

**Abstract:** In this work we study ultrafast laser-induced magnetization dynamics in samples of ferromagnetic semiconductor  $\text{Ga}_{1-x}\text{Mn}_x\text{As}$  with a nominal concentration of Mn within the range of  $x = 0,015\text{--}0,14$ . To get information about magnetization movement we use magneto-optic phenomena PKE and MLD in a time-resolved *pump & probe* experiment. Thorough analysis of the measured magneto-optical signal allows us to disentangle contributions due to angular movement of magnetization and due to demagnetization and to reconstruct 3D motion of magnetization vector without any numerical modeling. First we explain the basis of this experimental method and we demonstrate its utilization on the measured data. After that we study angular movement of magnetization vector and its dependence on the external magnetic field, excitation intensity and Mn concentration. The pump pulse helicity dependent and independent dynamics were treated separately. In the case of demagnetization we have been able to observe not only its intensity and Mn doping dependence but also the magnetic field dependence, which has not been reported so far in the literature.