Frequency-dependence of the linear-polarization-angle phase-shift in the microwave radiation-induced magneto-resistance oscillations

HAN-CHUN LIU, RASANGA SAMARAWEERA, Georgia State Univ, WERNER WEGSCHEIDER, ETH-Zurich, Zurich, Switzerland, RAMESH MANI, Georgia State Univ — High-mobility GaAs/AlGaAs heterojunctions subjected to microwave photoexcitation in the perpendicular magnetic field configuration exhibit -cycle phase-shifted oscillatory magneto-resistance and zero-resistance states at low magnetic fields or high filling factors [1]. Recent studies showed that the amplitude of oscillatory magneto-resistance is polarization-angle sensitive and can be described by a fitting formula, \( R_{xx}(\theta) = A \cos(2(\theta - \theta_0)) \) with diagonal resistance, \( R_{xx} \), polarization angle \( \theta \), and the extracted phase shift, \( \theta_0 \). Previous works have demonstrated that \( \theta_0 \) is frequency-dependent by investigating some specific frequencies [2,3]. Here, we examine the continuous variation of \( \theta_0 \) with frequency over the bands, 36-40 GHz and 45-49 GHz. Surprisingly, the results indicate dissimilar \( \theta_0 \) variation within the two frequency bands. A comparison of \( \theta_0(f) \) with the microwave polarization reported by an in-situ polarization sensor suggests that the frequency variation of \( \theta_0 \) might be caused by two different mechanisms in the two examined bands. [1] R. G. Mani et al., Nature 420, 646 (2002). [2] A. N. Ramanayaka et al., Phys. Rev. B 85, 205315 (2012). [3] Han-Chun Liu et al., J. Appl. Phys. 117, 064306 (2015)

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