Magnetoresistance oscillations in a modulated 2DEG periodic in the ratio h/e to flux per unit cell

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Transport properties of the 2DEG are studied in the presence of a normal magnetic field B and of a *weak*, two-dimensional *periodic* potential modulation. A tight-binding treatment has shown that each Landau level splits into several subbands with exponentially small gaps between them. Assuming the latter are closed due to disorder gives analytical wave functions and simplifies the evaluation of the magnetoresistance tensor $\rho_{\mu\nu}$. The relative phase of the oscillations in ρ_{xx} and ρ_{yy} depends on the modulation strengths and periods. For **short** periods ≤ 100 nm, in addition to the Weiss oscillations, the collisional contribution to the conductivity and the corresponding resistivity contribution show *prominent peaks when one flux quantum h/e passes through an integral number of unit cells* in good agreement with experiments. For periods $300-400$ nm long used in early experiments, these peaks occur at fields $10-25$ times smaller than those of the Weiss oscillations and are not resolved.