Characters of Reductive Groups Over a Finite Field - George Lusztig - 1984-06-21
This book presents a classification of all (complex) irreducible representations of a reductive group with connected centre, over a finite field. To achieve this, the author uses etale intersection cohomology, and detailed information on representations of Weyl groups.

The Langlands Classification and Irreducible Characters for Real Reductive Groups - J. Adams - 2012-12-06
This monograph explores the geometry of the local Langlands conjecture. The conjecture predicts a parametrizations of the irreducible representations of a reductive algebraic group over a local field in terms of the complex dual group and the Weil-Deligne group. For p-adic fields, this conjecture has not been proved; but it has been refined to a detailed collection of (conjectural) relationships between p-adic representation theory and geometry on the space of p-adic representation theory and geometry on the space of p-adic Langlands parameters. This book provides and introduction to some modern geometric methods in representation theory. It is addressed to graduate students and research workers in representation theory and in automorphic forms.
Graham, Benedict H. Gross, Xuhua He, Jing-Song Huang, Toshiyuki Kobayashi, Bertram Kostant, Wenjing Li, George Lusztig, Eric Marberg, William M. McGovern, Wilfried Schmid, Kari Vilonen, Diana Shelstad, Peter E. Trapa, David A. Vogan, Jr., Nolan R. Wallach, Xiaoheng Wang, Geordie Williamson

**Representations of Reductive Groups** - Monica Nevins - 2015-12-18
Over the last forty years, David Vogan has left an indelible imprint on the representation theory of reductive groups. His groundbreaking ideas have led to deep advances in the theory of real and p-adic groups, and have forged lasting connections with other subjects, including number theory, automorphic forms, algebraic geometry, and combinatorics. Representations of Reductive Groups is an outgrowth of the conference of the same name, dedicated to David Vogan on his 60th birthday, which took place at MIT on May 19-23, 2014. This volume highlights the depth and breadth of Vogan’s influence over the subjects mentioned above, and point to many exciting new directions that remain to be explored. Notably, the first article by McGovern and Trapa offers an overview of Vogan’s body of work, placing his ideas in a historical context.

**Finite Reductive Groups: Related Structures and Representations** - Marc Cabanes - 2012-12-06
Finite reductive groups and their representations lie at the heart of group theory. This volume treats linear representations of finite reductive groups and their modular aspects together with Hecke algebras, complex reflection groups, quantum groups, arithmetic groups, Lie groups, symmetric groups and general finite groups.

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**Groups** - Robert S. Doran, Paul J. Sally, Jr., and groups and their modular aspects together with Hecke algebras, complex reflection groups, quantum groups, arithmetic groups, Lie groups, symmetric groups and general finite groups.

**Representation Theory of Finite Reductive Groups** - Marc Cabanes - 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 Bonnafe–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.

**The Character Theory of Finite Groups of Lie Type** - Meinolf Geck - 2020-02-27
Through the fundamental work of Deligne and Lusztig in the 1970s, further developed mainly by Lusztig, the character theory of reductive groups over finite fields has grown into a rich and vast area of mathematics. It incorporates tools and methods from algebraic geometry, topology, combinatorics and computer algebra, and has since evolved substantially. With this book, the authors meet the need for a contemporary treatment, complementing in core areas the well-established books of Carter and Digne–Michel. Focusing on applications in finite group theory, the authors gather previously scattered results and allow the reader to get to grips with the large body of literature available on the subject, covering topics such as regular embeddings, the Jordan decomposition of characters, d-Harish–Chandra theory and Lusztig induction for unipotent characters. Requiring only a modest background in algebraic geometry, this useful reference is suitable for beginning graduate students as well as researchers.

**Harmonic Analysis on Reductive, $p$-adic**
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On the Irreducible Characters of Reductive Algebraic Groups - Peter Fiebig - 2008

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Featured Reviews in "Mathematical Reviews" 1995-1996 - Donald G. Babbitt -
This collection of reprinted 'Featured Reviews' published in Mathematical Reviews (MR) in 1995 and 1996 makes widely available informed reviews of some of the best mathematics published recently. 'Featured Reviews' were introduced in MR at the beginning of 1995 in part to provide some guidance to the current research-level literature. With the exponential growth of publications in mathematical research in the first half-century of MR, it had become essentially impossible for users of MR to identify the most important new research-level books and papers, especially in fields outside of the users' own expertise. This work identifies some of the "best" new publications, papers, and books that are expected to have a significant impact on the area of pure or applied mathematics with which researchers are concerned. All of the papers reviewed here contain interesting new ideas or applications, a deep synthesis of existing ideas, or any combination of these. The volume is intended to lead the user to important new research across all fields covered by MR.

