**Quantum Mechanical Scattering in Nanoscale Systems**[1] A.G.
GIANFRANCESCO, A. ILYASHENKO, C.R. BOUCHER, L.R. RAM-MOHAN,
Worcester Polytechnic Institute — We investigate quantum scattering using the finite element method. Unlike textbook treatments employing asymptotic boundary conditions (BCs), we use modified BCs, which permits computation close to the near-field region and reduces the Cauchy BCs to Dirichlet BCs, greatly simplifying the analysis. Scattering from any finite quantum mechanical potential can be modeled, including scattering in a finite waveguide geometry and in the open domain. Being numerical, our analysis goes beyond the Born Approximation, and the finite element approach allows us to transcend geometric constraints. Results of the formulation will be presented with several case studies, including spin dependent scattering, demonstrating the high accuracy and flexibility attained in this approach.

Anthony Gianfrancesco
Worcester Polytechnic Institute

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