of James and the second author in the 1980s relating the representation theory of $GL_n(F_q)$ over fields of characteristic coprime to q to the representation theory of quantum GL_n at roots of unity The new treatment allows us to extend the theory in several directions First we prove a precise functorial connection between the operations of tensor product in quantum GL_n and Harish Chandra induction in finite GL_n This allows us to obtain a version of the recent Morita theorem of Cline Parshall and Scott valid in addition for p singular classes From that we obtain simplified treatments of various basic known facts such as the computation of decomposition numbers and blocks of $GL_n(F_q)$ from knowledge of the same for the quantum group and the non defining analogue of Steinberg's tensor product theorem We also easily obtain a new double centralizer property between $GL_n(F_q)$ and quantum GL_n generalizing a result of Takeuchi Finally we apply the theory to study the affine general linear group following ideas of Zelevinsky in characteristic zero We prove results that can be regarded as the modular analogues of Zelevinsky's and Thoma's branching rules Using these we obtain a new dimension formula for the irreducible cross characteristic representations of $GL_n(F_q)$ expressing their dimensions in terms of the characters of irreducible modules over the quantum group

Representation Theory of Finite Reductive Groups Marc Cabanes, Michel Enguehard, 2004-01-29 At the crossroads of representation theory algebraic geometry and finite group theory this 2004 book blends together many of the main concerns of modern algebra with full proofs of some of the most remarkable achievements in the area Cabanes and Enguehard follow three main themes first applications of étale cohomology leading to the proof of the recent Bonnaf Rouquier theorems The second is a straightforward and simplified account of the Dipper James theorems relating irreducible characters and modular representations The final theme is local representation theory One of the main results here is the authors version of Fong Srinivasan theorems Throughout the text is illustrated by many examples and background is provided by several introductory chapters on basic results and appendices on algebraic geometry and derived categories The result is an essential introduction for graduate students and reference for all algebraists

Canonical Sobolev Projections of Weak Type $(1,1)$ Earl Berkson, 2001 Let $\mathcal{S}$ be a second order smoothness in the $\mathbb{R}^n$ DEGREEs setting We can assume without loss of generality that the dimension n has been adjusted as necessary so as to insure that $\mathcal{S}$ is also non degenerate This title describes how $\mathcal{S}$ must fit into one of three mutually exclusive cases and in each of these cases the authors characterize by a simple intrinsic condition the second order smoothnesses $\mathcal{S}$ whose canonical Sobolev projection $P_{\mathcal{S}}$ is of weak type $(1,1)$ in the $\mathbb{R}^n$ DEGR

Graded Simple Jordan Superalgebras of Growth One Victor G. Kac, Consuelo Martinez, Efim Zelmanov, 2001 This title examines in detail graded simple Jordan superalgebras of growth one Topics include structure of the even part Cartan type even part is direct

sum of two loop algebras A is a loop algebra and J is a finite dimensional Jordan superalgebra or a Jordan superalgebra of a superform

A Stability Index Analysis of 1-D Patterns of the Gray-Scott Model A. Doelman, Robert A. Gardner, Tasso J. Kaper, 2002 This work is intended for graduate students and research mathematicians interested in partial differential equations

The Spectrum of a Module Category Henning Krause, 2001 These notes present an introduction into the spectrum of the category of modules over a ring We discuss the general theory of pure injective modules and concentrate on the isomorphism classes of indecomposable pure injective modules which form the underlying set of this spectrum The interplay between the spectrum and the category of finitely presented modules provides new insight into the geometrical and homological properties of the category of finitely presented modules Various applications from representation theory of finite dimensional algebras are included

Mutual Invasibility Implies Coexistence in Spatial Models Richard Durrett, 2002 In 1994 Durrett and Levin proposed that the equilibrium behavior of stochastic spatial models could be determined from properties of the solution of the mean field ordinary differential equation ODE that is obtained by pretending that all sites are always independent Here we prove a general result in support of that picture We give a condition on an ordinary differential equation which implies that densities stay bounded away from 0 in the associated reaction diffusion equation and that coexistence occurs in the stochastic spatial model with fast stirring Then using biologists notion of invasibility as a guide we show how this condition can be checked in a wide variety of examples that involve two or three species epidemics diploid genetics models predator prey systems and various competition models

