Scattering matrix and Dirichlet-to-Neumann maps

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A general representation formula for the scattering matrix of a scattering system consisting of two selfadjoint operators in terms of an abstract operator valued Titchmarsh-Weyl M-function is proved. This result is applicable to scattering problems for different selfadjoint realizations of Schrödinger operators on unbounded domains, and Schrödinger operators with singular potentials supported on hypersurfaces. In both applications the scattering matrix is expressed in an explicit form with the help of Dirichlet-to-Neumann maps.