

**COLLOQUIUM**  
**UNIVERSITY OF PITTSBURGH**  
**FRIDAY, OCTOBER 28, 2016**

704 THACKERAY HALL

3:30 P.M.

**DAVID FUTER**

**DEPARTMENT OF MATHEMATICS**  
**TEMPLE UNIVERSITY**

**CAN YOU HEAR THE SHAPE OF A 3-MANIFOLD?**

**ABSTRACT:** In the 1960s, Marc Kac popularized the question, “Can you hear the shape of a drum?” In slightly more mathematical language, the question asks: “Can you determine the shape of a domain in the plane from the spectrum of frequencies at which it vibrates?” The study of this question has been extended to surfaces and manifolds of other dimensions.

We now know that the answer is usually “no”. There exist planar domains (and surfaces, and 3-manifolds) that have the same spectrum but different shapes. However, essentially all known counterexamples are related by a rigid cut-and paste procedure. I will explain how this works in the context of 3-dimensional manifolds, and report on some recent joint work with Christian Millichap.

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