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Magnetically induced spin relaxation in InAs QDs M. YASAR, I. KHAN, T. ALI, A. PETROU, SUNY at Buffalo, Buffalo NY, G. KIOSEOGLOU, C. LI, A. HANBICKI, B. JONKER, Naval Research Laboratory, Washington D.C., M. KORKUSINSKI, Institute for Microstructural Sciences NRC, Ottawa — The circular polarization P of light emitted by Fe/InAs QDs spin LEDs has been studied as function of magnetic field $B$and temperature T. Pshows a pronounced decrease around B_o= 5 T, in the form of a resonance with a full width of $\approx$ 0.75 T with the following characteristics: (i) The resonance strength is quite sensitive to the bias voltage V. At low V the resonance is strong, but, as V is increased, it becomes progressively weaker. (ii) The resonance is pronounced at $T = 5$ K but loses strength with increasing temperature, and disappears above 60 K. The decrease in P around B_o is attributed to a spin relaxation mechanism that is induced by magnetic field. The sensitivity of the resonance to V suggests that the origin of the spin relaxation mechanism is connected to the spin-orbit interaction. By changing B we tune the energies of different electron states and thereby change the rate of spin relaxation in the system. We compare experimental results with calculations, in which many-body energies and wave functions are obtained using the effective-mass configuration-interaction approach; the spin-orbit interaction, is treated perturbatively. Work at SUNY was supported by ONR and NSF.

M. Yasar
SUNY at Buffalo, Buffalo NY

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