Low energy scattering asymptotics in dimension two

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Abstract

Analysis of the Laplacian at low energy involves special challenges in dimension two. I will present a new technique, which is elementary and robust, for scattering theory in this setting, focusing on the fundamental example of obstacle scattering. The technique is based on a resolvent identity of Vodev. By an identity of Petkov and Zworski we deduce expansions for the scattering matrix and scattering phase, and similarly obtain expansions for the exterior Dirichlet-to-Neumann operator.

The leading singularities at low energy are given in terms of the obstacle's logarithmic capacity or Robin constant. We expect these results to hold for more general compactly supported perturbations of the Laplacian on $\mathbb{R}^2$, with the definition of the Robin constant suitably modified, under a generic assumption that the spectrum is regular at zero. This talk is based on joint work with Tanya Christiansen.