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Complementary asymptotically sharp estimates for eigenvalue means of Laplacians

Abstract

The average of the first k eigenvalues of a self-adjoint operator, as a function of k, has implications for inverse problems which are essentials in applications: it contains information about the operator and about the domain on which it is defined (e.g., its shape, volume, perimeter, etc.). The efforts to recover these details from the knowledge of the spectrum already started 50 years ago in the famous paper *"Can one hear the shape of a drum?"*

In this framework, we will present new asymptotically sharp inequalities, containing a second term, for the Dirichlet and Neumann eigenvalues of the Laplacian on a domain, which are complementary to the familiar Berezin-Li-Yau and Kröger inequalities in the limit as the eigenvalues tend to infinity.

Based on a joint work with E. Harrell II and J. Stubbe.