1st lesson

Dynamics and Statistical mechanics of Hamiltonian many body systems with long-range interactions: The Equilibrium case

I will review the importance of long-range interactions in many body systems focusing on Hamiltonian ones. In particular I will discuss the equilibrium properties of the Hamiltonian Mean Field model and the connections between dynamics and thermodynamics [1].

[1]T. Dauxois, V. Latora, A. Rapisarda, S. Ruffo and A. Torcini, Chapter of the volume:
   ``Dynamics and Thermodynamics of Systems with Long Range Interactions",
   T. Dauxois, S. Ruffo, E. Arimondo, M. Wilkens Eds.,
   "The Hamiltonian Mean Field Model: from Dynamics to Statistical Mechanics and backî,
   Lecture Notes in Physics Vol. 602, Springer (2002), [cond-mat/0208456].

2nd lesson

Dynamics and Statistical mechanics of Hamiltonian many body systems with long-range interactions: The out-of-Equilibrium case

I will discuss the anomalous and metastable dynamics of out-of-equilibrium long-range systems, discussing in particular the Hamiltonian Mean Field model. Generalization of this models and other examples will be also addressed. A possible interpretation in terms of Tsallis q-statistics and glassy dynamics will be discussed [1,2].

[1]A. Rapisarda and A. Pluchino,
   "Nonextensive thermodynamics and Glassy behaviour in Hamiltonian systems",
   Europhysics News 36 (2005) 202.
[2]A. Pluchino,A. Rapisarda,
   "Metastability in the Hamiltonian Mean Field model and Kuramoto model"
   PHYSICA A 365 (2006) 184