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Carolyn S Gordon* (csgordon@dartmouth.edu), Department of Mathematics, 6188 Kemeny Hall, Dartmouth College, Hanover, NH 03755. *You can't hear the shape of a manifold.*

Inverse spectral problems ask how much information about an object is encoded in spectral data. For example, Mark Kac's question "Can you hear the shape of a drum?" asks whether a plane domain, viewed as a vibrating membrane, is determined by the Dirichlet eigenvalue spectrum of the associated Laplacian, equivalently, by the characteristic frequencies of vibration. The lecture will focus on Kac's question and its generalization to Riemannian manifolds. We will consider methods for constructing manifolds with the same spectral data and compare examples of such "sound-alike" manifolds. We will also refer to related constructions on discrete and quantum graphs. (Received September 16, 2009)