1057-35-327 **Richard S Laugesen*** (Laugesen@illinois.edu), Department of Mathematics, University of Illinois, Urbana, IL 61801, and **Bartlomiej A Siudeja**. *Sums of Dirichlet eigenvalues: maximizing with rotationally symmetric domains.* Preliminary report.

Many sharp inequalities are known for the low Dirichlet eigenvalues of the Laplacian. We present new sharp inequalities for higher eigenvalues, namely for sums of the first n eigenvalues, for each n.

Consider a plane domain D having rotational symmetry of order 3 or greater. We prove that among all domains obtained from D by affine transformation, the scale-invariant eigenvalue sum

$$S_n = (\lambda_1 + \cdots + \lambda_n)\frac{A^3}{I}$$

is maximal for D, for each n. Here A denotes the area and I is the moment of inertia of the domain.

Corollaries: S_n is maximal for the equilateral triangle among all triangles. S_n is maximal for the square among all parallelograms. These corollaries extend work of Pólya on the fundamental tone, the case $n = 1$.

These results suggest a conjecture for convex plane domains: is the normalized eigenvalue sum S_n maximal for the disk? (Received January 25, 2010)