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Zero-field spin-splitting and spin lifetime in n-InSb/$In_{1-x}Al_xSb$ quantum wells[1] A.M. GILBERTSON, Imperial College, M. FEARN, J.H. JEFFERSON, QinetiQ Malvern, B.N. MURDIN, Surrey University, P.D. BUCKLE, QinetiQ Malvern, L.F. COHEN, Imperial College — The Rashba and Dresselhaus coupling parameters are calculated for a range of carrier densities in [001]-grown δ-doped n-type InSb/$In_{1-x}Al_xSb$ quantum wells using an established 8 band k.p formalism [1]. It is shown that both sets of parameters scale approximately linearly with carrier density. In contrast to other material systems the Dresselhaus contribution to spin splitting is found to be of significant and comparable value to the Rashba mechanism under certain conditions. The inherently large BIA induced SO coupling in these systems is shown to have considerable effect on the spin lifetime$\tau_{s[1\bar{1}0]}$for spins oriented along [1$\bar{1}$0]based on D'yakonov-Perel' mechanism [2]. The relaxation rate of spins oriented in the [001] direction is found to be dominated by the k-linear Rashba and Dresselhaus coupling parameters and at least an order of magnitude greater than in the [1$\bar{1}$0] direction [3]. Comparison to recent experimental results in similar structures is presented. [1] P. Pfeffer and W. Zawadzki, PRB **59**, 8 R5312 (1999) [2] Averkiev *et al.*, J. Phys.:Condens. Matter **14** (2002) [3] A.M.Gilbertson *et al.*, PRB **77** (16), 165335 (2008)

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