

Rutgers University
Hill Center - Room 705

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On the Long-Time Evolution of Spatially Homogeneous Gaussian Vlasov Fluctuation Fields

Abstract

I will present some work in progress about solutions to the Braun-Hepp equations for the dynamics of fluctuations around the Vlasov limit, for systems of particles with long range (but regularized) potentials. I will consider the case of an infinitely-extended neutral plasma in which the solution to the Vlasov equation is simply a spatially uniform field-free Vlasov equilibrium. In this case the Braun-Hepp equations are formally equivalent to a linear Vlasov equation. However, existing results about time-decay of solutions to this type of equation are based on smoothness assumptions that are not satisfied by the fluctuations. In the Gaussian case, I show by direct calculation and by applying a Tauberian result that the covariance of the “electric” field converges to a finite value as time goes to infinity. This implies that the random electric field produced by the fluctuations converges in law to a time-asymptotic random field. Such field is important from the standpoint of kinetic theory because, as I showed elsewhere, it leads (at least formally) to a very simple derivation of the Balescu-Lenard-Guernsey collision kernel for a classical, unmagnetized plasma.