

Abstracts of the Talks (Monday May 20, 2024)

9:15 – 10:15 **Rainer Kress**, University of Göttingen

Title: “Proving theorems and writing books with David, continued.”

Abstract: This will be an updated and modified version of my talk given at the 2013 conference at Delaware honoring David’s 70th birthday. In particular, I will shed light on the importance of the Oberwolfach Research Institute for our collaboration. Further, I will include a short review on recent results on inverse scattering for the DB boundary condition for the Maxwell equations.

11:00 – 12:00 **Gunther Uhlmann**, University of Washington

Title: “Inverse Problems for Nonlinear Equations.”

Abstract: We discuss inverse problems for nonlinear equations with the common feature that the nonlinear interaction of waves produces new waves that help some inverse problems that remain unsolved for their linear counterpart.

1:30 – 2:30 **Andreas Kirsch**, Karlsruhe Institute of Technology

Title: “Time harmonic Maxwell’s equations in periodic waveguides.”

Abstract: We study Maxwell’s equations with periodic coefficients in a closed waveguide. A functional analytic approach is used to formulate and to solve the radiation problem. We furthermore characterize the set of all bounded solutions to the homogeneous problem. The case of a compact perturbation of the medium is included, the scattering problem and the limiting absorption principle are discussed.

2:30 – 3:30 **Katya Krupchyk**, University of California, Irvine

Title: “Inverse problems for elliptic operators on Riemannian manifolds.”

Abstract: We discuss recent progress on inverse problems for elliptic operators in the setting of Riemannian manifolds. The first part of the talk concerns the fractional anisotropic Calderon problem on closed Riemannian manifolds. We demonstrate that the knowledge of the local source-to-solution map for the fractional Laplacian, given on an arbitrary small open nonempty a priori known subset of a smooth closed Riemannian manifold, determines the Riemannian manifold up to an isometry. This can be viewed as a nonlocal analog of the anisotropic Calderon problem in the setting of closed Riemannian manifolds, which remains wide open in dimensions three and higher. The second part of the talk deals with inverse boundary problems for semilinear Schrodinger equations on smooth compact Riemannian manifolds with boundary, at a large fixed frequency. We demonstrate that certain classes of cubic nonlinearities are uniquely determined from the knowledge of the nonlinear Dirichlet-to-Neumann map at a large fixed frequency on quite general Riemannian manifolds. In particular, in contrast to the previous results available, here the manifolds need not satisfy any product structure, may have trapped geodesics, and the geodesic ray transform need not be injective. Only a mild assumption about the geometry of intersecting geodesics is required. The talk is based on joint work with Ali Feizmohammadi, Tuhin Ghosh, and Gunther Uhlmann, as well as on joint work with Shiqi Ma, Suman Kumar Sahoo, Mikko Salo, and Simon St-Amant.

4:00 – 5:00 **John Schotland**, Yale University

Title: “Inverse Born Again.”

Abstract: I will review recent developments on the inverse Born series approach to inverse scattering. These include a geometric function theory approach that leads to stronger results on convergence and error estimates for the series. Applications to inverse problems for nonlocal PDEs arising in quantum optics will be described. This is joint work with Jeremy Hoskins and Howard Levinson.