Smooth Molecular Decompositions of Functions and Singular Integral Operators John E. Gilbert, 2002 Under minimal assumptions on a function ψ the authors obtain wavelet type frames of the form $\psi_{j,k,r}(\psi_r(\sum_{j=1}^n \psi_j(x - s_k)))$ in integer k in integer $\sum_{j=1}^n \psi_j(x - s_k)$ for some $r \geq 1$ and $s \geq 0$ This collection is shown to be a frame for a scale of Triebel Lizorkin spaces which includes Lebesgue Sobolev and Hardy spaces and the reproducing formula converges in norm as well as pointwise a.e The construction follows from a characterization of those operators which are bounded on a space of smooth molecules This characterization also allows us to decompose a broad range of singular integral operators in terms of

Iwahori-Hecke Algebras and Schur Algebras of the Symmetric Group Andrew Mathas, 1999 This volume presents a fully self contained introduction to the modular representation theory of the Iwahori Hecke algebras of the symmetric groups and of the q Schur algebras The study of these algebras was pioneered by Dipper and James in a series of landmark papers The primary goal of the book is to classify the blocks and the simple modules of both algebras The final chapter contains a survey of recent advances and open problems The main results are proved by showing that the Iwahori Hecke algebras and q Schur algebras are cellular algebras in the sense of Graham and Lehrer This is proved by exhibiting natural bases of both algebras which are indexed by pairs of standard and semistandard tableaux respectively Using the machinery of cellular algebras which is developed in chapter 2 this results in a clean and elegant classification of the irreducible representations of both algebras

The block theory is approached by first proving an analogue of the Jantzen sum formula for the q Schur algebras This book is the first of its kind covering the topic It offers a substantially simplified treatment of the original proofs The book is a solid reference source for experts It will also serve as a good introduction to students and beginning researchers since each chapter contains exercises and there is an appendix containing a quick development of the representation theory of algebras A second appendix gives tables of decomposition numbers

Spectral Decomposition of a Covering of $GL(r)$: the Borel case Heng Sun, 2002 Let F be a number field and $\mathbb{A}$ the ring of adeles over F Suppose $\overline{G}$ $\mathbb{A}$ is a metaplectic cover of G $\mathbb{A}$ $GL(r, \mathbb{A})$ which is given by the n th Hilbert symbol on $\mathbb{A}$

Topological Invariants of the Complement to Arrangements of Rational Plane Curves José Ignacio Cogolludo-Agustín, 2002 The authors analyse two topological invariants of an embedding of an arrangement of rational plane curves in the projective complex plane namely the cohomology ring of the complement and the characteristic varieties Their main result states that the cohomology ring of the complement to a rational arrangement is generated by logarithmic 1 and 2 forms and its structure depends on a finite number of invariants of the curve its combinatorial type

Dualities on Generalized Koszul Algebras Edward L. Green, Idun Reiten, Øyvind Solberg, 2002 Koszul rings are graded rings which have played an important role in algebraic topology noncommutative algebraic geometry and in the theory of quantum groups One aspect of the theory is to compare the module theory for a Koszul ring and its Koszul dual There are dualities between subcategories of graded modules the Koszul modules

Equivariant Orthogonal Spectra and S -Modules M. A. Mandell, J. Peter May, 2002 The last few years have seen a revolution in our understanding of the foundations of stable homotopy theory Many symmetric monoidal model categories of spectra whose homotopy categories are equivalent to the stable homotopy category are now known whereas no such categories were known before 1993 The most well known examples are the category of S modules and the category of symmetric spectra We focus on the category of orthogonal spectra which enjoys some of the best features of S modules and symmetric spectra and which is particularly well suited to equivariant generalization We first complete the nonequivariant theory by comparing orthogonal spectra to S modules We then develop the equivariant theory For a compact Lie group G we construct a symmetric monoidal model category of orthogonal G spectra whose homotopy category is equivalent to the classical stable homotopy category of G spectra We also complete the theory of S_G modules and compare the categories of orthogonal G spectra and S_G modules A key feature is the analysis of change of universe change of group fixed point and orbit functors in these two highly structured categories for the study of equivariant stable homotopy theory

