CONTEMPORARY MATHEMATICS

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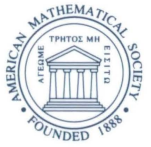
Jerusalem Combinatorics '93

An International Conference
in Combinatorics
May 9–17, 1993
Jerusalem, Israel

Hélène Barcelo
Gil Kalai
Editors



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Providence, Rhode Island

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Preface

The Jerusalem Combinatorics '93 International Conference in Combinatorics was held in Jerusalem, Israel, between May 9 and May 17, 1993. The organizing committee consisted of Gil Kalai, Hélène Barcelo, Noga Alon, Anders Björner and Edna Wigderson. One of the goals of the conference was to bring together mathematicians from various areas of combinatorics. Some of these areas were: enumeration theory, extremal combinatorics, graph theory, coding theory, combinatorics of polyhedra, representation theory and other topics in algebraic combinatorics, probabilistic methods and relations with computer science. We also felt it was important to give substantial representation to outstanding scientists in the early stages of their careers. More than one half of the 28 invited speakers were less than eight years after their Ph.D. Subsequently there was a large representation of women mathematicians among the speakers. There were four special one-hour lectures: two for a general audience given by Mireille Bousquet-Mélou on Polyominoes and by Vera Sòs on Unavoidable irregularities and two for a specialized audience given by Joan Birman on Combinatorics of finite-type knot invariants and by Hillel Furstenberg on Ergodic theory and combinatorics. There were also twenty-eight 45-minute invited talks and eight half-day workshops. The workshops and their organizers were:

Analytic methods, Vitaly Bergelson
The probabilistic method, Eli Shamir
Algebraic combinatorics, Sheila Sundaram
Enumeration, Rodica Simion
Combinatorics and geometry, Joseph Zaks
Combinatorics and polyhedra, Peter Kleinschmidt
Graphs and Hypergraphs, Ron Aharoni
Algorithms and optimization, Ronitt Rubinfeld.
Coding theory, Simon Litsyn.

The present volume contains several of the talks of the conference; they appear in alphabetical order by the first author's name. We would like to thank every participant of this conference for their contributions to its success. We are also indebted to the Edmund Landau Center for Research in Mathematical Analysis, the Israel Academy of Sciences and Humanities, the Department of Mathematics at the Hebrew University, the Einstein Foundation, the National Security

Agency (USA), the College of Liberal Arts and the Department of Mathematics of Arizona State University, the Association for Women in Mathematics (USA) and the various individuals who contributed from their personal grants, for their generous financial and technical support. We would also like to thank the referees for their invaluable time and effort in reviewing the papers submitted to these Proceedings. A special thanks also goes to Linda Arneson (A.S.U.) for her willingness and diligence in "$\mathcal{A}\mathcal{M}\mathcal{S}$-TEXing" a few of the papers. As a final note we are reproducing the welcoming address of the conference, given by Professor Miriam Cohen, President of the Israel Mathematical Union.

"Most mathematicians of this day, confronted with an argument requiring combinatorial thinking react with one of two stock phrases: (a) This is a purely combinatorial argument or (b) This is a difficult combinatorial argument. Hypnotic repetition of either slogan is likely to have the same effect on the speaker. Free from all scruples, he will pass the buck and unload the work onto someone else's shoulders". These words of Carlo Rota's forward to the book of Berge, "Principles of Combinatorics" written over 20 years ago are still valid. On behalf of the Israel Math Union I am very happy to greet you people to whom the buck is being passed. Rota's words show how much combinatorics, whose origin is in simply phrased questions, is essential in Mathematics and other sciences. From its critical use in probability and computer sciences to Herman Weyl's famous connection between Young tableaux and representations of $GL(n, \mathbb{R})$ and its recent successors (developed mainly by the Russian school): the braid groups, Yang Baxter equations, integrable systems and the like. Talking about the eastern block, and looking around this room, we see the effect of recent events. Our meetings and conferences in the academic world are a completely new experience. Colleagues that we have only read about are now free citizens of the world. Maybe more than in other academic societies in the West, Israel is faced with an extremely large and inspiring immigration. However, the great enthusiasm is accompanied with a fear that so many excellent scientists will not find suitable employment. The Israeli mathematical community is taking an unusually active role at finding solutions. It gives me a special pleasure to see here someone from the former eastern block who has always been a free spirit, Mr. Combinatorics himself, Prof. Erdös, whose mathematical contributions go much beyond combinatorics. The Israeli mathematical community is particularly indebted to him for establishing with the Israeli Mathematical Union a fund that awards the so called Erdös prize to outstanding Israeli young mathematicians. Noga Alon and Gil Kalai, two of the organizers of this conference, are amongst the winners of this prize. I always wondered where the fund money came from. I conjecture it consists of the money saved by having Prof. Erdös's conjectures unsolved. In conclusion, I wish you an inspiring conference and a good stay in our special and beloved city, Jerusalem."

Hélène Barcelo
Gil Kalai

Jerusalem Combinatorics '93

Hélène Barcelo and Gil Kalai, Editors

This book contains twenty-two papers presented at the International Conference in Combinatorics, held in Jerusalem in May 1993. The papers describe some of the latest developments in algebraic combinatorics, enumeration, graph and hypergraph theory, combinatorial geometry, and geometry of polytopes and arrangements. The papers are accessible to specialists as well as nonspecialists.

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