

Maximization of Neumann eigenvalues

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In this talk I will discuss the question of the maximization of the k -th eigenvalue of the Neumann-Laplacian under a volume constraint. After an introduction to the topic I will discuss the question of existence of optimal geometries. For now, there is no a general existence result, but one can prove existence of an optimal (*over*) *relaxed domain*, view as a density function. These results are an on-going work with E. Oudet.

In the second part of the talk, I will focus on the low eigenvalues. The first non-trivial one is maximized by the ball, the result being due to Szego and Weinberger in the fifties. Concerning the second non-trivial eigenvalue, Girouard, Nadirashvili and Polterovich proved that the supremum in the family of planar simply connected domains of R^2 is attained by the union of two disjoint, equal discs. I will show that a similar statement holds in any dimension and without topological restrictions. This last result is jointly obtained with A. Henrot.