Microwave polarization dependence of magnetoresistance oscillations of 2DES

Jesus Inarrea

Escuela Politécnica Superior, Universidad Carlos III, Leganes, Madrid, Spain

We solve analytically the time dependent Schrodinger equation of a two-dimensional quantum oscillator subjected to a time-varying force. As a direct application, we analyzed a two-dimensional electron system under a static and uniform magnetic field and microwave radiation. The obtained formalism is applied to the case of linearly polarized microwave induced resistance oscillations measured in a two-dimensional electron gas. We use the obtained formalism to study the role of the polarization angle on the radiation-induced magnetoresistance. We consider different regimes, from the radiation electric field parallel to the current (0^0) to perpendicular to it (90^0). We obtain, in agreement with recently measured experimental results [1], that magnetoresistance (R_{xx}) is sensitive to the orientation of the radiation electric field and that it is damped from the parallel to the current configuration to perpendicular to it (see Fig. 1). This is in clear contradiction with previous experimental and theoretical evidence. Here we present a novel theoretical approach based in the sample quality and shape, trying to reconcile both scenarios.

[1] A. N. Ramanayaka et al., Phys. Rev. B, 85, 205315 (2012).

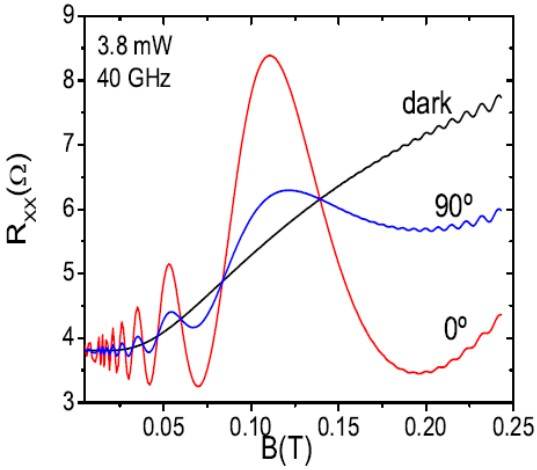

Figure 1