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Two-photon double-ionization of the H_2 molecule: effects of pulse duration[1] XIAOXU GUAN, KLAUS BARTSCHAT, Drake University, LARS KOESTERKE, Texas Advanced Computing Center, BARRY SCHNEIDER, National Science Foundation — In previous work [1,2], we solved the time-dependent Schrödinger equation to calculate the two-photon double ionization of the hydrogen molecule induced by non-sequential absorption of photons with a central energy of 30 eV in a short laser pulse lasting for about 1.6 femtoseconds. At the equilibrium internuclear separation, however, several doubly excited $^1\Sigma_{g,u}$ states lie about 30 eV above the ground $X\,^1\Sigma_g$ state. There is significant disagreement among various results published to date on this problem already for the angle-integrated cross section, and hence for the angular distribution as well. In the present work we address and clarify the fundamental role of those doubly excited states, which are accessible through photon absorption, on the two-photon breakup process. This can only be achieved by allowing for much longer laser pulses.

[1] X. Guan, K. Bartschat, and B. Schneider, Phys. Rev. A **82**, 041404 (2010).
[2] X. Guan, K. Bartschat, and B. Schneider, Phys. Rev. A **84**, 033403 (2011).

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