Representations of Hecke Algebras at Roots of Unity Meinolf Geck, Nicolas Jacon, 2011-05-18 The modular representation theory of Iwahori Hecke algebras and this theory's connection to groups of Lie type is an area of rapidly expanding interest it is one that has also seen a number of breakthroughs in recent years In classifying the irreducible representations of Iwahori Hecke algebras at roots of unity this book is a particularly valuable addition to current research in

this field Using the framework provided by the Kazhdan Lusztig theory of cells the authors develop an analogue of James 1970 characteristic free approach to the representation theory of Iwahori Hecke algebras in general Presenting a systematic and unified treatment of representations of Hecke algebras at roots of unity this book is unique in its approach and includes new results that have not yet been published in book form It also serves as background reading to further active areas of current research such as the theory of affine Hecke algebras and Cherednik algebras The main results of this book are obtained by an interaction of several branches of mathematics namely the theory of Fock spaces for quantum affine Lie algebras and Ariki's theorem the combinatorics of crystal bases the theory of Kazhdan Lusztig bases and cells and computational methods This book will be of use to researchers and graduate students in representation theory as well as any researchers outside of the field with an interest in Hecke algebras

Categorification and Higher Representation

Theory Anna Beliakova, Aaron D. Lauda, 2017-02-21 The emergent mathematical philosophy of categorification is reshaping our view of modern mathematics by uncovering a hidden layer of structure in mathematics revealing richer and more robust structures capable of describing more complex phenomena Categorified representation theory or higher representation theory aims to understand a new level of structure present in representation theory Rather than studying actions of algebras on vector spaces where algebra elements act by linear endomorphisms of the vector space higher representation theory describes the structure present when algebras act on categories with algebra elements acting by functors The new level of structure in higher representation theory arises by studying the natural transformations between functors This enhanced perspective brings into play a powerful new set of tools that deepens our understanding of traditional representation theory This volume exhibits some of the current trends in higher representation theory and the diverse techniques that are being employed in this field with the aim of showcasing the many applications of higher representation theory The companion volume Contemporary Mathematics Volume 684 is devoted to categorification in geometry topology and physics

Frobenius Groups and Classical Maximal Orders Ron Brown, 2001 Introduction Lemmas on truncated group rings Groups of real quaternions Proof of the classification theorem Frobenius complements with core index 1 Frobenius complements with core index 4 Frobenius complements with core index 12 Frobenius complements with core index 24 Frobenius complements with core index 60 Frobenius complements with core index 120 Counting Frobenius complements Maximal orders Isomorphism classes of Frobenius groups with Abelian Frobenius kernel Concrete constructions of Frobenius groups Counting Frobenius groups with Abelian Frobenius kernel Isomorphism invariants for Frobenius complements Schur indices and finite subgroups of division rings Bibliography *Groups Combinatorics & Geometry* A. A. Ivanov, Martin W. Liebeck, J. Saxl, 2003 Over the past 20 years the theory of groups in particular simple groups finite and algebraic has influenced a number of diverse areas of mathematics Such areas include topics where groups have been traditionally applied such as algebraic combinatorics finite geometries Galois theory and permutation groups as well as several more recent

developments *Groups St Andrews 2009 in Bath: Volume 1* C. M. Campbell, M. R. Quick, E. F. Robertson, C. M. Roney-Dougal, G. C. Smith, G. Traustason, 2011-06-16 Groups St Andrews 2009 was held in the University of Bath in August 2009 and this first volume of a two volume book contains selected papers from the international conference Five main lecture courses were given at the conference and articles based on their lectures form a substantial part of the proceedings This volume contains the contributions by Gerhard Hiss RWTH Aachen and Volodymyr Nekrashevych Texas A M Apart from the main speakers refereed survey and research articles were contributed by other conference participants Arranged in alphabetical order these articles cover a wide spectrum of modern group theory The regular proceedings of Groups St Andrews conferences have provided snapshots of the state of research in group theory throughout the past 30 years Earlier volumes have had a major impact on the development of group theory and it is anticipated that this volume will be equally important

