On some new estimates for low eigenvalues of the Laplacian

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In this talk we are concerned with the eigenvalues of the Laplacian on various classes of domains of given measure: simply-connected Lipschitz planar domains, smooth N-dimensional domains, n-sided planar polygons, platonic solids and 2-dimensional closed surfaces in $\mathbf{R}^3$, topologically equivalent to a sphere. In each case, we consider some quantities involving low eigenvalues of the (Dirichlet/Neumann) Laplacian for which we obtain new estimates. Our investigations make use of variational characterizations of eigenvalues, some properties of conformal mappings, Bessel functions and symmetric domains, some isoperimetric inequalities for moments of inertia, and a method of anisotropic auxiliary problems.
This talk is based on some joint works with Prof. Gerard A. Philippin, from Laval University (Canada).