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Gilbert damping and spin Coulomb drag in a magnetized electron liquid with spin-orbit interaction.[1] EWELINA HANKIEWICZ, GIOVANNI VIGNALE, University of Missouri-Columbia, YAROSLAV TSERKOVNYAK, University of California, Los Angeles — We present a microscopic calculation of the Gilbert damping constant for the magnetization of a two-dimensional spin- polarized electron liquid in the presence of intrinsic spin- orbit interaction. First we show that the Gilbert constant can be expressed in terms of the auto-correlation function of the spin-orbit induced torque. Then we specialize to the case of the Rashba spin-orbit interaction and we show that the Gilbert constant in this model is related to the spin-channel conductivity. This allows us to study the Gilbert damping constant in different physical regimes, characterized by different orderings of the relevant energy scales – spin-orbit coupling, Zeeman coupling, disorder, $e-e$ interaction, spin precession frequency – and to discuss its behavior in various limits. Particular attention is paid to interaction effects, which enter the spin conductivity via the spin Coulomb drag coefficient.

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