Free boundary methods in inverse scattering

Speaker: Mikko Salo, University of Jyväskylä

Abstract: We study a question arising in inverse scattering theory: given a penetrable obstacle, does there exist an incident wave that does not scatter? If this happens, the obstacle would be invisible for this choice of incident wave. This phenomenon is closely related to inverse problems with a single measurement.

There are several results on corner scattering showing that obstacles with corners typically scatter every incident wave. It was recently observed that the theory of free boundary problems can be used to shed light on this issue. We use free boundary methods and quadrature domains to give examples of invisible penetrable obstacles. Moreover, under a nonvanishing condition for the incident wave, we show that there is a dichotomy for boundary points of any invisible obstacle: either the boundary is regular, or the complement of the obstacle must be very thin near the point.

This talk is based on joint works with Pu-Zhao Kow (Jyväskylä), Simon Larson (Chalmers), and Henrik Shahgholian (KTH).