Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Novel dynamics and thermodynamics of a new Hamiltonian mean field model[1] SERGIO CURILEF, BORIS ATENAS, Universidad Catlica del Norte — Statistical systems are idealized by the hypothesis that the particles do not interact among them, or the range of interactions is short enough, reaching very fast the statistical state that we know as equilibrium. However, systems with long-range interactions are common in nature because of they are observed from the atomic scale to the astronomical scale, exhibiting some anomalies as inequivalence of ensembles, negative heat capacity, ergodicity breaking, non equilibrium phase transitions, quasi-stationarity, anomalous diffusion, etc. We present in this contribution a new Hamiltonian mean field model whose potential is inspired in the dipole-dipole interactions. The equilibrium is analytically studied in the canonical ensemble and coincides with the one obtained from molecular dynamics simulations (microcanonical ensemble). We notice, this model presents a kind of inequivalence of ensembles in long-standing states before arriving at equilibrium. However, the novelty, compared to other models presented in recent literature, is that two quasi-stationary states appear in the behavior of this system. The first quasi-stationary state decays to a second one, which is different to the first, before going to the equilibrium.We characterize them by its dynamics and thermodynamics.

[1]We acknowledge partial financial support by Anillo ACT-1204, VRIDT-UCN105/2015. We appreciate the computational assistance of A. Pluchino.

Sergio Curilef
Sociedad Chilena de Fsica

Date submitted: 06 Nov 2015 Electronic form version 1.4