From Representation Theory to Homotopy Groups Donald M. Davis, 2002 A formula for the odd primary v_1 periodic homotopy groups of a finite H space in terms of its K theory and Adams operations has been obtained by Bousfield This work applies this theorem to give explicit determinations of the v_1 periodic homotopy groups of $E_8/5$ and $E_8/3$ thus completing the determination of all odd primary v_1 periodic homotopy groups of all compact simple Lie groups a project suggested by Mimura in 1989

Basic Global Relative Invariants for Homogeneous Linear Differential Equations Roger Chalkley, 2002 Given any fixed integer $m \geq 3$ the author presents simple formulas for $m - 2$ algebraically independent polynomials over $\mathbb{Q}$ having the remarkable property with respect to transformations of homogeneous linear differential equations of order m that each polynomial is both a semi invariant of the first kind with respect to changes of the dependent variable and a semi invariant of the second kind with respect to changes of the independent variable These relative invariants are suitable for global studies in several different contexts and do not require Laguerre Forsyth reductions for their evaluation In contrast all of the general formulas for basic relative invariants that have been proposed by other researchers during the last 113 years are merely local ones that are either much too complicated or require a Laguerre Forsyth reduction for each evaluation

The Top Books of the Year Quantum Linear Groups And Representations Of Gln Fq The year 2023 has witnessed a remarkable surge in literary brilliance, with numerous captivating novels captivating the hearts of readers worldwide. Lets delve into the realm of popular books, exploring the fascinating narratives that have charmed audiences this year. The Must-Read : Colleen Hoover's "It Ends with Us" This heartfelt tale of love, loss, and resilience has gripped readers with its raw and emotional exploration of domestic abuse. Hoover expertly weaves a story of hope and healing, reminding us that even in the darkest of times, the human spirit can succeed. Uncover the Best : Taylor Jenkins Reid's "The Seven Husbands of Evelyn Hugo" This intriguing historical fiction novel unravels the life of Evelyn Hugo, a Hollywood icon who defies expectations and societal norms to pursue her dreams. Reid's compelling storytelling and compelling characters transport readers to a bygone era, immersing them in a world of glamour, ambition, and self-discovery. Discover the Magic : Delia Owens' "Where the Crawdads Sing" This mesmerizing coming-of-age story follows Kya Clark, a young woman who grows up alone in the marshes of North Carolina. Owens weaves a tale of resilience, survival, and the transformative power of nature, entrancing readers with its evocative prose and mesmerizing setting. These popular novels represent just a fraction of the literary treasures that have emerged in 2023. Whether you seek tales of romance, adventure, or personal growth, the world of literature offers an abundance of engaging stories waiting to be discovered. The novel begins with Richard Papen, a bright but troubled young man, arriving at Hampden College. Richard is immediately drawn to the group of students who call themselves the Classics Club. The club is led by Henry Winter, a brilliant and charismatic young man. Henry is obsessed with Greek mythology and philosophy, and he quickly draws Richard into his world. The other members of the Classics Club are equally as fascinating. Bunny Corcoran is a wealthy and spoiled young man who is always looking for a good time. Charles Tavis is a quiet and reserved young man who is deeply in love with Henry. Camilla Macaulay is a beautiful and intelligent young woman who is drawn to the power and danger of the Classics Club. The students are all deeply in love with Morrow, and they are willing to do anything to please him. Morrow is a complex and mysterious figure, and he seems to be manipulating the students for his own purposes. As the students become more involved with Morrow, they begin to commit increasingly dangerous acts. The Secret History is a masterful and suspenseful novel that will keep you guessing until the very end. The novel is a cautionary tale about the dangers of obsession and the power of evil.

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