

Contribution Title: ON THE APPROACH TO EQUILIBRIUM AND MIXING  
PROPERTIES IN FERMI-PASTA-ULAM MODELS  
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YRS seminar: NO

The well-known numerical experiment of Fermi-Pasta-Ulam (FPU) was conceived in order to study the approach to equilibrium. Starting from a zero-measure class of initial data they showed a lack of equipartition of energy among linear normal modes, raising the issue of relaxation times.

At variance with the original case of FPU, we investigate the approach to equilibrium considering sets of initial data of full measure, sampled out from the microcanonical ensemble by standard Monte Carlo techniques. We give numerical evidences that the system does not have the mixing property on finite time at low energy. Mixing is tested by looking at the decay of the autocorrelations of the mode energies.

We will discuss the results obtained in [CGGP], which show a partial decay of the autocorrelation to a nontrivial profile as a function of the mode number; such profile scales with the specific energy of the system and seems to survive in the thermodynamic limit. We will also present some recent progress on the role of the special form of nonlinearity ( $\alpha$ -model vs  $\beta$ -model) in these phenomena.

[CGGP] A. Carati, L. Galgani, A. Giorgilli, S. Paleari: Fermi-Pasta-Ulam phenomenon for generic initial data; PHYSICAL REVIEW E 76, 022104 2007