Fourier Transforms of Invariant Functions on Finite Reductive Lie Algebras - Emmanuel Letellier - 2004-11-15
The Fourier transforms of invariant functions on finite reductive Lie algebras are due to T.A. Springer (1976) in connection with the geometry of nilpotent orbits. In this book the author studies Fourier transforms using Deligne-Lusztig induction and the Lie algebra version of Lusztig's character sheaves theory. He conjectures a commutation formula between Deligne-Lusztig induction and Fourier transforms that he proves in many cases. As an application the computation of the values of the trigonometric sums (on reductive Lie algebras) is shown to reduce to the computation of the generalized Green functions and to the computation of some fourth roots of unity.

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Algebra IX - A.I. Kostrikin - 2013-04-17
The first contribution by Carter covers the theory...
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On the Gel'fand-Graev Characters of Reductive Groups with Disconnected Centre - François Digne - 1996

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**The Arcata Conference on Representations of Finite Groups** - Paul Fong - 1987

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**Families of Automorphic Forms and the Trace Formula** - Werner Müller - 2016-09-20
Featuring the work of twenty-three internationally-recognized experts, this volume explores the trace formula, spectra of locally symmetric spaces, p-adic families, and other recent techniques from harmonic analysis and representation theory. Each peer-reviewed submission in this volume, based on the Simons Foundation symposium on families of automorphic forms and the trace formula held in Puerto Rico in January-February 2014, is the product of intensive research collaboration by the participants over the course of the seven-day workshop. The goal of each session in the symposium was to bring together researchers with diverse specialties in order to identify key difficulties as well as fruitful approaches being explored in the field. The respective themes were counting cohomological forms, p-adic trace formulas, Hecke fields, slopes of modular forms, and orbital integrals.

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**Representation Theory, Number Theory, and Invariant Theory** - Jim Cogdell - 2017-10-19
This book contains selected papers based on talks given at the "Representation Theory, Number Theory, and Invariant Theory" conference held at Yale University from June 1 to June 5, 2015. The meeting and this resulting volume are in honor of Professor Roger Howe, on the occasion of his 70th birthday, whose work and insights have been deeply influential in the development of these fields. The speakers who contributed to this work include Roger Howe's doctoral students, Roger Howe himself, and other world renowned mathematicians. Topics covered include automorphic forms, invariant theory, representation theory of reductive groups over local fields, and related subjects.
algebras, covering topics such as block theory, representation theory and Clifford theory. It can also serve as an introduction to the Hecke algebras of complex reflection groups.

**Weil Conjectures, Perverse Sheaves and l’adic Fourier Transform** - Reinhardt Kiehl - 2013-03-14

The authors describe the important generalization of the original Weil conjectures, as given by P. Deligne in his fundamental paper “La conjecture de Weil II”. The authors follow the important and beautiful methods of Laumon and Brylinski which lead to a simplification of Deligne's theory. Deligne's work is closely related to the sheaf theoretic theory of perverse sheaves. In this framework Deligne's results on global weights and his notion of purity of complexes obtain a satisfactory and final form. Therefore the authors include the complete theory of middle perverse sheaves. In this part, the l-adic Fourier transform is introduced as a technique providing natural and simple proofs. To round things off, there are three chapters with significant applications of these theories.

**Lie Groups, Geometry, and Representation Theory** - Victor G. Kac - 2018-12-12

This volume, dedicated to the memory of the great American mathematician Bertram Kostant (May 24, 1928 – February 2, 2017), is a collection of 19 invited papers by leading mathematicians working in Lie theory, representation theory, algebra, geometry, and mathematical physics.
Kostant’s fundamental work in all of these areas has provided deep new insights and connections, and has created new fields of research. This volume features the only published articles of important recent results of the contributors with full details of their proofs. Key topics include:


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### Representations of Reductive Groups - Avraham Aizenbud - 2019-02-20

This volume contains the proceedings of the Conference on Representation Theory and Algebraic Geometry, held in honor of Joseph Bernstein, from June 11–16, 2017, at the Weizmann Institute of Science and The Hebrew University of Jerusalem. The topics reflect the decisive and diverse impact of Bernstein on representation theory in its broadest scope. The themes include representations of p-adic groups and Hecke algebras in all characteristics, representations of real groups and supergroups, theta correspondence, and automorphic forms.

