COLLOQUIUM

UNIVERSITY OF PITTSBURGH

FRIDAY, MARCH 3, 2017

704 THACKERAY HALL

3:30 P.M.

RICHARD LAUGESEN

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ASYMPTOTICALLY OPTIMAL SHAPES: THE DRUM WITH LOWEST n-th FREQUENCY, AND THE ELLIPSE ENCLOSING THE MOST LATTICE POINTS

ABSTRACT: What shape of domain minimizes the n-th eigenvalue (frequency) of the Laplacian, for large n? Does the minimizer approach a disk as n tends to infinity? This isoperimetric type conjecture is supported by the recent discovery of Antunes and Freitas that among rectangular drums, the one that minimizes the n-th frequency converges to a square as n tends to infinity. This result for rectangles relies on lattice point counting in ellipses, similar to the Gauss circle problem.

I will extend to lattice point counting in more general shapes, leading to an open problem about the optimal harmonic oscillator, or in other words, an open problem about right triangles.

[Joint with Shiya Liu, U. of Illinois, and Sinan Ariturk, Pontificia U. Catolica do Rio de Janeiro, Brazil.]

Refreshments served at 3:00 p.m.
in the Math Dept. COMMON ROOM, Thackeray 705