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Multi-photon ionization of the H_2^+ molecule by a laser pulse[1]
ETHAN SECOR, XIAOXU GUAN, KLAUS BARTSCHAT, Drake University, BARRY I. SCHNEIDER, National Science Foundation — We solve the time-dependent Schrödinger equation in prolate spheroidal coordinates to calculate the angle-differential cross section of the electron ejected from an aligned H_2^+ ion exposed to laser pulses with central photon energies of 40 and 50 eV. A finite-element discrete-variable representation is used to discretize the problem. The work was motivated by discrepancies in the predictions from time-dependent close-coupling [1] and time-independent exterior complex scaling methods [2]. As in those calculations, we employed the fixed-nuclei approximation. In the weak-field approximation, the dependence of the ionization amplitude on the relative angles between the laser polarization and the molecular axis can be separated in terms of parallel and perpendicular geometries. The angle-integrated cross section for two- and three-photon absorption was also investigated for central photon energies from $10 - 30$ eV. We compare these results with those obtained from time-independent perturbation theory.

[1] M. Foster, J. Colgan, O. Al-Hagan, J. L. Peacher, D. H. Madison, and M. S. Pindzola, Phys. Rev. A **75** (2007) 062707.
[2] T. N. Rescigno, D. A. Horner, F. L. Yip, and C. W. McCurdy, Phys. Rev. A **72** (2005) 052709.

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