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Link between the complex rotation resonances and scattering matrix resonances

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We consider a multichannel Schroedinger operator with binary channels and a three-body Hamitonian with pairwise interactions. Being written in the momentum representation, both of these operators are subject to the complex deformation, a kind of inhomogeneous complex rotation/scaling. Isolated non-real eigenvalues of the complexly deformed Hamiltonians are called the complex rotation resonances. For a class of rapidly decreasing and momentum-space analytic interactions, we prove that the complex rotation resonances do correspond to the scattering matrix resonances, that is, to the poles of the scattering matrix analytically continued to the respective unphysical sheet. Our proofs employ the explicit representations [1,2] (see also [3,4]) that express the T- and S-matrices on unphysical energy sheets through the values of those same matrices only taken in the physical sheet. We think the proofs we give are more transparent than the ones found in the literature (see [5] and references therein). To make the presentation even more illustrative, we first give the proofs in the simplest possible case — for the Friedrichs-Faddeev model [6].

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