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Analytic models of ultracold atomic collisions for application to confinement-induced resonances SATYAN BHONGALE, Rice University, IVAN DEUTSCH, University of New Mexico, SERVAAS KOKKELMANS, TU Eindhoven, The Netherlands — We construct simple analytic models of the S matrix, accounting for both scattering resonances and smooth background contributions for collisions that occur below the s-wave threshold. Such models are important for studying confinement-induced resonances such as those occurring in cold collisions of ^{133}Cs atoms in separated sites of a polarization-gradient optical lattice. Because these resonances occur at negative energy with respect to the s-wave threshold, they cannot be studied easily using direct numerical solutions of the Schrödinger equation. Using our analytic model, we extend previous studies of negative-energy scattering to the multichannel case, accounting for the interplay of Feshbach resonances, large background scattering lengths, and inelastic processes.

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