Geometric Analysis Day
Le jour de l'analyse géométrique

Vendredi, 6 juin 2014 / Friday, June 6 2014

CRM Salle / Room 5340

10:00 – 10:50 John Toth

Title: L^2 restriction bounds for eigenfunction Neumann data along hypersurfaces

Abstract: Let (M, g) be a compact, Riemannian manifold, H be a smooth oriented hypersurface with unit exterior normal ν and $\phi_{\lambda_j}; j = 1, 2, \cdots$ be L^2-normalized Laplace eigenfunctions with $\Delta_g \phi_\lambda + \lambda^2 \phi_\lambda = 0$. We consider the eigenfunction Neumann data $\phi_\lambda^{H,\nu} := \frac{1}{\lambda} \partial_\nu \phi_\lambda|_H$ along H and prove that $|\phi_\lambda^{H,\nu}|_{L^2(H)} = O(1)$. These estimates also extend to more general semiclassical Schrödinger operators. This is joint work with Hans Christianson and Andrew Hassell.

11:00 – 11:50 Asma Hassannezhad

Title: Sub-Laplacian Eigenvalues on Heisenberg Manifolds

Abstract: A Heisenberg manifold is a manifold with a non-integrable hyperplane distribution. This definition covers many examples such as the Heisenberg group, CR and contact Manifolds. There is a natural hypoelliptic operator on Heisenberg manifolds called the sub-Laplacian. We obtain upper bounds for its eigenvalues which are asymptotically optimal. We will see examples on which upper bounds are independent of the geometry of Heisenberg manifolds. This talk is based on joint work with Gerasim Kokarev.

11:50 – 14:00 Lunch break

14:00 – 14:50 David Sher

Title: Inverse spectral problems for the Dirichlet-to-Neumann map

Abstract: The Dirichlet-to-Neumann operator on a compact Riemannian manifold with boundary is the map which takes the boundary value of any harmonic function to the boundary value of its normal derivative. It appears in many physical settings, such as electric impedance tomography, and has been extensively studied over the last thirty years. The inverse spectral problem for the Dirichlet-to-Neumann map is the following: given knowledge of the spectrum of the map, as an operator acting on functions on the boundary, what can be said about the geometry of the manifold? In this talk, I will first give an introduction to the subject (requiring no specialized knowledge) and then briefly discuss two recent specific results. The first, joint with I. Polterovich (Montreal), uses heat equation techniques to show that any compact three-dimensional Euclidean domain with connected boundary which has the same Dirichlet-to-Neumann spectrum as a ball must in fact be a ball. The second, joint with A. Girouard (U. Laval), L. Parnovski (UCL), and I. Polterovich, shows how to determine the set of lengths of the boundary components of any compact surface from the Dirichlet-to-Neumann spectrum.

15:00 – 15:50 Niky Kamran

Title: A singular initial-boundary value problem for nonlinear wave equations and holography in asymptotically anti-de Sitter spaces

Abstract: We analyze the initial value problem for semi-linear wave equations on asymptotically anti-de Sitter spaces using energy methods adapted to the geometry of the problem at infinity. A key feature of the problem is that the coefficients of the pdes become strongly singular at infinity, which leads to considering nontrivial data on the conformal boundary of the manifold. This is joint work with Alberto Enciso (ICMAT, Madrid).