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Collision dynamics of ultracold atoms confined in 1D optical lattices ZHIYING LI, ROMAN KREMS, Department of Chemistry, University of British Columbia, Vancouver, B.C. V6T 1Z1, Canada — We present a formalism for rigorous multichannel scattering calculations of cross sections for inelastic and reactive collisions of atoms and molecules confined by 1D optical lattices. We obtain analytical expressions for the mean frequency of inelastic collisions in a confined gas in the temperature regime $T \sim \hbar\omega$ and at temperatures $T \gg \hbar\omega$, where ω is the oscillation frequency of trapped particles in the confining potential. Our numerical calculations for the gaseous mixture of Li and Rb atoms show that the threshold energy dependence of the collision cross sections can be tuned by varying the confinement strength and external magnetic fields at $T \ll \hbar\omega$ and that inelastic collisions in the temperature regime $T \sim \hbar\omega$ exhibit significant deviations from 3D scattering for systems with strong confinement and large scattering lengths. We find that the ratio of rate constants for inelastic scattering and elastic collisions is suppressed in the presence of a laser confinement and this suppression is significant for Li–Rb collisions at $T < 40$ μK.

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