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An equivalence of the complex rotation resonances and scattering matrix resonances

We consider a momentum-space multi-channel Hamiltonian that underwent the complex rotation, a kind of inhomogeneous complex scaling. Isolated non-real eigenvalues of this Hamiltonian are called the complex rotation resonances. For a class of sufficiently rapidly decreasing and 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 proof employs the explicit representations that express the multi-channel T- and S-matrices on unphysical energy sheets through those same matrices taken only in the physical sheet.

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