

CONTEMPORARY MATHEMATICS

482

Advances in Quantum Computation

Representation Theory, Quantum Field Theory,
Category Theory, Mathematical Physics,
and Quantum Information Theory
September 20–23, 2007
University of Texas at Tyler

Kazem Mahdavi
Deborah Koslover
Editors



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Preface

The 2007 Conference on Representation Theory, Quantum Field Theory, Category Theory, and Quantum Information Theory, held September 20 - 23 at the University of Texas at Tyler, was funded by the NSF for the purpose of bringing together scientists from a wide range of fields to share research and stimulate new ideas. Attendees included mathematicians, physicists, and computer scientists. Speakers came from major industries including IBM; major national laboratories including the Army Research Lab, Los Alamos and Argonne National Lab; and major education institutions including MIT, Harvard, and Stanford.

Our main purpose in publishing this proceedings is to bring together papers from a wide spectrum of disciplines to stimulate progress in the field of computation and communication, in particular, quantum communication (QC). The eleven contributed papers included in this volume cover a wide range of topics related to QC, including physical aspects, mathematical aspects and foundational issues of QC. All submissions were peer reviewed and the most outstanding have been chosen to appear here.

It is generally believed that there is a hierarchy of abstraction in the fields of Computer Science and Engineering, the Sciences, and Mathematics, with one end of the spectrum addressing real world problems and the other end concerned with more abstract, less practical issues. This leads to scientists in different fields reading and publishing in different journals and attending different conferences. Work done in one field may remain completely unknown in another. This compartmentalization of knowledge slows the advancement of science and leads to needless duplication of effort. By bringing together scientists who study QC in a wide range of fields and settings, we hope to generate cross-pollination of ideas and stimulate research in the field. We hope this volume will lead to advances in QC.

The editors would like to thank our co-organizers, Louis Kauffman (UIC) and Samuel Lomonaco (UMBC), of the Conference on Representation Theory, Quantum Field Theory, Category Theory, and Quantum Information Theory. We would also like to thank our speakers: John Armstrong (Tulane), Howard Barnum (LANL), Paul Benioff (ANL), Howard Brandt (ARL), Sergey Bravyi (IBM), Gavin Brenner (Innsbrook), Goong Chen (TAMU), Alioscia Hamma (USC), Masud Haque (MPI), Louis Kauffman (UIA), Eun-Ah Kim (Stanford), Vladimir Korepin (Stony Brook), Samuel Lomonaco (UMBC), John M. Myers (Harvard), Eric Rowell (TAMU), Travis Schedler (Chicago), Peter Shore (MIT) and Yong Zhang (Utah). Finally, the editors would like to thank the NSF for funding the conference (DMS 0703900).

Kazem Mahdavi
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This volume represents the talks given at the Conference on Interactions between Representation Theory, Quantum Field Theory, Category Theory, Mathematical Physics, and Quantum Information Theory, held in September 2007 at the University of Texas at Tyler.

The papers in this volume, written by top experts in the field, address physical aspects, mathematical aspects, and foundational issues of quantum computation.

This volume will benefit researchers interested in advances in quantum computation and communication, as well as graduate students who wish to enter the field of quantum computation.

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