CONTEMPORARY MATHEMATICS

602

Recent Developments in Algebraic and Combinatorial Aspects of Representation Theory

International Congress of Mathematicians Satellite Conference
Algebraic and Combinatorial Approaches to Representation Theory
August 12–16, 2010
National Institute of Advanced Studies, Bangalore, India
Follow-up Conference
May 18–20, 2012
University of California, Riverside, CA

Vyjayanthi Chari
Jacob Greenstein
Kailash C. Misra
K. N. Raghavan
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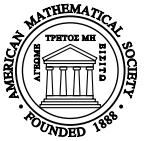

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Preface

Representation theory of Lie algebras, quantum groups and algebraic groups represent a major area of mathematical research in the twenty-first century with numerous applications in other areas of mathematics (geometry, number theory, combinatorics, finite and infinite groups, etc.) and mathematical physics (such as conformal field theory, statistical mechanics, integrable systems). Current research topics in representation theory include quantized enveloping and function algebras, Kac-Moody Lie algebras, Hecke algebras, canonical bases and crystal bases, vertex operator algebras, Hall algebras, A_∞-algebras, quivers, cluster algebras, Hopf algebras, and Artin-Schelter regular algebras. In particular, representation theory of quantized Kac-Moody Lie algebras and cohomological theories in noncommutative algebraic geometry have taken the lead not only within research areas in algebra but also in other areas of mathematics and physics.

There are various approaches to study representation theory. This proceedings is based on two conferences which focused on the algebraic and combinatorial approaches to the representation theory.

The first conference was held at the National Institute of Advanced Studies, Bangalore, India during August 12-16, 2010. This was a satellite conference preceding the International Congress of Mathematicians held at Hyderabad, India. The second follow-up conference was held at the University of California, Riverside during May 18-20, 2012. The speakers at each of these conferences were invited to contribute to this proceedings.

The articles in this proceedings touch upon a broad spectrum of topics including quantum groups, crystal bases, categorification, toroidal algebras, vertex algebras, Hecke algebras, Kazhdan-Lusztig bases, etc.

We thank all participants and speakers at both of these conferences for their participation and valuable contributions. In particular we thank the speakers who contributed to this proceedings volume. We are grateful to the National Science Foundation, USA and the International Center for Theoretical Sciences, India for providing the financial support for these conferences. Finally, we appreciate the help from the National Institute of Advanced Studies, Bangalore and the University of California, Riverside during the respective conferences.

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Algebraic and Combinatorial Aspects to Representation Theory • Chari et al., Editors

This volume contains the proceedings of the International Congress of Mathematicians Satellite Conference on Algebraic and Combinatorial Approaches to Representation Theory, held August 12–16, 2010, at the National Institute of Advanced Studies, Bangalore, India, and the follow-up conference held May 18–20, 2012, at the University of California, Riverside, CA.

It contains original research and survey articles on various topics in the theory of representations of Lie algebras, quantum groups and algebraic groups, including crystal bases, categorification, toroidal algebras and their generalizations, vertex algebras, Hecke algebras, Kazhdan-Lusztig bases, q-Schur algebras, and Weyl algebras.

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