Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

A parabolic quasi-Sturmian approach to quantum scattering by Coulomb-like potentials. LORENZO UGO ANCARANI, Universite de Lorraine, France, A.S. ZAYTSEV, S.A. ZAYTSEV, Pacific National University, Khabarovsk, Russia, K.A. KOUZAKOV, Lomonosov Moscow State University, Moscow, Russia — We propose a computational method in parabolic coordinates to treat the scattering of a charged particle from both spherically and axially symmetric Coulomb-like potentials. Specifically, the short-range part of the Hamiltonian is approximated by a Sturmian L2-basis-set truncated expansion while the long-range part is represented in parabolic quasi-Sturmian basis functions. The latter are derived in closed form making use of a convenient analytical representation of the Green's function. Taking advantage of the adequate built-in Coulomb asymptotic behavior of the quasi-Sturmian functions, scattering amplitudes are extracted as simple analytical sums that can be easily computed. The scheme provides scattering solution in the entire space. It proves to be numerically efficient and robust as illustrated with converged results for three different scattering potentials, one of spherical and two of axial symmetry. Applications to realistic electron-atom or electron-molecule scattering are being investigated.

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Date submitted: 16 Jun 2020 Electronic form version 1.4