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Selective optical excitation of in-plane and out-of-plane spin polarizations with linearly polarized light in InGaAs[1] STEFAN GOEBBELS, FREDERIK KLEIN, PHILIPP SCHAEFERS, MARKUS HAGEDORN, KLAUS SCHMALBUCH, GERNOT GUENTHERODT, II. Physikalisches Institut, RWTH Aachen University, Germany, MIHAIL LEPSA, THOMAS SCHAEPERS, Peter Gruenberg Institut (PGI-9), Forschungszentrum Juelich GmbH, Germany, BERND BESCHOTEN, II. Physikalisches Institut, RWTH Aachen University, Germany — Excitation with circularly polarized light is a standard technique for optical spin orientation in semiconductors. This method is based on the transfer of angular momentum from the photons to the electrons and yields a polar spin polarization directed along the propagation direction of the exciting laser beam. Here we present linearly polarized all-optical pump-probe experiments to excite and detect coherent electron spins in InGaAs [1]. We find the magnitude and the orientation of the spin polarization strongly depend on the polarization axes of the exciting light. While in general the excited spin ensemble is composed of both polar and transverse spin components, the polarization axis of the exciting light can be chosen such that polar and transverse spin components can be excited separately. Thus, selective excitation of in-plane and out-of-plane spin polarizations is feasible with linearly polarized light.

[1] K. Schmalbuch *et al.*, Phys. Rev. Lett. 105, 246603 (2010)

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