

UNIFIED APPROACH TO THE HEAVY-ION
OPTICAL POTENTIAL

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A unified approach to calculate the heavy-ion optical potential starting from a realistic nucleon-nucleon interaction and including collective excitations in the intermediate states is formulated. The nucleon matter approach is utilised to give an effective complex force to be used in the folding method which incorporates antisymmetry and finite range effects properly. However, the inclusion of collective excitations of either nucleus in the nuclear structure approach is essential to account for the imaginary part of the optical potential.

We justify this approach through the development of the Feshbach expression for optical potential in shell-model approximation by retaining only the dominant terms in one and two particle-hole excitation channels. An application is made to $^{16}\text{O} - ^{16}\text{O}$ scattering to obtain good agreement with experiment.