Abstract for GR-TR Conference on Statistical Mechanics and Dynamical Systems

Plenary Invited | Invited Talk

Absence of Energy Diffusion in Nonlinear Random Systems with linear Anderson Localization

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We study the spreading of an initially localized wavepacket in two nonlinear random 1D systems (random DNLS and quartic random KG models) [1]. We observe numerically similar behaviors in both models. The second moment seems to diverge as a function of time but the participation number of the energy (or norm) distribution of any initially localized wavepacket remains bounded at all time. We provide a straitghtforward rigorous proof that the participation number remains bounded for the random DNLS model and initial wave packets with large enough amplitude. Then a limit profile for the energy (or norm) distribution should exist in all cases (whatever is the second moment behavior diverging or non diverging) which forbids the possibility of slow energy diffusion (subdiffusion) where the amplitude of the wavepacket vanishes at infinite time. Numerical indications suggest that this limit profile could be an almost periodic solution (corresponding to infinite dimension KAM torus) though numerical convergence is extremely slow likely due to Arnol'd diffusion effect (note that recently a rigororous proof for the existence of quasiperiodic solutions (finite dimension invariant tori) in random DNLS models has been provided by Bourgain and Wang [2]). We shall present new empirical arguments supporting the above conjectures.

[1] G. Kopidakis, S. Komineas,S. Flach and S. Aubry *Phys. Rev. Lett.* **100** 084103 (2008).

[2] J. Bourgain and W.-M. Wang *J. Eur. Math. Soc.* **10** 1 (2008).