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Title: *The sound of symmetry*

**Abstract**

Have you heard the question "Can one hear the shape of a drum?" This question was popularized in M. Kac's 1966 Monthly article of the same name. It took about 25 years to prove that the answer is in general "no" (C. Gordon, D. Webb, S. Wolpert 1991). Although that may seem to be the final resolution, the question led to many mathematical discoveries, and many open problems remain. We will introduce this problem and its resolution and discuss variations, open problems, and recent results with Zhiqin Lu concerning the "sound of symmetry."