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SCATTERING PROCESSES IN FEW-BODY SYSTEMS WITH NON-ZERO ANGULAR MOMENTUM

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Scattering problems for few-body systems are of great importance for many physical processes. The complicated boundary conditions at large distances, especially for slowly decreasing potentials, are a major difficulty for these problems [1]. While several methods have been developed for constructing solutions to the three-body scattering problem, mathematically sound and computationally effective approaches to this problem are still in demand.

Here we present an approach based on splitting the reaction potential into a finite range part and a long range tail part to describe few-body scattering in the case of the Coulomb interaction [2.3]. The solution to the Schroedinger equation for the long range tail of the reaction potential is used as an incoming wave. This reformulation of the scattering problem into an inhomogeneous Schroedinger equation with asymptotic outgoing waves makes it suitable for solving with the exterior complex scaling technique [4]. The potential splitting approach is illustrated with calculations of scattering processes in atomic and molecular systems with non-zero angular momentum. The validity of the approach is analyzed and demonstrated numerically.

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