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Inverse Problems for the Schödinger Operator on Riemann Surfaces

We show that on a smooth compact Riemann surface with boundary (M_0, g) the Dirichlet-to-Neumann map of the Schrödinger operator $\Delta_g + V$ determines uniquely the potential V. This seemingly analytical problem turns out to have connections with ideas in symplectic geometry and differential topology. We will discuss how these geometric features arise and the techniques we use to treat them.

We will also discuss the problem of inverse scattering for the Schrödinger operator on noncompact surfaces with Euclidean ends. Here again the topology of the manifold plays a significant role. These topological obstructions suggest that counter-examples to identifiability exist on surfaces of many genus.

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