

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 **Shari Moskow**, Drexel University

Title: “Nonlinearity helps convergence of the inverse Born series.”

Abstract: We investigate the Born and inverse Born series for a scalar wave equation with linear and nonlinear terms, the nonlinearity being cubic of Kerr type. We show conditions which guarantee convergence of the inverse Born series, enabling recovery of the coefficients of the linear and nonlinear terms. Furthermore, we show that if the unknown perturbation is only in the nonlinear term, an arbitrarily strong nonlinearity can be reconstructed for sufficiently small data. Similar convergence results hold for general polynomial nonlinearities. Our results are illustrated with numerical examples. This is joint work with N. Defilippis and J. Schotland.

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.