

# K-théorie

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Marco FONTANA, Salah-Eddine KABBAJ, Sylvia WIEGAND, (Editors). — **Commutative ring theory and applications: proceedings of the fourth International Conference.** — Lecture notes in pure and applied mathematics, vol. 231. — Un vol. broché, 17,5×25, de XII, 499 p. — ISBN 0-8247-0855-5. — Prix: US\$ 185.00. — Marcel Dekker, New York, 2002.

Featuring presentations from the fourth International Conference on Commutative Algebra held in Fez, Morocco, this reference presents recent breakthroughs and new trends in the growing area of commutative algebra—emphasizing innovative applications and connections to algebraic number theory and geometry, and homological and computational algebra. This book discusses linear Diophantine equations... going-down and going-up properties... graded modules and analytic spread... Gröbner bases and computational methods... Krull domains and generalizations... prime spectra and dimension theory, and covers algebroïd curves and chain conditions... ideal and modules... integral independence... pullbacks and ultraproducts... tight closure and completions... and power series and polynomial rings.

Susan MONTGOMERY, Hans-Jürgen SCHNEIDER, (Editors). — **New directions in Hopf algebras.** — Mathematical Sciences Research Institute publications, vol. 43. — Un vol. relié, 16,5×24, de X, 485 p. — ISBN 0-521-81512-6. — Prix: £55.00. — Cambridge University Press, Cambridge, 2002.

Hopf algebras have important connections to quantum theory, Lie algebras, knot and braid theory, operator algebras, and other areas of physics and mathematics. The contributors to this volume of expository papers were participants in the Hopf Algebras Workshop held at MSRI as part of the 1999-2000 Year of Noncommutative Algebra. Together the papers give a clear picture of the current trends in this active field, with a focus on what is likely to be important in future research. Among the topics covered are results toward the classification of finite-dimensional Hopf algebras (semisimple and non-semisimple), as well as what is known about the extension theory of Hopf algebras. Some papers consider the Hopf version of classical topics, such as the Brauer group, while others are closer to recent work in quantum groups. The book explores the connections and applications of Hopf algebras to other fields.

## ***K*-théorie**

Bruce A. MAGURN. — **An algebraic introduction to *K*-theory.** — Encyclopedia of mathematics and its applications, vol. 87. — Un vol. relié, 16,5×24, de XIV, 676 p. — ISBN 0-521-80078-1. — Prix: £75.00. — Cambridge University Press, Cambridge, 2002.

This book is an introduction to *K*-theory and a text in algebra. These two roles are entirely compatible. On the one hand, nothing more than the basic algebra of groups, rings, and modules is needed to explain the classical algebraic *K*-theory. On the other hand, *K*-theory is a natural organizing principle for the standard topics of a second course in algebra, and these topics are presented carefully here, with plenty of exercises at the end of each short section. The reader will not only learn algebraic *K*-theory, but also Dedekind domains, classic groups, semisimple rings, character theory, quadratic forms, tensor products, localization, completion, tensor algebras, symmetric algebras, central simple algebras, and Brauer groups.

Alain VALETTE. — **Introduction to the Baum-Connes conjecture.** — From notes taken by Indira Chatterji, with an appendix by Guido Mislin. — Lectures in mathematics, ETH Zürich — Un vol. broché, 17×24, de X, 104 p. — ISBN 3-7643-6706-7. — Prix: SFr. 33.00. — Birkhäuser, Basel, 2002.

The Baum-Connes conjecture can be viewed as a conjectural generalisation of the Atiyah-Singer index theorem, to the equivariant setting (the ambient manifold is not compact, but some

compactness is restored by means of a proper, co-compact action of a group  $\Gamma$ ). Like the Atiyah-Singer theorem, the Baum-Connes conjecture states that a purely topological object coincides with a purely analytical one. For a given group  $\Gamma$ , the topological object is the equivariant  $K$ -homology of classifying space for proper actions of  $\Gamma$ , while the analytical object is the  $K$ -theory of the  $C^*$ -algebra associated with  $\Gamma$  in its regular representation. The Baum-Connes conjecture implies several other classical conjectures, ranging from differential topology to pure algebra. It has also strong connections with geometric group theory, as the proof of the conjecture for a given group  $\Gamma$  usually depends heavily on geometric properties of  $\Gamma$ . This book is intended for graduate students and researchers in geometry (commutative or not), groups theory, algebraic topology, harmonic analysis, and operator algebras. It presents, for the first time in book form, an introduction to the Baum-Connes conjecture.

### ***Théorie des groupes et généralisations***

William G. DWYER, Hans-Werner HENN. — **Homotopy theoretic methods in group cohomology**. — Advanced courses in mathematics CRM Barcelona. — Un vol. broché,  $24 \times 17$ , de IX, 98 p. — ISBN 3-7643-6605-2. — Prix: SFr. 34.00. — Birkhäuser, Basel, 2001.

This book looks at group cohomology with tools that come from homotopy theory. These tools give both decomposition theorems (which rely on homotopy colimits to obtain a description of the cohomology of a group in terms of the cohomology of suitable subgroups) and global structure theorems (which exploit the action of the ring of topological cohomology operations). The approach is expository and thus suitable for graduate students and others who would like an introduction to the subject that organizes and adds to the relevant literature and leads to the frontier of current research. The book should also be interesting to anyone who wishes to learn some of the machinery of homotopy theory (simplicial sets, homotopy colimits, Lannes' T-functor, the theory of unstable modules over the Steenrod algebra) by seeing how it is used in a practical setting.

C.R. LEEDHAM-GREEN, S. MCKAY. — **The structure of groups of prime power order**. — London Mathematical Society monographs. New series, vol. 27. — Un vol. relié,  $16 \times 24$ , de XII, 334 p. — Prix: £60.00. — Oxford University Press, Oxford, 2002.

First account of the modern theory of finite  $p$ -groups, this book introduces important material on cohomology of groups, spectral sequences, and representation theory. It develops the theory of pro- $p$  groups. New material on the Nottingham and Grigorchuk groups is presented and exercises are provided throughout. — *Contents*: Preliminaries. New groups from old.  $p$ -groups of maximal class. Finite  $p$ -groups acting uniserially. Using Lie algebra theory to find bounds. The proof of Conjecture A using powerful  $p$ -groups. Pro- $p$ -groups. Constructing finite  $p$ -groups. Homological algebra. Uniserial  $p$ -adic space groups. The structure of finite  $p$ -groups. Beyond coclass.

César Polcino MILIES, Sudarshan K. SEHGAL. — **An introduction to group rings**. — Algebras and applications, vol. 1. — Un vol. relié,  $17 \times 24,5$ , de XI, 371 p. — ISBN 1-4020-0238-6. — Prix: €133.00. — Kluwer, Dordrecht, 2002.

Group rings play a central role in the theory of representations of groups and are very interesting algebraic objects in their own right. In their study, many branches of algebra come to a rich interplay. This book takes the reader from beginning to research level and contains many topics that, so far, were only found in papers published in scientific journals and, whenever possible, offers new proofs of known results. It also includes many historical notes and some applications.