1057-35-418 **Alexandre Girouard*** (alex.girouard@gmail.com). *Shape optimization for lower eigenvalues of the Neumann and Steklov problems on planar domains.*

The Pólya conjecture (1954) states that the k-th Neumann eigenvalue of a planar domain is bounded above by $4k\pi$. In this talk I will present a sharp isoperimetric inequality for the second non-zero eigenvalue. This implies the Pólya conjecture for $k = 2$. I will also discuss similar results for the spectrum of the Dirichlet-to-Neumann map and for the spectrum of the Laplace-Beltrami operator on spheres. Surprisingly, this extension to spheres is possible only for odd dimensions. (Received January 26, 2010)