Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Angular momentum conservation in light-induced spin manipulation in NiO(001) GEORG LEFKIDIS, Kaiserslautern University of Technology and Research Center OPTIMAS, Box 3049, 67653 Kaiserslautern, Germany, GUO PING ZHANG, Physics Department, Indiana State University, Terre Haute, Indiana 47809, USA, WOLFGANG HÜBNER, Kaiserslautern University of Technology and Research Center OPTIMAS, Box 3049, 67653 Kaiserslautern, Germany — We compute from first principles the strongly-correlated intragap levels of a NiO cluster and we propagate the population in time under the influence of the laser pulse [1]. In this ultrafast magnetization-dynamics scenario we demonstrate an exact microscopic spin-switch mechanism. Combining *ab initio* electronic many-body theory and quantum optics analysis we show in detail how the coherently induced material polarization leads to angular-momentum exchange between the light and the irradiated antiferromagnetic NiO (001) surface. Thus we answer the long standing question where the angular momentum goes. The calculation also predicts a dynamic Kerr-effect, which provides a signature for monitoring spin-dynamics, by simply measuring the transient rotation and ellipticity of the reflected pump beam [2].

[1] G. Lefkidis and W. Hübner, PRB **76**, 014418 (2007)
[2] G. Lefkidis, G. P. Zhang, and W. Hübner, PRL (2009, in press)

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Date submitted: 12 Nov 2009 Electronic form version 1.4