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Effective Hamiltonian Approach for the Magnetic Band Structure and Novel Oscillations in the Magnetization MANFRED TAUT, Leibniz Institute for Solid State and Materials Research, Dresden, Germany — The one-electron Schroedinger equation in a 2D periodic effective potential and an homogeneous magnetic field B has been solved numerically in the framework of magnetic band structure theory. Alternatively,the spectrum around a given rational flux quantum number p0/q0 can also been obtained by semi-classical quantization of the exact magnetic band structure (MBS) at p0/q0. To implement the latter procedure, a generalized effective Hamiltonian theory based on the MBS at finite magnetic fields has been established. The total energy has been calculated numerically as a function of magnetic field B and of band filling. The magnetization M is the derivative of the total energy with irespect to the magnetic field. The total energy as a function of B shows series of kinks, which produce series of oscillations in the magnetization. One of these series, the de Haas-van Alphen oscillation, contains information about the (zero magnetic field) band structure. The other series provide the corresponding information about certain MBSs. In order to obtain the information about the MBS at field B0, we have to plot the magnetization as a function of 1/(B-B0). The asymptotic period of the oscillations in M(1/(B-B0)) provides the Fermi surface cross sections for the MBS at B0.

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