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Electron spin splitting effect in AlSb/InAs/AlSb quantm wells
MINU KIM, TAKAAKI KOGA, Faculty of Engineering and Graduate School of Information Science and Technology, Creative Research Initiative Sousei, Hokkaido Univ., Japan, KEITA OHTANI, YUZO OHNO, HIDEO OHNO, Research Institute of Electrical Communication, Tohoku Univ., Japan — We investigated the electron spin splitting effect in AlSb/InAs/AlSb quantum wells (QW) both experimentally and theoretically. Our experiment was performed on MBE-grown high quality AlSb/InAs/AlSb QW samples whose potential symmetry was controlled by intentional/unintentional dopings near the QW layer, where we didn't observe the beating pattern in the Shubnikov de Haas (SdH) oscillations experimentally. Although the presence of the beating pattern in the SdH oscillations can be considered as a side-evidence of the zero-field spin splitting in the pertinent 2DEG (two dimensional electron gas), the absence of it does *not* necessarily support the *absence of the zero-field spin splitting*. Our theoretical analysis including all the Rashba, Dresselhaus and Zeeman spin-splitting Hamiltonians revealed that the absence of the SdH beating is not inconsistent with the presence of the zero-field spin splitting in our specific samples. Considering the fact that SdH oscillations itself are not visible below 1T in our experiment, the magnitude of the zero-field spin splitting energy can be as large as 1 meV according to our theoretical treatment.

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