Preface

Quantization has been a potent source of interesting ideas and problems in various branches of mathematics. A European Mathematical Society activity, the Arithmetic and Geometry around Quantization (AGAQ) conference has been organized in order to present hot topics in and around quantization to younger mathematicians, and to highlight possible new research directions.

This volume comprises lecture notes, and survey and research articles originating from AGAQ. A wide range of topics related to quantization is covered, thus aiming to give a glimpse of a broad subject in very different perspectives

- Symplectic and algebraic geometry, in particular, mirror symmetry and related topics
  by *S. Akbulut, G. Ben Simon, Ö. Ceyhan, K. Fukaya, S. Salur.*
- Representation theory, in particular quantum groups, the geometric Langlands program and related topics
  by *S. Arkhipov, D. Gaitsgory, E. Frenkel, K. Kremnizer.*
- Quantum ergodicity and related topics
  by *S. Gurevich, R. Hadani.*
- Non-commutative geometry and related topics
  by *S. Mahanta, W. van Suijlekom.*

In their chapter, Akbulut and Salur introduce a new construction of certain 'mirror dual' Calabi–Yau submanifolds inside of a G_2 manifold. The question of constructing central extensions of (2-)groups using (2-)group actions on categories is addressed by Arkhipov and Kremnizer. In his chapter, Ceyhan introduces quantum cohomology and mirror symmetry to real algebraic geometry. Frenkel and Gaitsgory discuss the representation theory of affine Kac–Moody algebras at the critical level and the local geometric Langlands program of the authors. Motivated by constructions of Lagrangian Floer theory, Fukaya explains the fundamental structures such as A_∞-structure and operad structures in Lagrangian Floer theory using an abstract and unifying framework. Ben Simon's chapter provides the first results about the universal covering

of the group of quantomorphisms of the prequantization space. In their two chapters, Hadani and Gurevich give a detailed account of self-reducibility of the Weil representation and quantization of symplectic vector spaces over finite fields. These two subjects are the main ingredients of their proof of the Kurlberg–Rudnick Rate Conjecture. The expository chapter of Mahanta is a survey on the construction of motivic rings associated to the category of differential graded categories. Finally, van Suijlekom introduces and discusses Connes–Kreimer type Hopf algebras of Feynman graphs that are relevant for quantum field theories with gauge symmetries.

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