October 29: Tsachik Gelander (Yale), "Homotopy type and volume of locally symmetric manifolds." FOLLOWED BY DINNER.

We consider locally symmetric manifolds with a fixed universal covering (e.g. hyperbolic manifolds of fixed dimension), and construct for each such manifold M a simplicial complex $\mathcal{R}$ whose size is proportional to the volume of M. When M is non-compact, $\mathcal{R}$ is homotopically equivalent to M, while when M is compact, $\mathcal{R}$ is homotopically equivalent to $M \setminus N$, where N is a finite union of submanifolds of fairly smaller dimension. This reflects how the volume controls the topological structure of M, and yields concrete bounds for various finiteness statements which previously had no quantitative proofs. For example, it gives an explicit upper bound for the possible number of locally symmetric manifolds of volume bounded by $v > 0$, and it yields an estimate for the size of a minimal presentation for the fundamental group of a manifold in terms of its volume. It also yields a number of new finiteness results.