Carleman Estimates and Anisotropic Inverse Problems, Part I
Mikko Salo, University of Jyvaskyla
Monday 1:30- 3:00, Fields Institute, Room 230

ABSTRACT

This course is an introduction to Calderón's inverse conductivity problem on Riemannian manifolds. This problem arises as a model for electrical imaging in anisotropic media, and it is one of the most basic inverse problems in a geometric setting. The problem is still largely open, but we will discuss recent developments based on complex geometrical optics and the geodesic X-ray transform.

We begin with an introduction to the Calderón problem on manifolds, stating the main questions studied in this course. We then review basic facts on smooth and Riemannian manifolds, also discussing the Laplace-Beltrami operator and geodesics. Limiting Carleman weights, which turn out to exist on manifolds with a certain product structure, are treated next. Carleman estimates on manifolds with product structure will be proved using the Fourier transform and eigenfunction expansions. Finally we discuss a uniqueness result for the inverse problem in certain geometries, based on inverting the geodesic X-ray transform.