Abstract Submitted
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A general approach to few-cycle laser interactions with complex atoms[1] XIAOXU GUAN, OLEG ZATSARINNY, KLAUS BARTSCHAT, Drake University, JOHANNES FEIST, Vienna University of Technology (Austria), BARRY SCHNEIDER, National Science Foundation, CLIFF NOBLE, Daresbury Laboratory (U.K.) — We are developing a general method to solve the time-dependent Schrödinger equation for the interaction of a strong laser pulse with a general atom, i.e., beyond the models of quasi-one or quasi-two-electron targets. The field-free hamiltonian matrices are generated in a B-spline R-matrix method [1], and the laser field is coupled in through dipole matrices generated with the same program. The major advantages of our approach are i) its generality and ii) the possibility of generating highly accurate target descriptions with small configuration interaction expansions. We propagate the solution of the TDSE by the Arnoldi method [2]. The generalized eigenvalue problem is transformed by diagonalizing the overlap matrix S of the non-orthogonal basis functions and generating new field-free hamiltonian and dipole matrix blocks through $H' = S^{-1/2}HS^{-1/2}$ and $D' = S^{-1/2}DS^{-1/2}$. Details of various numerical implementations will be discussed.

[1] O. Zatsarinny, Comp. Phys. Commun. **174**, 273 (2006).
[2] T.J. Park and J.C. Light, J. Chem. Phys. **85**, 5870 (1986).

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