Department Colloquium

Speaker: Ikemefuna Agbanusi, University of Illinois at Urbana-Champaign
Date: Friday, October 30
Time: 2:30 p.m.
Place: Jeffery 234
Title: The Laplacian Plus a Large Potential

Abstract: It is a fairly well known fact that if one perturbs the Laplacian by a potential function that is ``large", localized in a particular region, and has jumps across a reasonably smooth interface, one essentially ``recovers the Dirichlet Laplacian" in the exterior of this region. The Dirichlet Laplacian here refers to imposing Dirichlet boundary conditions on the interface.

This invariably has implications for quantum mechanics, diffusions, obstacle scattering and other time dependent processes, i.e. semigroups, "generated" by the Laplacian. In these contexts, the potential controls the interactions in the system --- be they ``quantum particles", particles undergoing Brownian motion or Waves --- and one usually speaks of large or strong coupling.

In this talk we will review and describe several approaches to the problem. We will also discuss our own recent approach which uses (rather well-known) pseudodifferential techniques to get some precise results on the rate and mode of convergence to the Dirichlet Laplacian.

I will labour to make this talk accessible to anyone with only a smattering knowledge of PDE and functional analysis. In particular, if you are somewhat familiar with the heat equation then this talk is up your alley.