

MATHEMATISCHES FORSCHUNGSINSTITUT OBERWOLFACH

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Combinatorics, Probability and Computing

Organised by
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ABSTRACT. One of the exciting phenomena in mathematics in recent years has been the widespread and surprisingly effective use of probabilistic methods in diverse areas. The probabilistic point of view has turned out to be very profitable in Discrete Mathematics, Analysis and Theoretical Computer Science. The meeting was dedicated to recent developments in these areas, focusing on the investigation of random graphs and probabilistic methods, on the study of stochastic processes including questions on percolation and random triangulations, on the design and analysis of randomized algorithms, and on the relationship between complexity and randomness.

Mathematics Subject Classification (2000): 05D05, 05D10, 05D40, 68Q25.

Introduction by the Organisers

The conference was organized by Noga Alon (Tel Aviv), Béla Bollobás (Cambridge and Memphis) and Ingo Wegener (Dortmund). The programme consisted of 8 main lectures, supplemented by 21 shorter contributions, and covered many areas in Extremal and Probabilistic Combinatorics as well as in Theoretical Computer Science.

In its simplest form, the Probabilistic Method refers to the technique of proving the existence of structures with unexpected properties by showing that a randomly chosen object from an appropriate probability distribution has the properties with positive probability. The probabilistic method has been strikingly successful in Combinatorics, Graph Theory and Combinatorial Number Theory, and the probabilistic point of view has had an enormous influence on theoretical computer science.

The speakers reported on recent developments in Ramsey theory, including variants of these problems for Random Graphs and for Geometric questions, extending classical work in Functional Analysis. Extremal graph and hypergraph theory has also been discussed extensively, combining combinatorial, probabilistic and analytic tools. Additional active topics discussed included Percolation on quasi-random graphs and the properties of random triangulations of point sets in the plane as well as novel results in Complexity Theory including connections between communication complexity and geometric problems, and the study of refutation proofs for random instances of satisfiability.

The aim of the workshop was to focus on the connections and common themes of Combinatorics, Discrete Probability and Theoretical Computer Science. The diversity of the topics and participants stimulated a lot of fruitful discussions between researchers in different and yet related branches and gave rise to interesting discussions and new collaborations between the participants including the younger generation of researchers.

49 scientists, including 36 from countries other than Germany participated in the meeting. The organizers and participants would like to thank the Mathematisches Forschungsinstitut Oberwolfach for providing an inspiring setting for this conference.