

## On Solving the Problem of Heavy Ion Collisions in an Optical Model

We present algorithm implements the solution of the inverse problem, i.e., calculates the unknown coupling constant  $g(E)$  and scattering matrix  $S(g(E), E)$  from condition  $|S(g(E), E)|^2 = 1 - |T(E)|^2$  by means of the secant method. The required amplitudes of transmission  $T(E)$  and reflection  $R(E)$  subject also to the condition  $|R(E)|^2 = 1 - |T(E)|^2$  of the model with incoming wave boundary conditions (IWBCs) are previously calculated by the standard MAPLE implemented KANTBP 4M program. The algorithm provides a one-to-one correspondence between the OM with a complex-valued potential and the model of IWBCs with a real-valued potential.

The efficiency of the proposed approach is shown by solving numerically the scattering problem and calculating the reference fusion cross section for a pair of heavy ions  $^{16}\text{O} + ^{144}\text{Sm}$  in the single-channel approximation of the close-coupling method.

A.A. Gusev, O. Chuluunbaatar, V.L. Derbov, R.G. Nazmitdinov, S.I. Vinitzky, P.W. Wen, C.J. Lin, H. M. Jia, L. L. Hai, Symbolic-numerical algorithm for solving the problem of heavy ion collisions in an optical model with a complex potential, Lecture Notes in Computer Science 14139, pp. 128–140 (2023).

### Section

Nuclear structure: theory and experiment

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