Title: Gazillions of isospectral Riemann surfaces and the Sunada condition

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Abstract: In a celebrated paper, Kac popularized the question "Can one hear the shape of a drum?" in the 1960s. Every Riemannian manifold carries with it a Laplace operator, the natural generalization of $\Delta = -\sum_{i=1}^{n} \frac{\partial^2}{\partial x^2}$ on $\mathbb{R}^n$. The spectrum of Δ corresponds to the frequencies that are heard when the drum (manifold) vibrates (via the wave equation). Thus the mathematical question posed by Kac is: "Can two manifolds that are not isometric have the same spectrum of the Laplace operator?" Examples and methods proving that the answer is a resounding "No" have been studied for the last 25 years. We focus our talk on the Sunada method for constructing isospectral manifolds, and show how to construct families of "gazillions" of isospectral Riemann surfaces that are pairwise isospectral and not isometric. Time permitting, we also consider the "covering spectrum" and how it relates to the Sunada condition.

The talk will start with a very expository introduction to spectral geometry, with a promise by the speaker to go as slow/fast as the audience wishes.