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Generalized susceptibilities for a perfect quantum gas

Abstract: The system we consider here is a charged fermions gas in the effective mass approximation, and in grand-canonical conditions. We assume that the particles are confined in a three dimensional cubic box Λ with side $L \geq 1$, and subjected to a constant magnetic field of intensity $B \geq 0$. Define the grand canonical generalized susceptibilities χ_L^N, $N \geq 1$, as successive partial derivatives with respect to B of the grand canonical pressure P_L. Denote by P_∞ the thermodynamic limit of P_L. Our main result is that χ_L^N admit as thermodynamic limit the corresponding partial derivatives with respect to B of P_∞. In this paper we only give the main steps of the proofs, technical details will be given elsewhere.