

Lotfi Hermi (Florida International University in Miami)

Title: Universal and Isoperimetric Inequalities for the Eigenvalues of the Laplacian and Other Elliptic Operators

Abstract: Integral transform methods provide a powerful framework for establishing eigenvalue bounds. We deploy them alongside a class of sum rules and the Rayleigh-Ritz scheme to derive universal Weyl-type bounds for the eigenvalues of the fixed membrane problem and their averages. A central contribution is the demonstration that these integral transforms reveal a fundamental equivalence between the Berezin-Li-Yau inequality and a classical inequality of Kac, while also illuminating connections to the inequalities of H.C. Yang and Harrell-Stubbe. We further reexamine the work of A. Melas through this new lens and propose several conjectures. This line of inquiry traces its roots to the foundational paper of Payne, Pólya, and Weinberger (1956).