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Computing wave functions in multichannel collisions with non-local potentials using the R-matrix method[1] JOEY BONITATI, BEN SLIMMER, Clemson University, WEICHUAN LI, GREGORY POTEL, FILOMENA NUNES, Michigan State University (NSCL) — The calculable form of the R-matrix method has been previously shown to be a useful tool in approximately solving the Schrodinger equation in nuclear scattering problems. We use this technique combined with the Gauss quadrature for the Lagrange-mesh method to efficiently solve for the wave functions of projectile nuclei in low energy collisions (1-100 MeV) involving an arbitrary number of channels. We include the local Woods-Saxon potential, the non-local potential of Perey and Buck, a Coulomb potential, and a coupling potential to computationally solve for the wave function of two nuclei at short distances. Object oriented programming is used to increase modularity, and parallel programming techniques are introduced to reduce computation time. We conclude that the R-matrix method is an effective method to predict the wave functions of nuclei in scattering problems involving both multiple channels and non-local potentials.

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