On a self consistent Vlasov-Fokker-Planck equation with general interactions

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The self consistent Vlasov-Fokker-Planck equation models a large system of particles which is subject to external confinement, long-range interactions between particles, and thermalization mechanisms. Motivated by applications in particle accelerator physics, we consider interaction potentials which may be singular and non-symmetric with respect to the relative position of the particles. Under suitable assumptions, including in particular Poisson (Coulomb) interactions.

We prove existence, uniqueness and stability of steady states. The rate of convergence towards the steady state is quantitative and improves former results. This presentation is based on a joint work with Maxime Herda (Centre Inria de l'Université de Lille).