### Eisenstein Series and Automorphic L-functions - Freydoon Shahidi - 2010

This book presents a treatment of the theory of $L$-functions developed via the theory of Eisenstein series and their Fourier coefficients. The author is a co-developer of the important Langlands-Shahidi method. This account of the theory is ideal for graduate students and researchers interested in the Langlands program in automorphic forms and its connections with number theory.
Harish-Chandra Homomorphisms for P-adic Groups - Roger Howe - 1985-12-31
This book introduces a systematic new approach to the construction and analysis of semisimple $p$-adic groups. The basic construction presented here provides an analogue in certain cases of the Harish-Chandra homomorphism, which has played an essential role in the theory of semisimple Lie groups. The book begins with an overview of the representation theory of GL$_n$ over finite groups. The author then explicitly establishes isomorphisms between certain convolution algebras of functions on two different groups. Because of the form of the isomorphisms, basic properties of representations are preserved, thus giving a concrete example to the correspondences predicted by the general philosophy of Langlands. The first chapter, suitable as an introduction for graduate students, requires only a basic knowledge of representation theory of finite groups and some familiarity with the general linear group and the symmetric group. The later chapters introduce researchers in the field to a new method for the explicit construction and analysis of representations of $p$-adic groups, a powerful method clearly capable of extensive further development.

Character Identities in the Twisted Endoscopy of Real Reductive Groups - Paul Mezo - 2013-02-26
Suppose $G$ is a real reductive algebraic group, $\theta$ is an automorphism of $G$, and $\omega$ is a quasicharacter of the group of real points $G$. Under some additional assumptions, the theory of twisted endoscopy associates to this triple real reductive groups $H$. The Local Langlands Correspondence partitions the admissible representations of $H$ into $L$-packets. The author proves twisted character identities between $L$-packets of comprised of essential discrete series or limits of discrete series.

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Complements of Discriminants of Smooth Maps - Zongzhu Lin - 2009-01-16
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**Representations of Finite Groups of Lie Type**  
- Francois Digne - 1991-04-26  
The authors aim to treat the basic theory of representations of finite groups of Lie type, such as linear, unitary, orthogonal and symplectic groups. They emphasize the Curtis-Alvis duality map and Mackey's theorem and the results that can be deduced from it. They also discuss Deligne-Lusztig induction. This will be the first elementary treatment of this material in book form and will be welcomed by beginning graduate students in algebra.

**Characters of Finite Coxeter Groups and Iwahori-Hecke Algebras**  
- Institut Girard Desargues Meinolf Geck - 2000  
Finite Coxeter groups and related structures arise naturally in several branches of mathematics, for example, Lie algebras or theory of knots and links. This is the first book which develops the character theory of finite Coxeter groups and Iwahori-Hecke algebras in a systematic way, ranging from classical results to recent developments.

**Representations of Groups**  
- Canadian Mathematical Society. Seminar - 1995  
Representations of Groups contains papers presented at the Canadian Mathematical Society Annual Seminar held in June 1994, in Banff, Alberta. The material addresses representations of Lie groups, algebraic groups, finite groups, and quantum groups and the relationships among these areas. With both survey and research articles, this book offers the latest results on various aspects of representation theory of groups.

**An Introduction to Algebraic Geometry and Algebraic Groups**  
- Meinolf Geck - 2013-03-14  
An accessible text introducing algebraic groups at advanced undergraduate and early graduate level, this book covers the conjugacy of Borel subgroups and maximal tori, the theory of algebraic groups with a BN-pair, Frobenius maps on affine varieties and algebraic groups, zeta functions and Lefschetz numbers for varieties over finite fields.

**On Certain L-functions**  
- James Arthur - 2011  
This volume constitutes the proceedings of a conference, ""On Certain $L$-functions", held July 23-27, 2007 at Purdue University, West Lafayette, Indiana. The conference was organized in honor of the 60th birthday of Freydoon Shahidi, widely recognized as having
program (Schwerpunktprogramm) Algorithmic Langlands program. The articles in this volume represent a snapshot of the state of the field from several viewpoints. Contributions illuminate various areas of the study of geometric, analytic, and number theoretic aspects of automorphic forms and their $L$-functions, and both local and global theory are addressed. Topics discussed in the articles include Langlands functoriality, the Rankin-Selberg method, the Langlands-Shahidi method, motivic Galois groups, Shimura varieties, orbital integrals, representations of $p$-adic groups, Plancherel formula and its consequences, the Gross-Prasad conjecture, and more. The volume also includes an expository article on Shahidi’s contributions to the field, which serves as an introduction to the subject. Experts will find this book a useful reference, and beginning researchers will be able to use it to survey major results in the Langlands program.

