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Spin susceptibility of a 2D gas with Rashba spin-orbit in the HF approximation GABRIELE GIULIANI, STEFANO CHESI, Department of Physics, Purdue University — The in plane and out of plane spin susceptibility $\chi_S^{\parallel(\perp)}(r_s, \bar{\alpha})$ in a two dimensional electron gas with Rashba spin-orbit is studied within the Hartree-Fock approximation in both the static ($\omega \to 0$ first then $q \to 0$) and adiabatic ($q \to 0$ first then $\omega \to 0$) limits. The latter is related to what is commonly referred to as the spin-Hall conductivity. The behavior of $\chi_S^{\parallel(\perp)}(r_s, \bar{\alpha})$ as a function of the density parameter r_s and the spin-orbit coupling strength $\bar{\alpha}$ has been explored. At variance with a recent perturbative analysis, we find that, as one would expect, the exchange interaction tends to increase $\chi_S^{\parallel(\perp)}(r_s, \bar{\alpha})$ over its non interacting value. The interplay between the differential instability of the paramagnetic chiral state as signaled by the divergence of $\chi_S^{\parallel(\perp)}(r_s, \bar{\alpha})$ and the (first order) spin polarization transition to a spin-textured chiral state will be discussed.

Gabriele Giuliani
Department of Physics, Purdue University

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