

# Simons Lectures in Mathematics

## Spring, 2014



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(Berkeley)

## The Virtual Haken Conjecture

Waldhausen conjectured in 1968 that every aspherical 3-manifold has a finite-sheeted cover which is Haken (contains an embedded essential surface). Thurston conjectured that hyperbolic 3-manifolds have a finite-sheeted cover which fibers over the circle. The first lecture will be an overview of 3-manifold topology in order to explain the meaning of Waldhausen's virtual Haken conjecture and Thurston's virtual fibering conjecture, and how they relate to other problems in 3-manifold theory. The second lecture will give some background on geometric group theory, including the topics of hyperbolic groups and CAT(0) cube complexes after Gromov, and explain how the above conjectures may be reduced to a conjecture of Dani Wise in geometric group theory. The third lecture will discuss the proof of Wise's conjecture, that cubulated hyperbolic groups are virtually special. Part of this result is joint work with Daniel Groves and Jason Manning.

### Lecture 1: The virtual Haken conjecture

Tuesday, March 25, 2014 – 4:00 pm, SCGP 102

### Lecture 2: Geometric group theory

Wednesday, March 26, 2014 – 4:00 pm, SCGP 102

### Lecture 3: Virtually special cube complexes

Thursday, March 27, 2014 – 4:00 pm, SCGP 102