Abstract Submitted
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Spin precession and spin waves in a chiral electron gas: beyond Larmors theorem[1] SHAHRZAD KARIMI, University of Missouri, FLORENT BABOUX, Laboratoire Materiaux et Phenomenes Quantiques, Universite Paris Diderot, CNRS-UMR, FLORENT PEREZ, Institut des Nanosciences de Paris, CNRS/Universite Paris VI, G. KARCZEWSKI, T. WOJTOWICZ, Institute of Physics, Polish Academy of Sciences, CARSTEN ULLRICH, University of Missouri — Larmor's theorem holds for magnetic systems that are invariant under spin rotation. In the presence of spin-orbit coupling this invariance is lost and Larmor's theorem is broken: for systems of interacting electrons, this gives rise to a subtle interplay between the spin-orbit coupling acting on individual single-particle states and Coulomb many-body effects. We consider a quasi-two-dimensional, partially spin-polarized electron gas in a semiconductor quantum well in the presence of Rashba and Dresselhaus spin-orbit coupling. Using a linear-response approach based on time-dependent density-functional theory, we calculate the dispersions of spin-flip waves. We obtain analytic results for small wavevectors and up to second order in the Rashba and Dresselhaus coupling strengths α and β. Comparison with experimental data from inelastic light scattering allows us to extract α and β as well as the spin-wave stiffness very accurately. We find significant deviations from the local density approximation for spin-dependent electron systems.

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