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Determination of Rashba and Dresslhaus coefficient in InGaAs quantum wells[1] SÉBASTIEN FANIEL, Université catholique de Louvain, TORU MATSUURA, Hokkaido University, SHUNSUKE MINESHIGE, GSIST, Hokkaido University, YOSHIAKI SEKINE, NTT BRL, NTT Corp, TAKAAKI KOGA, GSIST, Hokkaido University — We report the determination of the intrinsic spin-orbit interaction (SOI) parameters for $In_{0.53}Ga_{0.47}As/In_{0.52}Al_{0.48}As$ quantum wells (QWs) from the analysis of the weak antilocalization effect measured at dilution temperature [1]. We found that the Dresselhaus SOI is mostly negligible relative to the Rashba SOI in this system. The intrinsic parameter for the Rashba effect, $a_{SO} \equiv \alpha/\langle E_z \rangle$, is determined to be $a_{SO} m^*/m_e = (1.46 - 1.51 \times 10^{-17} N_S\ [m^{-2}])\ e\text{Å}^2$, where α is the Rashba SOI coefficient, $\langle E_z \rangle$ is the expected electric field within the QW, m^*/m_e is the electron effective mass ratio, and N_S is the sheet carrier density. The N_S dependence of a_{SO} corrsponds to the non-parabolic correction in the effective mass or electron g-factor. These values for $a_{SO} m^*$, which are in good agreement with the thoretical prediction by Kane's $\mathbf{k} \cdot \mathbf{p}$ theory, were also confirmed by the observation of beatings in the Shubnikov-de Haas oscillations in our most asymmetric QW sample.

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Takaaki Koga
koga@ist.hokudai.ac.jp
Hokkaido University

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