

Insalate di Matematica presents

"Can one hear the shape of a drum?" and other related questions

Roberto Ognibene

Università degli Studi di Milano-Bicocca

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The eigenvalues of the Laplacian (on a bounded domain) are related to the sound produced by a drum (a vibrating body, in general), via the wave equation, and the sound strongly depends on the physical properties of the drum itself. Starting from the basics, in this talk we will discuss these relations and I will present some questions that naturally arise in this context (e.g. the celebrated "Can one hear the shape of a drum?", raised by M. Kac in 1966). In particular, we will focus on how the sound of a drum is affected by small modifications of its shape, i.e. how the spectrum of the Laplacian changes with respect to perturbations of the domain (and of the boundary conditions).

Keywords:

**vibrating bodies • eigenvalues of the Laplacian •
perturbations of the domain • asymptotics of eigenvalues**

"Obvious" is the most dangerous word in mathematics.
- Eric Temple Bell