Abstract Submitted
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Excitation and doping dependence of hole-spin relaxation in bulk GaAs[1] MICHAEL KRAUSS, University of Kaiserslautern, DAVID HILTON, University of Alabama-Birmingham, HANS CHRISTIAN SCHNEIDER, University of Kaiserslautern — We present theoretical and experimental results on ultrafast hole-spin dynamics in bulk GaAs. By combining a sufficiently realistic bandstructure at the level of an 8×8 $\vec{k}\cdot\vec{p}$ theory and a dynamical treatment of the relevant scattering mechanisms [1], we obtain quantitative agreement between the microscopic theoretical results and differential transmission measurements [2] for different excitation conditions. In particular, we examine the dependence of the hole-spin relaxation time on the optically excited carrier density, lattice temperature, and doping concentration. Although the spin relaxation is rather insensitive to changes in the optically excited density and temperature, strong p-doping causes a significantly faster relaxation.

[1] M. Krauss, M. Aeschlimann, and H. C. Schneider, Phys.Rev.Lett. **100**, 256601 (2008)

[2] D. J. Hilton and C. L. Tang, Phys. Rev. Lett. **89**, 146601 (2002)

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