

Maxime Herda (UPMC) - Massless electron limit of the magnetized Vlasov-Poisson-Fokker-Planck equation

vendredi 20 octobre 2017 14:00 (40 minutes)

In this talk, I will present results obtained in collaboration with L. Miguel Rodrigues. We consider a plasma of electrons in an inhomogeneous background of ions. We are interested in the dynamics of the light particles which is modeled by the Vlasov-Poisson-Fokker-Planck equation. In the appropriate scaling where characteristic time scales are those of the ions, an important dimensionless parameter appears, the mass ratio between an electron and an ion.

Our focus is on deriving an asymptotic model when the mass ratio tends to 0. In this regime, strong anisotropic phenomena occurs; while adiabatic equilibrium along magnetic field lines is asymptotically reached our limit model captures a non trivial guiding-center dynamics in the perpendicular directions. We do check that in any case the obtained asymptotic model defines a well-posed dynamical system and when self consistent electric fields are neglected we provide a rigorous mathematical justification of the formally derived systems. In this last step we provide a complete control on solutions by developing anisotropic hypocoercive estimates.