The pump-probe reflectivity studies of quantum wells provide important information on the dynamics of the excitonic states as well as evolution of electron and hole populations after short excitation (pump) pulse. The use of spectrally narrowed pump pulse, whose energy can be tuned in wide spectrum across the resonance, and simultaneous recording of photoluminescence excitation (PLE) spectrum, allowed us to detect that the energy shift of the heavy hole exciton depends not only on the density of the charge carriers created by the pump pulse, but also strongly depends on the kinetic energy of created excitons or electron-hole plasma. Thanks to the Giant Zeeman splitting in the Mn containing QWs we could distinguish effects of delocalization and screening.

The reflectivity spectrum of excitonic states in single quantum wells was studied using spectrally broad pulses (FWHM>20 nm) from tunable, femtosecond Ti$^{3+}$:Al$_2$O$_3$ laser. The spectrally narrowed pump pulses selected from the same laser beam with controlled delay and tunable spectral position were used to create nonequilibrium population of excitons and charge carriers and photoluminescence in PLE experiment.

Several samples with single (Cd, Mn)Te/(Cd, Mg)Te QW with different well width (from 80 Å to 140 Å) and low Mn concentration (less than 0.7%) were investigated. In most cases, the QWs contained a 2D gas of free holes whose density could be varied by changing an intensity of additional illumination from tungsten halogen lamp.

The delay between circularly polarized pump and linearly polarized probe pulses was adjusted to observe maximum changes of a heavy hole exciton. The reflectivity signal was recorded for two circular polarizations, parallel and orthogonal to the polarization of the pump (co- and cross-polarization configurations).

Under conditions described above the energy shift of the heavy hole exciton line was investigated as a function of the density of created excitons and photon energy of excitation.

For both polarization configurations we observe blue shifts of the excitonic line by resonant and nearly resonant excitation. The value of the energy shift is dependent not only on the density of created excitons but also on the photon energy of the excitation beam. For the same exciton density the blue shift was smaller when the excitation energy was higher. The smaller blue shift of hot excitons (the transition induced by the pump of higher energy) indicates delocalization of the excitons and therefore weaker interaction between them.

In case with external magnetic field applied perpendicularly to the sample the fast diminishing of the blue shift for hot excitons was observed only for co-polarization configuration. The blue shift decrease of hot excitons for cross-polarized configurations dumps with decreasing excitons density. We claim that delocalization mechanisms predominates for excitons of the same spin and for ones with orthogonal polarization we observe the effects of screening.