Simulations of intense laser-driven multielectron dynamics using classical and quantum computers

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Quantum chemistry on quantum computers has attracted much attention as a promising target of near-term quantum devices. Quantum chemistry solves the time-independent Schrödinger equation of electrons. On the other hand, time-dependent Schrödinger equation (TDSE) on quantum computers is less investigated. One needs to solve TDSE of many-electron systems to describe light-matter interactions, which however suffers from the problem of combinatorial explosion peculiar to quantum many-body dynamics. In this talk, we report the progress of our hybrid quantum/classical simulator of multielectron dynamics for describing light-matter interactions and demonstrate successful applications of real quantum computers to intense-laser driven multielectron dynamics.