

Extrema of determinants of Laplacians on tori

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The search for extremal geometries is a central theme in several areas of mathematics. In this talk, we address the following question: among all n -dimensional orthogonal tori of unit volume, which one maximizes the determinant of the Laplacian? This determinant is obtained via the zeta regularization method, originally introduced by Ray and Singer to define an analytic analogue of the topological invariant, the Reidemeister torsion. While this determinant is connected to topology, geometry, analysis, and number theory, it is also important in physics. For example, Stephen Hawking, observed that the zeta-function regularization technique could be used to regularize quadratic path integrals on a curved background space-time.

This talk is based on joint work with Fabio Francesconi and will be broadly accessible to mathematicians, physicists, and their students!