Constructing highly regular expanders from hyperbolic Coxeter

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Given a string Coxeter system (W,S), we construct highly regular quotients of the 1-skeleton of its universal polytope P, which form an infinite family of expander graphs when (W,S) is indefinite and P has finite vertex links. The regularity of the graphs in this family depends on the Coxeter diagram of (W,S). The expansion stems from superapproximation applied to (W,S). This construction is also extended to cover Wythoffian polytopes. As a direct application, we obtain several notable families of expander graphs with high levels of regularity, answering, in particular, the question posed by Chapman, Linial, and Peled positively.

(joint work with Marston Conder, Alex Lubotzky, and Francois Thilmany)