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Inverse obstacle scattering with generalized backscattering data in only one or two directions

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We study questions related to recovery of an obstacle from limited scattering data. In particular, in Euclidean obstacle scattering, we show that knowledge of the scattering amplitude in one or two particular pairs of incident and reflected directions suffices under certain conditions to recover the Taylor series for the boundary defining function for an obstacle at a point. This allows for the recovery of certain obstacles with analytic boundary. We connect this to earlier work, some joint with Michael Taylor, on recovering obstacles in a waveguide from one or two entries in the scattering matrix.

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