Surface quotients of hyperbolic buildings

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Bourdon's building is a negatively curved 2-complex built out of hyperbolic right-angled polygons. Its automorphism group is large (uncountable) and remarkably rich. We study, and mostly answer, the question of when there is a discrete subgroup of the automorphism group such that the quotient is a closed surface of genus g. This involves some fun elementary combinatorics, but quickly leads to open questions in group theory and number theory.

One consequence of our construction is that lattices in the automorphism group of Bourdon's building contain surface subgroups. This proves a special case of Gromov's surface subgroup conjecture. Joint work with Anne Thomas.