Abstract Submitted
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Time-dependent Perturbation Propagator[1] NORIO TAKEMOTO, B.D. ESRY, J.R. Macdonald Laboratory, Kansas State University — We develop a numerical method to solve the time-dependent Schrödinger equation based on time-dependent perturbation theory. In this method, we expand a quantum state as a perturbation series and obtain a hierarchy of equations for the respective terms in the series. Each equation takes the form of an inhomogeneous time-dependent Schrödinger equation with the source term being the interaction potential multiplied by the solution of the lower-order equation. The balance between efficiency and accuracy may be adjusted incrementally through the order of truncation, and time-ordering of the propagator is exactly taken into account by setting the reference Hamiltonian to be time-independent. The method allows us to interpret observables in terms of contributions of different perturbation orders. Furthermore, the solution at different values of the perturbation parameter can be computed without re-solving the hierarchy of equations by simply re-summing the perturbation series. Therefore, in application to laser-matter interactions, averaging over intensity or carrier-envelope phase (CEP) incurs negligible additional computational cost once the observables at a single intensity or CEP value are obtained.

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