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Entanglement Mechanisms in One-Dimensional Potential Scattering NATHAN HARSHMAN, PAVNEET SINGH, American University — When two non-relativistic particles scatter in one dimension, they can become entangled. This entanglement process is constrained by the symmetries of the scattering system and the boundary conditions on the incoming state. Applying these constraints, three different mechanisms of entanglement can be identified: the superposition of reflected and transmitted modes, momentum correlations of the reflected mode due to inversion of the relative momentum, and momentum correlations in the transmitted and reflected modes due to dependence of the scattering amplitude on the relative momentum. We consider three standard potentials, the hard core, Dirac delta, and double Dirac delta, and show that the relative importance of these mechanisms depends on the interaction and on the properties of the incoming wave function. We find that even when the momenta distributions of the incoming articles are sharply peaked, entanglement due to the momentum correlations generated by reflection can be quite large for particles with unequal mass.

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