

**COLLOQUIUM  
UNIVERSITY OF PITTSBURGH  
FRIDAY, FEBRUARY 24, 2017**

**704 THACKERAY HALL**

**3:30 P.M.**

**NATHAN DUNFIELD**

**UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN  
DEPARTMENT OF MATHEMATICS**

**FUN WITH FINITE COVERS OF 3-MANIFOLDS: CONNECTIONS  
BETWEEN TOPOLOGY, GEOMETRY AND ARITHMETIC**

**ABSTRACT:** From the revolutionary work of Thurston and Perelman, we know the topology of 3-manifolds is deeply intertwined with their geometry. In particular, hyperbolic geometry, the non-Euclidean geometry of constant negative curvature, plays a central role. In turn, hyperbolic geometry opens the door to applying tools from number theory, specifically automorphic forms, to what might seem like purely topological questions.

After a passing wave at the recent breakthrough results of Agol, I will focus on exciting new questions about the geometric and arithmetic meaning of torsion in the homology of finite covers of hyperbolic 3-manifolds, motivated by the recent work of Bergeron, Venkatesh, Le, and others. I will include some of my own results in this area that are joint work with F. Calegari and J. Brock.

**Refreshments served at 3:00 p.m.  
in the Math Dept. COMMON ROOM, Thackeray 705**