

Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Fano-like resonances in strongly coupled binary Coulomb systems

LUCIANO SILVESTRI, GABOR J. KALMAN, Boston College, ZOLTÁN DONKÓ, PETER HARTMANN, Wigner Research Centre for Physics, Hungarian Academy of Sciences, HANNO KÄHLERT, Institute for theoretical physics and astrophysics, Kiel, Germany — Molecular Dynamics (MD) simulation of a strongly coupled binary ionic mixture has revealed the presence of a sharp minimum of several orders of magnitude in the dynamical density (current) fluctuation spectrum of the system. This phenomenon is reminiscent of the well-known Fano anti-resonance observed in various physical systems. The Fano resonance effect can be understood on the basis of a classical model as a feature of the response function of a multi-resonant system, and therefore it is a phenomenon that should occur in classical systems as well. What, however, is not widely recognized is that there must be a corollary to this phenomenon as demanded by the Fluctuation Dissipation Theorem: the equilibrium fluctuation spectrum of a strongly coupled system has to display a similar spectral feature. We present a theoretical description based on the Quasi Localized Charge Approximation, reformulated to include collisional effects, in order to explain the simulation results. The essence of the phenomenon is that the minimum is due to the interference between the two damped plasmon modes of a binary system. The validity of the theoretical model has been verified by further MD simulations and an excellent agreement between theory and observation has been demonstrated.

Luciano Silvestri
Boston College

Date submitted: 11 Jul 2014

Electronic form version 1.4