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Optical Excitation of Spins in Lightly Doped GaAs layers and Quantum Wells[1] T.A. KENNEDY, A.S. BRACKER, D. GAMMON, A. SHABAEV, AL.L. EFROS, Naval Research Lab., M. SCHEIBNER, Univ. of Wuerzburg — The transfer of a quantum state from light to localized spins in a solid is of great interest for potential applications in quantum information and optoelectronics. Here, ultrafast pump-probe experiments have been used to excite and detect spin states in n-doped GaAs layers and remotely doped wide quantum wells. Strong signals whose g-factors indicate electron spin precession were observed with 1.5 ps circularly polarized exciting pulses and linearly polarized probe pulses analyzed through Time-Resolved Kerr Rotation (TRKR). We use a simple theory for the trion in the quantum well to describe the results with resonant light. The trion recombination time and hole spin relaxation time are important parameters. However, the functional form of the data partially disagrees with the theory. Reasons for this, such as a contribution from four-wave mixing, are discussed along with explanations of the results for other wavelengths and samples.

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