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Electric field-driven coherent spin reorientation and spin rephasing of optically generated electron spin packets in InGaAs¹ SEBASTIAN KUHLEN, KLAUS SCHMALBUCH, MARKUS HAGEDORN, PAUL SCHLAMMES, MARTEN PATT, II. Physikalisches Institut, RWTH Aachen University, Germany, MIHAIL LEPSA, Peter Gruenberg Institut (PGI-9), Forschungszentrum Juelich GmbH, Germany, GERNOT GUENTHERODT, BERND BESCHOTEN, II. Physikalisches Institut, RWTH Aachen University, Germany — Full electric-field control of spin orientations is one of the key tasks in semiconductor spintronics. We demonstrate that electric field pulses can be utilized for phase-coherent 2π spin rotation of optically generated electron spin packets in InGaAs epilayers using time-resolved Faraday rotation. Through spin-orbit interaction, the electric-field pulses act as local magnetic field pulses (LMFP). By the temporal control of the LMFP, we can turn on and off electron spin precession and thereby rotate the spin direction into arbitrary orientations in a 2-dimensional plane [1]. Moreover, using two subsequent pulses of opposite polarity allows us to perform spin echo measurements by reversing the spin precession direction. Although our spin transport experiment is in the diffusive regime, we unexpectedly observe that electric field-induced spin dephasing is reversible to a large extend. [1] S. Kuhlen *et al.* arXiv 1107.4307

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