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Phase Coherent Photorefractivity in ZnSe Quantum Wells SUVRANTA TRIPATHY, HANS-PETER WAGNER, HANS-PETER TRANITZ, University of Cincinnati, Cincinnati, Ohio, 45221, WOLFGANG LANGBEIN, Universitaet Dortmund, Germany — We observe an efficient phase coherent photorefractive (PCP) effect in ZnSe single quantum wells for ultra short light pulses resonant to the excitonic transition. The effect has been investigated by spectral and temperature dependent measurements in a two- and a three-beam four-wave mixing configuration. The observed PCP is attributed to the formation of an electron grating formed by the interference of coherent excitons that enables the storage of four different logic bits in a three-beam configuration. The different bits can be distinguished by the diffracted signal intensities and by their filed polarizations. The high efficiency of this PCP detectable at an average power level of a few μW makes it attractive for applications in all optical data processing. Also interesting for optical switch applications is the possibility to erase the PCP by a temporal overlap of the exciting pulses. All characteristic features of the effect are explained and reproduced by numerical calculations based on optical Bloch equations for a three-level system.

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