

# The Asymptotic Geometry of Nodal Domains

Bogdan Georgiev

## Abstract

Given a closed manifold  $M$  with an associated Laplace operator and its eigenfunctions  $\varphi_\lambda$ , we ask about the characteristics of nodal domains (i.e. connected components of  $\{\varphi_\lambda > 0\}$  or  $\{\varphi_\lambda < 0\}$ ) as the corresponding eigenvalue tends to infinity. Relying on local analysis of eigenfunctions and classical elliptic estimates, seen in the works of Dan Mangoubi and Donnelly-Fefferman, we discuss several results concerning the asymptotic behaviour of the inner radius, local volume and thickness. We also present an approach, initiated by Steinerberger, that investigates a heat process associated to a nodal domain.