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Probing Excitonic Effects in Spin Relaxation Dynamics of Undoped InSb Multi Quantum Wells in the Mid-Infrared[1] MITHUN BHOWMICK, M. FRAZIER, G.A. KHODAPARAST, Virginia Tech, T.D. MISHIMA, M.B. SANTOS, University of Oklahoma — The recent rapid progress in the field of spintronics involves extensive measurements of spin relaxation dynamics in semiconductors. In this work, we employed polarization- resolved differential transmission measurements in the mid-infrared, to probe spin relaxation times in undoped InSb multi quantum wells(QW). InSb offers several unique characteristics such as small effective mass, large g-factor, and a strong spin-orbit coupling. In addition, InSb is the narrowest band gap material for which room temperature excitons were reported. In undoped QWs, the electron-hole pair near the band gap forms an exciton. The exciton spin can relax via spin relaxation of either hole or electron, or spin flip of both entities simultaneously. The main mechanism, which simultaneously flips the electron and hole spins, is the exchange interaction. The complex nature of the valance band and the strong non-parabolicity in InSb can result in a short range exchange interaction in which the light hole and heavy hole mixing can flip the exciton spin. The goal of our studies is to understand and identify spin relaxation mechanisms close to several excitonic transitions.

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