JOSEPH FELS RITT LECTURES

SPRING 2025

Professor Gunther Uhlmann

(University of Washington)

First Lecture: 45 Years of Calderon's Problem

Wednesday, April 16 @ 4:30 PM
Math 520

Abstract: Calderon's inverse problem asks whether one can determine the conductivity of a medium by making voltage and current measurements at the boundary. In mathematical terms it consists in recovering coefficients of a PDE by making boundary measurements of solutions. This question arises in several areas of applications including medical imaging and geophysics. It has also led to a proposal for making objects invisible. I will report on some of the progress that has been made on this problem since Calderon proposed it in 1980, including recent developments on similar problems for nonlinear equations and nonlocal operators.

Second Lecture: Journey to the Center of the Earth

Thursday, April 17 @ 2:45 PM
Math 520

Abstract: We will consider the inverse problem of determining the sound speed or index of refraction of a medium by measuring the travel times of waves going through the medium. This problem arises in global seismology in an attempt to determine the inner structure of the Earth by measuring travel times of earthquakes. It also has several applications in optics and medical imaging among others. The problem can be recast as a geometric problem: Can one determine the Riemannian metric of a Riemannian manifold with boundary by measuring the distance function between boundary points? This is the boundary rigidity problem. We will survey some of the known results about this problem.