COULOMB SCATTERING WITH TRANSVERSAL CONFINEMENT

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We study the Coulomb scattering problem of two charged particles with reduced mass $\mu = 1$ and charge q (in scaled units) in transversal oscillator confinement potential $V(\rho,z) = 2q / (\rho^2+z^2)^{1/2} + (\gamma / 2)^2\rho^2$. For a system of two similar or opposite charged particles with equal ratios of charges to masses, the motion of the center of mass of the system is separated and the scattering problem is formulated for the three-dimensional Schrödinger equation in a spherical coordinate system [1]. For solution of the scattering problem including the calculation of the wave function of the continuous spectrum and the matrices of reflection and transmission coefficients in open channels the set of algorithms and program complex KANTBP are elaborated (see [2] and references therein).

Non-monotonic resonance dependences of transmission $|T|^2$ and reflection $|R|^2$ coefficients for similar and opposite charged particles vs. collision energy E is revealed. It produces by finite and countable series of the metastable states imbedded in continuum. A new resonance behavior of enhancement coefficient $(C(E))^2 / (C_0(E))^2$ of probability density vs. collision energy E in pair collision point corresponding to maxima or minima of transmission coefficients $|T|^2$ for similar or opposite charged particles is revealed This behavior is different with nrespect to the conventional one, $(C_0(E))^2 = 2\pi\zeta / (\exp(2\pi\zeta) - 1)$, $\zeta = q / p$, $p = (2E)^{1/2}$, known for the pure Coulomb scattering [3], for an example, see Fig.1.

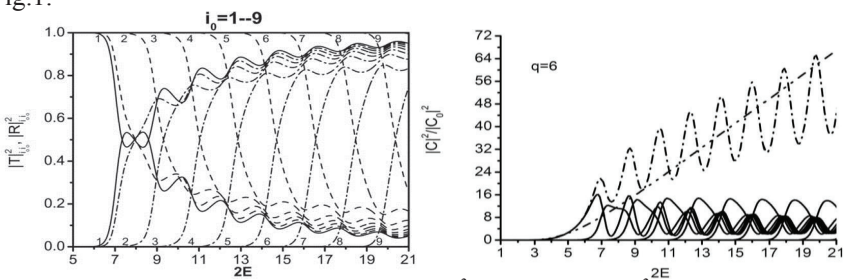

Fig. 1. Diagonal elements of the transmission $|T|^2$ and reflection $|R|^2$ matrices in first open channels (i_o =1-9) (left), enhancement coefficient $(C(E))^2/(C_0(E))^2$, partial (solid), total (dash-dotted) and analytic (right) vs. collision energy E for similar charged particles (q=6, γ=1).

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