

NEW & FORTHCOMING from Birkhäuser

Algebra, Arithmetic, and Geometry

In Honor of Y.I. Manin

YURI TSCHINKEL, *New York University, NY, USA*; YURI G. ZARHIN, *Pennsylvania State University, University Park, PA, USA* (Eds)

The two volumes of *Algebra, Arithmetic, and Geometry: In Honor of Y.I. Manin* consist of invited expository articles and surveys detailing Manin's contributions to the subjects.

In celebration of Manin's 70th birthday, the following well-respected and distinguished mathematicians have contributed: K. Behrend, V. Berkovich, J. Bost, P. Bressler, D. Calaque, J. Carlson, A. Chambert-Loir, E. Colombo, A. Connes, C. Consani, A. Dambrowski, C. Deninger, I. Dolgachev, S.K. Donaldson, T. Ekedahl, A.-S. Elsenhans, B. Enriquez, P. Etingof, B. Fantechi, V. Fock, E. Friedlander, B. van Geemen, G. van der Geer, E. Getzler, A. Goncharov, M. Harris, A. Iskovskikh, J. Jahnel, D. Kaledin, M. Kapranov, N. Katz, R. Kaufmann, J. Kollár, M. Kontsevich, M. Larsen, E. Looijenga, M. Marcolli, M. Markl, L. Merel, S. Merkulov, M. Movshev, E. Mukhin, J. Nekovář, V. Nikulin, O. Ogievetsky, F. Oort, D. Orlov, A. Panchichkin, I. Penkov, A. Polishchuk, P. Sarnak, V. Schechtman, V. Tarasov, S. Tikhomirov, J. Tsimerman, B. Tsygan, K. Vankov, A. Varchenko, E. Vasserot, A. Vishik, A. Voronov, M. Wodzicki, Y. Zarhin, T. Zink.

2008/APPROX. 600 PP. EACH VOL./HARDCOVER

VOLUME I: ISBN 978-0-8176-4744-5/\$79.95 (TENT.)
PROGRESS IN MATHEMATICS, VOL. 269

VOLUME II: ISBN 978-0-8176-4746-9/\$79.95 (TENT.)
PROGRESS IN MATHEMATICS, VOL. 270

The Mathematics of Minkowski Space-Time

With an Introduction to Commutative Hypercomplex Numbers

FRANCESCO CATONI, *Roma, Italy*; DINO BOCCALETTI, *Università di Roma 'La Sapienza', Italy*; ROBERTO CANNATA, *ENEA, C.R. Casaccia, Italy*; VINCENZO CATONI, *Roma, Italy*; ENRICO NICHELATTI; PAOLO ZAMPETTI, *both ENEA, C.R. Casaccia, Italy*

This book arose out of original research by the authors on the extension of well-established applications of complex numbers related to Euclidean geometry and the space-time symmetry of two-dimensional special relativity. The system of hyperbolic numbers (the simplest extension of complex numbers) is extensively studied and applied to typical instances as the "twin-paradox," and a simple exposition of space-time geometry and trigonometry is given. The application of hyperbolic numbers to special relativity suggests the possible application to multidimensional hypercomplex systems. In addition, commutative hypercomplex systems with four unities are studied and their interesting properties are discussed.

2008/APPROX. 250 PP./SOFTCOVER
ISBN 978-3-7643-8613-9/\$54.95
FRONTIERS IN MATHEMATICS

Frames and Bases

An Introductory Course

OLE CHRISTENSEN, *Technical University of Denmark, Lyngby, Denmark*

Based on a streamlined presentation of the author's previous work, *An Introduction to Frames and Riesz Bases*, this new textbook fills a gap in the literature, developing frame theory as part of a dialogue between mathematicians and engineers. Newly added sections on applications will help mathematically oriented readers to see where frames are used in practice and engineers to discover the mathematical background for applications in their field. The primary focus of the work is on basic topics without too many side remarks making it easier for students to follow the presentation.

