Constructing Chiral Polytopes with Coxeter Groups

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Abstract polytopes are partially ordered sets of elements, which obey certain axioms. The most symmetrical are regular polytopes, where all maximal chains of elements (called flags) form a single orbit under the automorphism group. Chiral polytopes, a less symmetric but equally fascinating class, have two distinct flag orbits, with adjacent flags lie in different orbits.

Coxeter groups, known for their geometric and algebraic elegance, play a central role in understanding symmetries of abstract polytopes. While regular polytopes are well-studied, chiral polytopes remain challenging to construct, with many open questions persist. This talk will present recent advances in constructing new examples of chiral polytopes using group-theoretic approaches.