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Spin relaxations in 2D electron gas determined by the memory in the carrier dynamics.[1] EUGENE SHERMAN, University of Toronto, St. George Street 60, Toronto, MIKHAIL GLAZOV, Ioffe Physico-Technical Institute RAS, St-Petersburg, Russia — The effects of long memory, in carrier dynamics in a magnetic field, on spin polarization evolution in 2D electron gas are investigated qualitatively and quantitatively. As examples we consider (i) systems with random Rashba-type SO coupling and (ii) quantum wells with rigid short-range scatterers (antidotes) and regular Dresselhaus SO coupling. In both cases the spin dynamics is strongly non-Markovian. In the system with the random SO coupling the time dependence of the spin polarization shows Gaussian rather than exponential behavior with the cusps corresponding to the electron revolutions. The relaxation speeds up with the increase of the magnetic field. In the system with antidotes scattering, the spin polarization shows a long-tail behavior with the relaxation rate determined by inelastic electron-phonon and electron-electron collisions and demonstrates unusual field dependence.

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