2008/XX, 316 PP., 14 ILLUS./HARDCOVER
ISBN 978-0-8176-4677-6/\$49.95
APPLIED AND NUMERICAL HARMONIC ANALYSIS

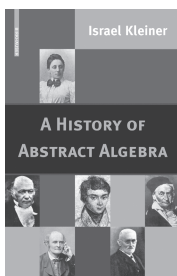
History of Banach Spaces and Linear Operators

ALBRECHT PIETSCH, *University of Jena, Germany*

"This fundamental and interesting monograph is devoted to the history (and not only) of a remarkable and rich branch of up-to-date mathematics... I recommend this book to all who are interested in Functional Analysis, to beginners and researchers, all students and all professors who deal with Functional Analysis and its applications. And I think that this book will be useful to each mathematical library."

—ZENTRALBLATT MATH

2007/XXIII, 855 PP., 82 ILLUS./HARDCOVER
ISBN 978-0-8176-4367-6/\$129.00



A History of Abstract Algebra

ISRAEL KLEINER, *York University, Toronto, ON, Canada*

This presentation provides an account of the history of the basic concepts, results, and theories of abstract algebra. The development of abstract algebra was propelled by

the need for new tools to address certain classical problems that appeared unsolvable by classical means. A major theme of the approach in this book is to show how abstract algebra has arisen in attempts to solve some of these classical problems, providing a context from which the reader may gain a deeper appreciation of the mathematics involved.

2007/XVI, 168 PP., 24 ILLUS./SOFTCOVER
ISBN 978-0-8176-4684-4/\$49.95

An Introduction to the Heisenberg Group and the Sub-Riemannian Isoperimetric Problem

LUCA CAPOGNA, *University of Arkansas, Fayetteville, AR, USA*; DONATELLA DANIELLI, *Purdue University, West Lafayette, IN, USA*; SCOTT D. PAULS, *Dartmouth College, Hanover, NH, USA*; JEREMY T. TYSON, *University of Illinois, Urbana-Champaign, IL, USA*

This book provides an introduction to the basics of sub-Riemannian differential geometry and geometric analysis in the Heisenberg group, focusing primarily on the current state of knowledge regarding Pierre Pansu's celebrated 1982 conjecture regarding the sub-Riemannian isoperimetric profile. It presents a detailed description of Heisenberg submanifold geometry and geometric measure theory, which provides an opportunity to collect, for the first time in one location, the various known partial results and methods of attack on Pansu's problem.

2007/XVI, 223 PP./HARDCOVER
ISBN 978-3-7643-8132-5/\$59.95
PROGRESS IN MATHEMATICS, VOL. 259

Metric Foliations and Curvature

DETLEF GROMOLL, *State University of New York, Stony Brook, NY, USA*; GERARD WALSHAP, *University of Oklahoma, Norman, OK, USA*

Riemannian manifolds, particularly those with positive or nonnegative curvature, are constructed from only a handful by means of metric fibrations or deformations thereof. This text documents some of these constructions, many of which have only appeared in journal articles. The emphasis is less on the fibration itself and more on how to use it to either construct or understand a metric with curvature of fixed sign on a given space.

2008/APPROX. 200 PP./HARDCOVER
ISBN 978-3-7643-8714-3/\$59.95
PROGRESS IN MATHEMATICS, VOL. 268

Polynomial Convexity

EDGAR LEE STOUT, *University of Washington, Seattle, USA*

"The style is rigorous, elegant and clear, the exposition is beautiful. The book is an extremely important tool to every researcher interested in the subject, as it contains basic facts and therefore will remain a standard reference in the future and, moreover, it opens a perspective on further directions of research."

—ZENTRALBLATT MATH

2007/X, 439 PP./HARDCOVER
ISBN 978-0-8176-4537-3/\$79.95
PROGRESS IN MATHEMATICS, VOLUME 261

CALL: 1-800-777-4643 • FAX: (201) 348-4505 • E-MAIL: orders@birkhauser.com • www.birkhauser.com

Please mention promotion #013659 when ordering. Prices are valid in the Americas only and are subject to change without notice. For price and ordering information outside the Americas, please contact Birkhäuser Verlag AG by E-mail: birkhauser@springer.de