Graduate Talk

Large scale versus small scale geometry

Large scale geometry is the study of geometric objects from the asymptotic point of view. Two important examples are Mostow's proof of his rigidity theorem and Gromov's theory of hyperbolic groups. Somewhat surprisingly, large scale geometry has found applications to ordinary small scale geometry. In this talk, I will discuss some of the basic ideas of large scale geometry and explain how they can be applied to study problems in differential geometry.

Colloquium I

Rigidity of manifolds and higher index theory of elliptic operators

A compact manifold M is said to be rigid if whenever another manifold M' is homotopy equivalent to M, then M' is actually homeomorphic to M. The Borel conjecture claims that all compact aspherical manifolds are rigid. The Novikov conjecture is an infinitesimal version of the Borel conjecture. In this talk, I will give a survey on the current status of the Novikov conjecture and its connection to higher index theory of elliptic operators.

Colloquium II

Modeling groups after Banach spaces

In this talk, we will discuss how to model the geometry of groups after Banach spaces in the following two ways: coarse embedding into Banach spaces and proper isometric actions on Banach spaces. For example, all hyperbolic groups admit proper and isometric actions on ℓ^p spaces. The problem when a group admits a coarse embedding into a "nice" Banach space or a proper isometric action on a "nice" Banach space is motivated by the problem of computing higher indices of elliptic operators.