Three-dimensional Geometric Structures and the Laplace Spectrum

Samuel Lin
Dartmouth College

The earliest examples of non-isometric Laplace-isospectral manifolds have the same local geometries. In fact, the first example of 16-tori given by Milnor and other isospectral pairs arising from the classical group theoretic method of Sunada have the same local geometries. However, examples from Gordon, Schueth, Sutton, and An-Yu-Yu demonstrate that in dimension four and higher, the local geometry is not a spectral invariant, even among locally homogeneous spaces. Thus it is natural to ask whether the local geometry is a spectral invariant in dimension two and three.

I will present our result in this direction, which provides strong evidence that the local geometry of a three-dimensional locally homogeneous space is a spectral invariant. This talk is based on a joint work with Ben Schmidt and Craig Sutton.