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First-principles calculation of the photon-shortage mystery in femtosecond magnetism[1] GUOPING ZHANG, Department of Physics, Indiana State University, MINGSU SI, Lanzhou University, YIHUA BAI, Indiana State University, T.F. GEORGE, University of Missouri-St. Louis — Laser-induced femtosecond magnetism needs photons to influence the magnetization in a sample, but there is a debate on whether the photon-shortage really exists [1]. Here we directly compute the number of photons used in ferromagnetic nickel, and we find that for nearly all the experiments, there are enough photons. The key is that one has to compute this number correctly using the surface instead of volume as a parameter [1,2]. Then we use the first-principles method to compute the magnetization for a fixed number of photons. Our results show that the number of photons is not a decisive factor, since for a fixed number, the laser amplitude and pulse duration can be changed systematically. We suggest that it is more appropriate to use the laser amplitude and pulse duration as two decisive parameters to characterize the role of photons, instead of the photon number. [1] M. S. Si and G. P. Zhang, J. Phys.: Cond. Matt. **22**, 076005 (2010). [2] G. P. Zhang, W. Hübner, G. Lefkidis, Y. H. Bai, and T. F. George, Nature Phys. **5**, 499 (2009).

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