

Title: Streaming Instability with Exchange Field in bounded Quantum Dusty Plasma

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Abstract

The behaviour of electrostatic wave is studied in bounded quantum dusty plasmas. The plasma system is containing electrons, ions and uniformly charged dust species with streaming electrons and ions. The Quantum Hydrodynamic Model (QHD) is solved including equation of motion consisting of quantum effects due to Fermi degenerate, and Bohm potential, equation of continuity. The Poisson's equation results the solution of zero order Bessel function. Afterwards, we get linear dispersion relation for plasma waves propagating in a cylindrical wave-guide filled by dense plasma consisting of electrons, ions and charged dust particles. It is seen that finite boundary effects and streaming velocity of electrons and ions give one of possible mode of propagation which are unstable linearly. The frequency-shift induced by electron exchange-correlation effect, the radius of the wave guide and quantum correction is observed. It is found that the influence of the electron exchange-correlation, the radius of wave-guide and quantum correction on the wave modes in bounded nano-waveguide is strongly coupled. It is noted that the exchange-correlation field turn to the same order of Fermi degenerate. The growth rate of such instability is seen to depend significantly on different plasma parameters.