Second order corrections to the semiclassical model of solids and a formula for magnetic susceptibility

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Abstract: In the physics literature, second order corrections to the semiclassical model in perturbed periodic crystals were proposed in order to derive formulas e.g. for the orbital magnetic susceptibility of a gas of non-interacting fermions in a crystal.

I will explain in which sense one can associate uniquely a classical Hamiltonian system, including second order corrections with such a system, and show that indeed the orbital magnetic susceptibility at zero temperature can be exactly computed from this classical system. This is not true at non-zero temperature and I will also show how the approach needs to be modified.

This is joint work with Wolfgang Gaim.