JEAN LAGACÉ, Université de Montréal

Optimal bounds on a generalised Gauss circle problem

In this joint work with Leonid Parnovski, we study of the integrated density of states of the free periodic Schrödinger operator on $\mathbb{T}^n \times \mathbb{R}^k$ leads to a generalisation of the Gauss circle problem. Geometrically, this generalisation corresponds to computing the area of hyperplanes intersecting a ball of large radius. Using the Poisson summation formula, one can recover upper bounds for the error term just as in the classical case, and they become more precise as both the dimension of the ball and of the hyperspace grows.

What is surprising, is that when the codimension of the hyperplanes is sufficiently small the upper bound on the error term stops improving. Furthermore, we can show that this upper bound is optimal in an average sense. I will show how this behavior happens, and where it leads in the study of periodic Schrödinger operators on $\mathbb{T}^n \times \mathbb{R}^k$.