

1022-35-26

Plamen Stefanov* (stefanov@math.purdue.edu), Department of Mathematics, Purdue University, West Lafayette, IN 47907, and **Gunther Uhlmann**. *Tensor tomography and lens rigidity on a class of non-simple Riemannian manifolds with boundary.*

We study a class of compact manifolds M with boundary equipped with a Riemannian metric g , not necessarily convex, with possible conjugate points. We study the geodesic ray transform of integrals of symmetric 2-tensor fields over geodesics connecting boundary points. Moreover, we restrict the set of geodesics over which we know the integrals to an open one such that its conormal bundle covers T^*M . Under some conditions on the pairs of the conjugate points and on the topology of M , we show that for an open dense set of g 's, the geodesic ray transform recovers uniquely the tensor up to a potential field, and moreover, there is a stability estimate uniform under small perturbations of g . That set includes all real analytic metrics satisfying the assumptions. The methods rely on analytic and classical microlocal analysis. We discuss applications of this result to the non-linear lens rigidity problem of recovering g from the scattering relation on the boundary. (Received August 28, 2006)