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Current bias and temperature effect on the Shubnikov de Haas oscillations in high mobility GaAs/AlGaAs system CHATHURANGA MUNASINGHE, RASANGA SAMARAWEERA, BINUKA GUNAWARDANA, ZHUO WANG, Georgia State University, CHRISTIAN REICHL, WERNER WEGSCHEIDER, ETH-Zurich, RAMESH MANI, Georgia State University — The study of the temperature dependence of Shubnikov de Haas (SdH) oscillations in two dimensional systems serves to investigate electronic properties such as, for example, the carrier effective mass. This study was conducted to determine carrier heating induced by the current bias utilized in typical magnetotransport measurements of the high mobility GaAs/AlGaAs two dimensional electron gas system. Carrier heating due to the current bias is investigated by comparing the observed variation in the amplitude of the SdH oscillations as a function of the current, with the SdH lineshape observed at a vanishing current bias at various temperatures over the temperature range $1.6 \leq T \leq 4.2$K, with the specimen immersed in pumped liquid helium. Thus, carrier heating due to the current bias is determined by quantitatively matching the large current SdH lineshape at base temperature with the vanishing current SdH lineshape at an elevated temperature. For this purpose, lineshape fits of the SdH oscillations to the standard Lifshitz-Kosevich theory have been carried out. The results of the study will be presented here.

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