Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Electric-field dependent quantum dynamics in a delta-function potential system ILKI KIM, GERALD J. IAFRATE[1], Dept. of Electrical and Computer Eng., NC State Univ., Raleigh, NC 27695 — The quantum dynamics for a single electron interacting with a general superposition of delta-function potentials subject to a spatially homogeneous electric field of arbitrary strength and time dependence is presented. The delta-function model system has been utilized heuristically to represent a short range atom or optically active defect, and in more complex combinations, in representing resonant tunneling junctions, molecular switches, and Dirac comb lattices. In the formalism, the electric field is described through the use of the vector potential gauge. The time dependent Schrödinger equation for this problem is solved exactly in quadrature form; specific detailed analysis is performed for constant and oscillatory electric fields, and for a single attractive delta-function. For this case, when the electron is initially in the bound state, the exact ionization probability is determined and discussed for both constant and oscillatory electric fields of varying strengths.

[1]Member ID: IA424284

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Date submitted: 26 Nov 2004 Electronic form version 1.4