Abstract:

A cold electron gas fills the lowest Landau level for superstrong magnetic fields and very low densities. In such cases, in general, the potential energy of the particles is equal to or greater than their kinetic energy (strongly coupled plasmas), and a special approach is called for. The STLS (Singwi, Tosi, Land, and Sjolander) approximation scheme is used to study the dispersion and damping of the low-frequency modes, i.e., the whistler and the extraordinary modes for zero temperature. The lowest order dispersion for all modes in consideration are unaffected by correlations, but for undamped plasmas the correlation term is of the orderγa 2 c −2. Further,δ(ω 2) for the whistler mode becomes infinite atγ=3; its behavior critically depends on the "filling number"η Fc =ε F/ħΩ, whereε F is the Fermi energy and Ω is the electron cyclotron frequency.