Fun with 3-dimensional manifolds: connections between topology, geometry, and number theory.

Nathan Dunfield
University of Illinois at Urbana-Champaign

Wednesday, February 6, 2013
007 Kemeny, 4:00PM
Tea at 3:30 pm in 300 Kemeny Hall

Abstract

Following the revolutionary work of Thurston and Perelman, 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. I will sketch these connections in the context of their application to questions about finite covers of 3-manifolds, including the recent breakthroughs of Agol, Wise, and others. I will then discuss some of my own results in this area, including those motivated by the recent work of Bergeron and Venkatesh, that are joint work with (variously) J. Brock, F. Calegari, D. Ramakrishnan, and W. Thurston.

This talk should be accessible to graduate students.