1156-57-340 **James Farre*** (`james.farre@yale.edu`). *Dense representations of discrete groups and bounded cohomology.*

Let Γ be a discrete group, and let $\rho : \Gamma \to \mathrm{Isom}^+(\mathbb{H}^3)$ be a homomorphism. We will define bounded cohomology $H_b^\bullet(\Gamma)$ of Γ and describe an invariant of ρ in $H_b^3(\Gamma)$ defined by computing the (signed) volumes of certain geodesic tetrahedra in $\mathbb{H}^3$. The main theorem is that this invariant is non-zero for representations with dense image. Moreover, if a dense representation exists, then the degree 3 bounded cohomology of Γ has uncountable dimension. Surprisingly, the proof relies on some non-trivial topology and geometry of 3-manifolds. The aim of the talk will be to explain how one can apply the ideas of the proof in dimension $n \geq 4$, given a hyperbolic n-manifold with some prescribed topological and geometric properties (if one exists). The discussion is already interesting when Γ is a non-abelian free group, in which case we do not know if bounded cohomology in degree larger than 3 is (non-)zero. (Received January 27, 2020)