The Calderón problem in transversally anisotropic geometries

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In this talk, will discuss the anisotropic Calderon problem of recovering a conductivity matrix or a Riemannian metric from electrical boundary measurements in three and higher dimensions. In an earlier work, it was shown that a metric in a fixed conformal class is uniquely determined by boundary measurements under two conditions :

(1) the metric is conformally transversally anisotropic (CTA),

and (2) the transversal manifold is simple.

In this talk we will consider geometries satisfying (1) but not (2). The first main result states that the boundary measurements uniquely determine a mixed Fourier transform / attenuated geodesic ray transform of an unknown coefficient. In particular, one obtains uniqueness results whenever the geodesic ray transform on the transversal manifold is injective. The second result shows that the boundary measurements in an infinite cylinder uniquely determine the transversal metric. The first result is proved by using complex geometrical optics solutions involving Gaussian beam quasimodes, and the second result follows from a connection between the Calderon problem and Gel'fand's inverse problem for the wave equation. In this talk, I will focus on the second result in cylindrical "wave guide" type of geometries. This is a joint work with Slava Kurylev (University College London), Matti Lassas (University of Helsinki) and Mikko Salo (University of *Jyväskylä*).