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**Algorithmic Algebra and Number Theory** - B. Heinrich Matzat - 2012-12-06

This book contains 22 lectures presented at the final conference of the German research program (Schwerpunktprogramm) Algorithmic Number Theory and Algebra 1991-1997, sponsored by the Deutsche Forschungsgemeinschaft. The purpose of this research program and of the meeting was to bring together developers of computer algebra software and researchers using computational methods to gain insight into experimental problems and theoretical questions in algebra and number theory. The book gives an overview on algorithmic methods and on results obtained during this period. This includes survey articles on the main research projects within the program: • algorithmic number theory emphasizing class field theory, constructive Galois theory, computational aspects of modular forms and of Drinfeld modules • computational algebraic geometry including real quantifier elimination and real algebraic geometry, and invariant theory of finite groups • computational aspects of presentations and representations of groups, especially finite groups of Lie type and their Hecke algebras, and of the isomorphism problem in group theory. Some of the articles illustrate the current state of computer algebra systems and program packages developed with support by the research program, such as KANT and LiDIA for algebraic number theory, SINGULAR, RED LOG and INVAR for commutative algebra and invariant theory respectively, and GAP, SYMPHOS and CHEVIE for group theory and representation theory.

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A Panorama of Pure Mathematics, As Seen by N. Bourbaki - 1982-08-18
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Finite Simple Groups: Thirty Years of the Atlas and Beyond - Manjul Bhargava - 2017-07-24
Classification of Finite Simple Groups, one of the most monumental accomplishments of modern mathematics, was announced in 1983 with the proof completed in 2004. Since then, it has opened up a new and powerful strategy to approach and resolve many previously inaccessible problems in group theory, number theory, combinatorics, coding theory, algebraic geometry, and other areas of mathematics. This strategy crucially utilizes various information about finite simple groups, part of which is catalogued in the Atlas of Finite Groups (John H. Conway et al.), and in An Atlas of Brauer Characters (Christoph Jansen et al.). It is impossible to overestimate the roles of the Atlases and the related computer algebra systems in the everyday life of researchers in many areas of contemporary mathematics. The main objective of the conference was to discuss numerous applications of the Atlases and to explore recent developments and future directions of research, with focus on the interaction between computation and theory and applications to number theory and algebraic geometry. The papers in this volume are based on talks given at the conference. They present a comprehensive survey on current research in all of these fields.

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
including open problems and conjectures. 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.

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This book provides an accessible introduction to the state of the art of representation theory of finite groups. Starting from a basic level that is summarized at the start, the book proceeds to cover topics of current research interest, including open problems and conjectures. The central themes of the book are block theory and module theory of group representations, which are comprehensively surveyed with a full bibliography. The individual chapters cover a range of topics within the subject, from blocks with cyclic defect groups to representations of symmetric groups. Assuming only modest background knowledge at the level of a first graduate course in algebra, this guidebook, intended for students taking first steps in the field, will also provide a reference for more experienced researchers. Although no proofs are included, end-of-chapter exercises make it suitable for student seminars.

**Representations of SL2(Fq)** - Cédric Bonnafé - 2010-10-08
Deligne-Lusztig theory aims to study representations of finite reductive groups by means of geometric methods, and particularly l-adic cohomology. Many excellent texts present, with different goals and perspectives, this theory in the general setting. This book focuses on the smallest non-trivial example, namely the group SL2(Fq), which not only provides the simplicity required for a complete description of the theory, but also the richness needed for illustrating the most delicate aspects. The development of Deligne-Lusztig theory was inspired by Drinfeld’s example in 1974, and Representations of SL2(Fq) is based upon this example, and extends it to central themes of the book are block theory and module theory of group representations, which are comprehensively surveyed with a full bibliography. The individual chapters cover a range of topics within the subject, from blocks with cyclic defect groups to representations of symmetric groups. Assuming only modest background knowledge at the level of a first graduate course in algebra, this guidebook, intended for students taking first steps in the field, will also provide a reference for more experienced researchers. Although no proofs are included, end-of-chapter exercises make it suitable for student seminars.
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