Hyperplane Arrangements: Combinatorial and Geometric Aspects

Abstracts

T. Abe

Height bases for Weyl arrangements

In this talk, we consider the relation between freenss of Weyl, Shi and Catalan arrangements and heights of roots corresponding to each hyperplanes. When we consider height-one roots, we obtain the simple-root basis mentioned in the talk by Terao. We generalize these basis to those corresponding to roots of arbitrary heights, so called height bases, under a certain assumption, called the height free hypothesis. This basis enables us to construct bases for several arrangements in terms of the SRBs. Also, a classical duality of logarithmic modules is also generalized. This is a joint work with Hiroaki Terao.

D. Bessis

Why the G_{31} arrangement is $K(\pi, 1)$

To solve the $K(\pi, 1)$ conjecture for complex reflection arrangements, the hardest case to address is G_{31}, an exceptional arrangement of 60 hyperplanes in dimension 4. The talk will present some of the key ingredients (combinatorics, geometry, and a splash of categorical homotopy theory) involved in a proposed proof of this case.

M. Cuntz

On root posets for noncrystallographic root systems (joint work with Christian Stump)

We discuss properties of root posets for finite crystallographic root systems, and show which of these properties uniquely determine posets for the noncrystallographic types. For the Coxeter groups of type H_3 and H_4 we do this by exhaustive computer searches. In particular, we determine the bigraded Hilbert series of the diagonal coinvariants of the group of type H_4.

M.J. Falk

Milnor fibers and non-crossing partitions

We describe regular cell complexes built from the non-crossing partition lattice that have the homotopy type of the Milnor fiber of the corresponding Coxeter arrangement or discriminant. This is joint work with Tom Brady and Colum Watt.

T. Hoge

On inductively free arrangements

We will give a short overview of the classification of inductively free reflection arrangemets and point out some applications of the methods used in this classification for arbitrary hyperplane arrangemens. (This is joint work with G. Röhrle and M. Cuntz.)

J. Michel

The center of the pure complex braid groups

This is a joint work with Francois Digne and Ivan Marin. We prove that the center of the fundamental group of the hyperplane complement of an irreducible finite complex reflection group is cyclic. This is deduced using Garside theory from the same result obtained by Bessis for the center of the braid group, and applies actually to any finite index subgroup of the braid group.

M. Schulze

Partial normalizations of Coxeter arrangements and discriminants

We study natural partial normalization spaces of Coxeter arrangements and discriminants and relate their geometry to representation theory. The underlying ring structures arise from Dubrovin's Frobenius manifold structure which is lifted (without unit) to the space of the arrangement. We also describe an independent approach to these structures via duality of maximal Cohen–Macaulay fractional ideals. In the process, we find 3rd order differential relations for the basic invariants of the Coxeter group. Finally, we show that our partial normalizations give rise to new free divisors.

H. Terao

Logarithmic derivation modules of Shi arrangements associated to root systems

In his affirmative answer to the Edelman-Reiner conjecture, Yoshinaga proved that the logarithmic derivation modules of the cones of the extended Shi arrangements are free modules. However, all we know about the bases is their existence and degrees. In this talk, we introduce two distinguished bases for the modules. More specifically, we will define and study the simple-root basis plus (SRB+) and the simple-root basis minus (SRB-) when a primitive derivation is fixed. They have remarkable properties relevant to the simple roots and those properties characterize the bases. (This is a joint work with T. Abe.)