NEGLIGIBLE BOUNDARIES FOR THE SCALAR AND HODGE LAPLACIANS ON SINGULAR MANIFOLDS

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Abstract. In this talk, we will present results on the essential self-adjontness of the scalar and Hodge Laplacians on singular manifolds.

The original Laplacian defined on the set of smooth functions is never self-adjoint. Thus, one extend it to a self-adjoint operator and apply the functional analytical techniques. The natural question is the uniqueness of the extensions. For instance, the Laplacian on a complete manifold without boundary has unique self-adjoint extension and the Laplacian on a manifold with boundary has infinitely many extensions. One may expect that if the singularity of the manifold is "small" in certain sense, then there is no boundary condition, and accordingly, these extensions are unique; if the singularity is "large", then there are several different with respect to each boundary condition.

In this talk, I will show that the sense of "small" are different when the Laplacian is the scalar-Laplacian or Hodge-Laplacian. Indeed, the uniqueness of the former is related to a concept in potential theory and stochastic analysis, and the latter is related also to the topology of the space. I will also introduce some recent development in the research for "large" singularity from stochastic analytical point of view.