Abstract Submitted
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Determination of the Dresselhaus spin-orbit interaction in a (110)-oriented GaAs quantum well[1] YUANSEN CHEN, IBM Research - Zurich, STEFAN FAELT, WERNER WEGSCHEIDER, Solid State Physics Laboratory, ETH Zurich, GIAN SALIS, IBM Research - Zurich — The Dresselhaus spin-orbit (SO) interaction is studied in a (110)-oriented and symmetrically doped GaAs quantum well (QW) by means of time-resolved Kerr rotation with a magnetic field applied along an oblique angle. The nonzero averaged SO field is obtained by introducing a DC current through the QW to shift the Fermi circle of the electron gas. By monitoring the change of the electron Larmor precession frequency induced by the current, we can determine both the magnitude and the direction of the Dresselhaus SO field. In agreement with the theoretical expectation, we find the SO field to be out-of-plane and to linearly increase with a current applied along the $[1\bar{1}0]$ direction. A negligible SO field is observed for a current along the [001] direction. The vector sum of the SO field and the in-plane component of an external magnetic field leads to an observable tilting of the spin precession axis. The unidirectional SO field is expected to support a persistent spin helix state in the QW.

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