

MATHEMATISCHES FORSCHUNGSINSTITUT OBERWOLFACH

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## Geometric and Topological Combinatorics

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ABSTRACT. The 2007 Oberwolfach meeting “Geometric and Topological Combinatorics” presented a great variety of investigations where topological and algebraic methods are brought into play to solve combinatorial and geometric problems, but also where geometric and combinatorial ideas are applied to topological questions.

*Mathematics Subject Classification (2000):* 05-06, 54-06, 52-06.

### Introduction by the Organisers

The 2007 Oberwolfach meeting “Geometric and Topological Combinatorics” was organized by Anders Björner (KTH and Mittag-Leffler Institute, Stockholm), Gil Kalai (Hebrew University, Jerusalem), and Günter M. Ziegler (TU Berlin). It consisted of six one-hour lectures by Isabella Novik, Herbert Edelsbrunner, Carsten Schultz, Igor Pak, Alexander Barvinok and Roy Meshulam, as well as twenty-seven half-hour talks, a problem session (led by Gil Kalai, also documented below), two software demonstrations (on `polymake` by Michael Joswig, and on `LattE` by Jesus De Loera), and many more informal sessions, group discussions, and a great variety of small group and pairwise discussions. It was a lively week!

As will become obvious from the sequence of extended abstracts presented below, the conference treated a broad spectrum of topics from Topological Combinatorics (such as poset topology, graph coloring, etc.), Discrete Geometry (polytopes, triangulations, arrangements, Coxeter groups, and polyhedral surfaces), as well as Geometric Topology (triangulated manifolds, persistent homology of geometric data, etc.).

The manifold connections between these themes, with refinements of well-established bridges as well as completely new links between seemingly distant

themes, problems, methods, and theories show that the area is very much alive. Even more so this is demonstrated by substantial progress on older problems, which on this conference included Isabella Novik's opening lecture about centrally symmetric polytopes (joint works with Nati Linial and with Alexander Barvinok), or still on the first day Ed Swartz' report about the  $f$ -vectors of triangulated manifolds.

Of course there is no way to present the richness and depth of the work and presentations of the conference's program on a one page report, or a short collection of abstracts. All the following can offer is an overview of the official program of the conference. It does not cover all the additional smaller presentations, group discussions and blackboard meetings (for example, Tom Braden was coerced into an additional evening presentation of the topology of hypertoric varieties "by popular demand"), nor the lively interactions that occurred during the week — for example, a surprising connection was made at the problem session between permutation patterns that appeared in Jonas Sjöstrand's lecture, and a conjecture posed by Alex Postnikov; in subsequent work, the problem was solved by Axel Hultman, Svante Linusson, John Shareshian, and Jonas Sjöstrand (paper in preparation).

We are extremely grateful to the Oberwolfach institute, to its director and to all of its staff for providing a perfect setting for an inspiring, intensive week of "Geometric and Topological Combinatorics."

Anders Björner, Gil Kalai, Günter M. Ziegler  
Stockholm / Jerusalem / Berlin, March 2007