# Preface

The aim of this book is to extend the understanding of the fundamental role of generalizations of Lie and related non-commutative and non-associative structures in Mathematics and Physics.

This is a thematic volume devoted to the interplay between several rapidly expanding research fields in contemporary Mathematics and Physics, such as generalizations of the main structures of Lie theory aimed at quantization and discrete and non-commutative extensions of differential calculus and geometry, non-associative structures, actions of groups and semi-groups, non-commutative dynamics, non-commutative geometry and applications in Physics and beyond.

The specific fields covered by this volume include:

- Applications of Lie, non-associative and non-commutative associative structures to generalizations of classical and quantum mechanics and non-linear integrable systems, operadic and group theoretical methods;
- Generalizations and quasi-deformations of Lie algebras such as color and super Lie algebras, quasi-Lie algebras, Hom–Lie algebras, infinite-dimensional Lie algebras of vector fields associated to Riemann surfaces, quasi-Lie algebras of Witt type and their central extensions and deformations important for integrable systems, for conformal field theory and for string theory;
- Non-commutative deformation theory, moduli spaces and interplay with non-commutative geometry, algebraic geometry and commutative algebra, $q$-deformed differential calculi and extensions of homological methods and structures;
- Crossed product algebras and actions of groups and semi-groups, graded rings and algebras, quantum algebras, twisted generalizations of coalgebras and Hopf algebra structures such as Hom-coalgebras, Hom-Hopf algebras, and super Hopf algebras and their applications to bosonisation, parastatistics, parabosonic and parafermionic algebras, orthoalgebas and root systems in quantum mechanics;
- Commutative subalgebras in non-commutative algebras and their connections to algebraic curves, important for the extension of algebra–geometric methods to discrete versions of non-linear equations and representation theory, Lie and generalized Lie methods for differential equations and geometry.

The volume will stimulate further advances in the topics represented as well as in related directions and applications.

This book will be a source of inspiration for a broad spectrum of researchers and for research students, as the contributions lie at the intersection of the research directions and interests of several large research communities and research groups on modern Mathematics and Physics.

This volume consists of 5 parts comprising 25 chapters, which were contributed by 32 researchers from 12 different countries. All contributions in the volume have been refereed.

Lund, Sweden
June 2008

*Sergei Silvestrov*
*Eugen Paal*
*Viktor Abramov*
*Alexander Stolin*

http://www.springer.com/978-3-540-85331-2

Generalized Lie Theory in Mathematics, Physics and Beyond

Silvestrov, S.D.; Paal, E.; Abramov, V.; Stolin, A. (Eds.)

2009, XVIII, 306 p. 3 illus., Hardcover
ISBN: 978-3-540-85331-2