

Title: Positive and negative isospectrality results, or, what can and cannot be heard?

Abstract: Mark Kac's 1966 paper, "Can one hear the shape of a drum?" popularized the isospectral problem for planar domains. Imagine a bounded domain in the plane is the head of a drum, made with a flexible material which vibrates and creates a sound upon being struck. Is the sound unique to that particular shape? This can be translated into the language of mathematics as an isospectral problem for the Laplacian: if two bounded planar domains have the same spectrum, then are they the same shape? This seemingly simple question inspired many important mathematical discoveries. The answer was demonstrated to be "One cannot hear the shape of a drum" (Gordon, Webb & Wolpert 1991). In this talk I will discuss the isospectral problem, its resolution, and recent results including "One can hear the corners of a drum" and "one can realistically hear symmetry."