

Title:

Probabilistic scaling, propagation of randomness and invariant Gibbs measures

Abstract:

In this talk, we will start by describing how classical tools from probability offer a robust framework to understand the dynamics of waves via appropriate ensembles on phase space rather than particular microscopic dynamical trajectories. We will continue by explaining the fundamental shift in paradigm that arises from the “correct” scaling in this context and how it opened the door to unveil the random structures of nonlinear waves that live on high frequencies and fine scales as they propagate. We will then discuss how these ideas broke the logjam in the study of the Gibbs measures associated to nonlinear Schrödinger equations in the context of equilibrium statistical mechanics and of the hyperbolic Φ_3^4 model in the context of constructive quantum field theory.

We will end with some open challenges about the long-time propagation of randomness and out-of-equilibrium dynamics.