ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

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SB - Institute of Mathematics - ANMC

SEMINAR OF MATHEMATICS

➢ MONDAY 26 MARCH 2018, 15:30 - MA A1 12

Prof. Vadim KALOSHIN (University of Maryland, College Park / USA)
will present a seminar entitled:

"Can you hear the shape of a drum, deformational spectral rigidity and Birkho Conjecture"

Abstract:

M. Kac popularized a beautiful and important question "Can you hear the shape of a drum?". Formally, for a domain $\Omega \subset \mathbf{R}^2$ the Laplace spectrum $Sp(\Omega)$ is the collection of the eigenvalues of the Dirichlet problem for the Laplacian

$$\Delta u + \lambda^2 u = 0, \qquad u = 0 \quad \text{on} \quad \partial\Omega.$$

Does Sp(Ω) determine a domain Ω?
In general, the answer is negative due to examples of Gordon-Webb-Wolpert.
Can one deform a domain without changing it's Laplace spectrum?
We show a progress on this question in the case of axis symmetric domains. It turns out that the method of proof gives an insight into another old problem, called Birkhoff Conjecture.

G.D.Birkhoff introduced a mathematical billiard inside of a convex domain in R2 as the motion of a massless particle with elastic reection at the boundary. A theorem of Poncelet says that the billiard inside an ellipse is integrable in the sense that near the boundary there is a smooth _rst integral. A famous conjecture by Birkhoff claims that ellipses are the only domains with integrable billiard. We show that the conjecture is true for perturbation of ellipses. Both results are based on several joint papers with A. Avila, J. De Simoi, A. Figalli, G. Huang, A. Sorrentino, Q. Wei.

Lausanne, 13 March 2018/ AA/cr
