# APPLICATIONS OF THE THEORY OF THE DIELECTRIC FUNCTION FOR DENSE PLASMA

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Within a linear response theory, a systematic approach to the calculation of the dielectric function of Coulomb systems is given which allows a consistent treatment of optical and electrical properties [1]. The perturbative treatment of the dynamical collision frequency leads to a generalized Drude formula with a complex and frequency dependent collision frequency. Different effects such as dynamical screening, strong collisions and renormalization are consistently taken into account. Various applications of our approach to the dielectric function are given.

The investigation of the inverse bremsstrahlung of hot, weakly coupled plasma leads to a better understanding of earlier approximations and their region of validity [2].

The dynamic structure factor for a two-component model plasma is related to the non-local dielectric function. Results for the long-wavelength limit are extended to arbitrary wave numbers using the Mermin ansatz. Good agreement with molecular dynamics simulations is observed for weakly coupled plasma [3].

The reflectivity of Xenon plasma is calculated and compared with experimental results and molecular dynamic simulations. It was shown that the consideration of a finite width of the plasma producing shock wave front seems to be crucial [4].

An interesting quantity related to the dielectric function is the stopping power of heavy ions in plasma. Our approach will be compared with well established approximations.

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