Combinatorics
Job Talk

The Problem of Polytope Reconstruction

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Abstract: What partial information about a convex d-polytope is enough to uniquely determine its combinatorial type? This problem, known as the problem of polytope reconstruction, has been extensively studied since the sixties. For instance, a famous result of Perles asserts that simplicial d-polytopes are determined by their \lfloor d/2 \floor-skeletons.
In this talk, I will survey recent advances in this field, from mainly two perspectives. 1) realizability: can a certain simplicial complex be realized as the (\lfloor d/2 \rfloor-1)-skeleton of a simplicial d-polytope or a simplicial (d-1)-sphere? 2) sufficiency: can the i-skeleton (where i ¡ \lfloor d/2 \rfloor), together with some additional information such as affine (i+1)-stresses, determine the combinatorial or even affine type of the polytope?
This is joint work with Satoshi Murai and Isabella Novik.

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