Novel interaction-induced magneto-oscillations in ac conductivity of 2D electron gas

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MIKHAIL RAIKH, University of Utah — We demonstrate that electron-electron interactions in a high-mobility 2D electron gas give rise to the oscillatory correction, \( \delta \sigma^{\text{int}}(\omega) \), to the ac magnetoconductivity, \( \sigma(\omega) \). Similarly to the conventional single-particle harmonics of the cyclotron resonance, the oscillating correction is periodic in \( \omega_c^{-1} \), where \( \omega_c \) is the cyclotron frequency. However, unlike the single-particle oscillations, which are periodic with \( \omega \), the interaction correction is periodic with \( \omega^{3/2} \). Oscillatory behavior of the interaction-induced magnetoconductivity develops at very low magnetic fields, \( \omega_c \ll \omega \); at such fields the conventional harmonics are suppressed by the disorder. The underlying physical process of the new effect is double backscattering of an electron from the impurity-induced Friedel oscillations. Unlike the case of single-particle oscillations, the electron travels only a small portion of the Larmour circle during the time \( \sim \omega^{-1} \) between the two backscattering events.

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