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Geometrizing generic few-relator groups

Given a presentation of a group G with many more generators than relations, where the relations are random long words, we construct a 2-dimensional complex with nice geometry whose fundamental group is G. This complex is built out of hyperbolic polygons, glued by isometry along the edges, with a negative curvature condition at the vertices. The entire construction is guided and locally modeled on the dual 2-skeleton of a triangulated 3-manifold. As a consequence of this "geometric realization" of the group, we learn that G is hyperbolic and enjoys several other pleasant group-theoretic properties. For instance, G is orderable, and all finitely generated subgroups are undistorted, hyperbolic, and separable. This is joint work with Dani Wise.