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An inverse scattering problem in random media

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ABSTRACT: In inverse scattering theory the aim is to determine a scattering potential q from appropriate measurements. In many applications the scatterer is non-smooth and vastly complicated. For such scatterers, the inverse problem is not so much to recover the exact micro-structure of an object but merely to determine the parameters or functions describing the properties of the micro-structure. An example of such parameters is the local strength of the medium which controls the size of the oscillations of the scatterer. In mathematical terms, the potential q is assumed to be a Gaussian random function whose covariance operator is a classical pseudo-differential operator. We show that the backscattered field, obtained from a single realization of the random potential q, determines uniquely the principal symbol of the covariance operator—called the local strength of the potential. This is a joint work with Tapio Helin and Matti Lassas.

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