# SYNCHRONOUSLY PUMPED PPLN OPO FOR PUMP AND PROBE POLARISATION SPECTROSCOPY OF QUANTUM WELLS

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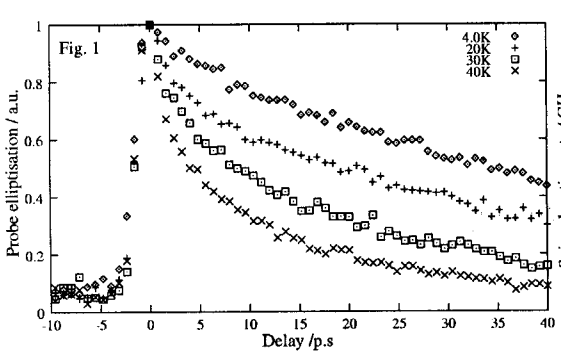
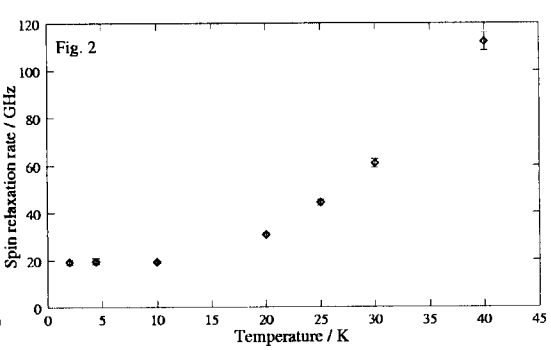
Room temperature picosecond pump-probe transmission measurements on InGaAsP/InGaAsP MQWs have shown large rotation (~40°) of probe polarisation induced by circularly polarised pump and have been proposed as a mechanism for optical switching[1]. We report low temperature investigations in a lattice matched 8nm $In_{.43}Ga_{.57}As$/InP MQW.

The picosecond source constructed for these measurements was an optical parametric oscillator pumped synchronously by a modelocked, diode pumped Nd:YLF laser. The non-linear crystal is periodically poled lithium niobate fabricated at Southampton. This all-solid-state system emits 5-ps pulses tunable from 1.3 to 6μm.

Circularly polarised pump pulses tuned to the n=1 heavy hole exciton absorption produced circular dichroism in the wells through phase space filling by spin-polarised excitons. Delayed probe pulses were linearly polarised and acquired elliptisation and/or rotation on transmission through the sample. Figure 1 shows the elliptisation signal as a function of time delay, and figure 2 the temperature dependence of the corresponding relaxation rate. The latter is consistent with the "motional narrowing" mechanism of Ref. 2; proportional to in-plane exciton kinetic energy and momentum scattering time. At higher T the decay became non exponential, with an initial fast component close to the time resolution of the system. The peak rotation of the plane of the probe polarisation in this low temperature regime is less than 1° for a pump intensity of 76 W/cm$^2$. Reasons for the contrast with Ref. 1 are not understood, especially since in both experiments phase-space-filling by excitons should play a significant role at early times.




[1] Hyland et al. Semicond. Sci.Tech **14** (1999) 215
[2] Maialle et al. Phys. Rev. B **47** (1993) 15 776